



FOSTERING FURTHER PARTICIPATION IN AGRI-FOOD BUSINESS  
GLOBAL VALUE CHAINS: A MULTIPLE CASE-STUDY ON  
INTERMEDIARY ROLES AND CAPABILITIES IN THE PHILIPPINE RICE  
AND MANGO INDUSTRIES

A Dissertation

Submitted to the National Graduate Institute for Policy Studies (GRIPS)

in Partial Fulfillment of the Requirements for the Degree of

Ph.D. in Public Policy

by

Kevin Christopher L. Go

June 2022



## **Abstract**

For developing countries to maximize gains and tackle poverty alleviation from integration into agri-food business Global Value Chains (GVC), it is necessary to explore the mechanisms through which innovation intermediary organizations act as a conduit that aid local producers and micro, small, and medium enterprises in participating, upgrading, and innovating in their respective value chains. Innovation intermediaries support producers and firms by performing roles that promote knowledge transfer, technology diffusion, and organizational collaboration. These intermediaries are also more successful as they build their key-capabilities. However, a gap remains in understanding how intermediaries perform their roles and build their key-capabilities as innovation systems and GVCs co-evolve. To address this, we conduct a multiple case-study on intermediary organizations in the Philippine rice and mango industries. 18 organizations participated in the study, and data was gathered from 42 interviews, two focus group discussions, and secondary desk research. In building the cases, we assess how their roles and key-capabilities are affected by organization type differences, value chain support and participation, and primary market orientation variations. The rice and mango industries represent the domestic and export market-oriented approaches. We provide several critical theoretical contributions: integration of innovation intermediation to the innovation system and GVC co-evolutionary relationship through the application of the three pertinent variables; performance delineations between public and private sector intermediaries; and a proposed framework to assess various dimensions of innovation intermediation in value chains more efficiently and thoroughly. In addition to these, implications for policy and management are provided based on the study's findings.

## **Acknowledgements**

I want to extend my sincerest and most profound appreciation and gratitude to my mentor and adviser, Prof. Patarapong Intarakumnerd, who has unwaveringly supported my academic journey at and beyond GRIPS. I am also grateful to my committee members, professors, and GRIPS staff, who have taught and supported my growth, development, and life in Japan, most especially Prof. Jonna Estudillo, Prof. Michiko Iizuka, Prof. Matthew Brummer, Prof. Jun Suzuki, Prof. Takayuki Hayashi, Prof. Tateo Arimoto, Prof. Koichi Sumikura, Ms. Nami Maeda, Ms. Yuuko Uemura, and Ms. Aya Ito.

I express my deep gratitude to the Asian Development Bank for the opportunity to pursue my degrees at GRIPS. Furthermore, I am thankful to all who offered their support and participation in my research: the farmers, growers, firms, organization representatives, researchers, and public officials and staff, especially Mayor Lenj Paulino.

I also want to thank Dr. Leland Dela Cruz, Dr. Jayeel Cornelio, and the Office for Social Concern and Involvement of the Ateneo de Manila University for their encouragement and support in pursuing this endeavor.

My appreciation also goes to my classmates and friends at GRIPS, Japan, and the Philippines, who made the five-year adventure an unforgettable experience, especially Teoxon, Paula, Elroy, Rene, King, Joi, Kev, Lyndon, Ata, Adet, Vanna, Aba, Jay, Laarni, Cherry, Len, Bass, Neil, Kris, Kat, Teya, Raffy, William, Amanda, Tiwi, Jarud, Daniel, Kate, Tung, Michael, Yoko, Ate Jenny, Kyoko, Bayra, and AFSJ. I am also grateful to the Tarriela and Rodriguez families for their help, encouragement, and support.

My tremendous heartfelt appreciation goes to Pam and Lucy for giving me the encouragement and inspiration I needed at the tail end of and in continuing my journey.

I am most grateful to my family, especially Mommy, Papa, Kim, and Karen, for their unceasing encouragement, faith, and support throughout my life.

Finally, I am grateful to God for making all these possible.

*“We need to make the most of the time we have –  
to live our lives the way we want to live.  
Every minute, every moment, matters.”*  
– Aerith Gainsborough  
(*Final Fantasy VII Remake*)

## Table of Contents

<b>Abstract .....</b>	<b>i</b>
<b>Acknowledgements .....</b>	<b>ii</b>
<b>Table of Contents.....</b>	<b>iv</b>
<b>List of Figures .....</b>	<b>viii</b>
<b>List of Tables .....</b>	<b>ix</b>
<b>List of Appendices .....</b>	<b>xiii</b>
<b>List of Abbreviations .....</b>	<b>xiv</b>
<b>CHAPTER I .....</b>	<b>1</b>
<b>INTRODUCTION .....</b>	<b>1</b>
<b>Section 1.1 Introduction .....</b>	<b>1</b>
<b>Section 1.2 Statement of the Problem .....</b>	<b>5</b>
<b>Section 1.3 Research Contribution .....</b>	<b>7</b>
<b>Section 1.4 Research Objective .....</b>	<b>8</b>
<b>Section 1.5 Scope of the study .....</b>	<b>8</b>
<b>Section 1.6 Operationalization of Key Concepts .....</b>	<b>10</b>
<b>Section 1.7 Structure of the Dissertation .....</b>	<b>11</b>
<b>CHAPTER II.....</b>	<b>14</b>
<b>REVIEW OF RELATED LITERATURE .....</b>	<b>14</b>
<b>Section 2.1 Introduction .....</b>	<b>14</b>
<b>Section 2.2 Global Value Chains.....</b>	<b>15</b>
2.2.1 Governance.....	19
2.2.2 Upgrading.....	22
<b>Section 2.3 Innovation Systems.....</b>	<b>25</b>
<b>Section 2.4 The Co-evolutionary Relationship of GVCs and ISs .....</b>	<b>32</b>
2.4.1 GVC and IS in developing countries.....	40
<b>Section 2.5 AFB Value Chains .....</b>	<b>44</b>
<b>Section 2.6 Intermediary organizations: types, roles, and key-capabilities.....</b>	<b>48</b>
<b>Section 2.7 Literature Gaps .....</b>	<b>63</b>
<b>Section 2.8 Conceptual and Analytical Frameworks.....</b>	<b>66</b>
2.8.1 Conceptual framework .....	66

2.8.2 Analytical framework.....	69
<b>Section 2.9 Chapter Summary .....</b>	<b>72</b>
<b>CHAPTER III .....</b>	<b>73</b>
<b>RESEARCH METHODOLOGY .....</b>	<b>73</b>
<b>Section 3.1 Introduction .....</b>	<b>73</b>
<b>Section 3.2 Research Questions .....</b>	<b>73</b>
<b>Section 3.3 Research Method .....</b>	<b>76</b>
3.3.1 Case-Study Approach.....	77
3.3.2 Case Selection .....	80
3.3.3. Case Study Design .....	85
<b>Section 3.4 Research Procedure.....</b>	<b>86</b>
3.4.1 Conceptualization of Research Questions and Framework.....	86
3.4.2 Case Units Selection.....	90
3.4.3 Data Collection.....	93
3.4.4 Data Analysis .....	95
3.4.5 Data Validation .....	98
<b>Section 3.5 Scope and Limitations .....</b>	<b>100</b>
<b>Section 3.6 Chapter Summary .....</b>	<b>103</b>
<b>CHAPTER IV .....</b>	<b>105</b>
<b>THE STATE OF THE PHILIPPINE AFB SECTOR AND ITS POLICIES FOR DEVELOPMENT .....</b>	<b>105</b>
<b>Section 4.1 Introduction .....</b>	<b>105</b>
<b>Section 4.2 The Current State of the Philippine AFB Sector.....</b>	<b>105</b>
<b>Section 4.3 The Philippine Development Plan 2017-2022 .....</b>	<b>117</b>
<b>Section 4.4 Harmonized R&amp;D Agenda 2017-2022 .....</b>	<b>121</b>
<b>Section 4.5 Inclusive Innovation Industrialization Strategy and Regional and Commodity Roadmaps .....</b>	<b>123</b>
<b>Section 4.6 Prevailing Agriculture Development Policies .....</b>	<b>130</b>
<b>Section 4.7 Chapter Summary .....</b>	<b>133</b>
<b>CHAPTER V .....</b>	<b>137</b>
<b>THE CASE OF INNOVATION INTERMEDIARIES IN THE PHILIPPINE RICE AFB GVC AND INDUSTRY .....</b>	<b>137</b>
<b>Section 5.1 Introduction .....</b>	<b>137</b>
<b>Section 5.2 The Philippine rice industry context.....</b>	<b>138</b>

<b>Section 5.3 The government's rice industry development policy .....</b>	<b>148</b>
<b>Section 5.4 The Philippines' innovation system relationship with and participation in the rice global value chain .....</b>	<b>152</b>
5.4.1 Institutions, laws, and practices.....	153
5.4.2 Value chain segments, processes, and technologies .....	158
5.4.3 Value chain actors .....	161
5.4.4 The financial structure of milled rice in the Philippines .....	164
5.4.5 Governance structure of the Philippine rice industry .....	166
5.4.6 The GVC-IS co-evolutionary trajectory of the Philippine rice industry .....	168
<b>Section 5.5 Intermediary organizations in the Philippine rice industry .....</b>	<b>169</b>
5.5.1 Differences in role performance and key-capability building by organization type.....	173
5.5.2 Differences in role performance and key-capability building by value chain segment support.....	204
5.5.3 Role performance and key-capability building as a domestic-market oriented industry.....	224
<b>Section 5.6 Chapter Conclusions .....</b>	<b>242</b>
<b>CHAPTER VI .....</b>	<b>252</b>
<b>THE CASE OF INNOVATION INTERMEDIARIES IN THE PHILIPPINE MANGO AFB GVC AND INDUSTRY .....</b>	<b>252</b>
<b>Section 6.1 Introduction .....</b>	<b>252</b>
<b>Section 6.2 The Philippine mango industry context .....</b>	<b>253</b>
<b>Section 6.3 The government's mango industry development policy .....</b>	<b>269</b>
<b>Section 6.4 The Philippines' innovation system relationship with and participation in the mango global value chain .....</b>	<b>272</b>
6.4.1 Institutions, laws, and practices.....	274
6.4.2 Value chain segments, processes, and technologies .....	278
6.4.3 Value chain actors .....	282
6.4.4 The financial structure of mango production in the Philippines .....	286
6.4.5 The governance structure of the Philippine mango industry.....	289
6.4.6 The GVC-IS co-evolutionary trajectory of the Philippine mango industry .....	291
<b>Section 6.5 Innovation Intermediaries in the Philippine mango industry .....</b>	<b>292</b>
6.5.1 Differences in role performance and key-capability building by organization type.....	296



6.5.2 Differences in role performance and key-capability building by value chain segment support.....	328
6.5.3 Role performance and key-capability building as an export market-oriented industry.....	351
<b>Section 6.6 Chapter Conclusions .....</b>	<b>372</b>
<b>CHAPTER VII.....</b>	<b>383</b>
<b>CROSS-CASE COMAPRISON AND ANALYSIS OF INNOVATION INTERMEDIARIES IN THE PHILIPPINE RICE AND MANGO AFB GVCS AND INDUSTRIES .....</b>	<b>383</b>
Section 7.1 Introduction .....	383
Section 7.2 Key Similarities and Differences of the Two Industries .....	384
Section 7.3 Recap of Innovation Intermediaries in the Two Industries.....	398
Section 7.4 Cross Case Comparison by Organization Type .....	400
Section 7.5 Cross Case Comparison by Value Chain Participation and Support .....	438
Section 7.6 Intermediation in Domestic and Export Market-Oriented Industries .....	452
Section 7.7 Chapter Summary .....	473
<b>CHAPTER VIII.....</b>	<b>476</b>
<b>CONCLUSION .....</b>	<b>476</b>
Section 8.1 Introduction .....	476
Section 8.2 Main Conclusions .....	477
Section 8.3 Theoretical Implications .....	484
Section 8.4 Policy Implications .....	488
Section 8.5 Management Implications .....	492
Section 8.6 Prospects for Future Research .....	494
<b>REFERENCES .....</b>	<b>497</b>

## List of Figures

Figure 2.1 An example of a smile curve conceptualized by Shih. ....	16
Figure 2.2. Governance structures in GVCs.....	22
Figure 2.3 The co-evolutionary relationship between GVCs and ISs and their effect on local firms' innovation process or producers and MSMEs. ....	36
Figure 2.4. Research diagram portraying how the three main variables may affect an intermediary's roles and key-capabilities. ....	67
Figure 2.5. A general global value chain for agri-food business industries. ....	68
Figure 3.1. Supply utilization of rice in the Philippines, 2000 to 2020.....	83
Figure 3.2. Supply utilization of mangoes in the Philippines, 2000 to 2020.....	83
Figure 3.3. The study's embedded multiple case-study design.....	85
Figure 4.1. Percentage contribution of each economic sector to GDP, 2000 to 2020..	106
Figure 4.2. Percentage growth of food product and beverage manufacturing, 2000 to 2019. ....	107
Figure 4.3. Value of production and volume of production growth of processed fruits and vegetables, 2000, 2006 to 2018. ....	107
Figure 4.4. Value of production and volume of production growth of rice, corn, and flour milling, 2000, 2006 to 2018.....	108
Figure 4.5. The average contribution of various sub-sectors to the agriculture, forestry, and fishing gross value added (GVA) from 2000 to 2020. ....	109
Figure 4.6. Percentage contribution of crop sub-sectors in the total value of production in agriculture, 2000 to 2020.....	111
Figure 4.7. Economic sectoral percentage distribution of employment, 1995 to 2018.	113
Figure 4.8. Poverty incidence among the basic sectors, 2015 and 2018. ....	116
Figure 4.9. The RIIC network proposed by the DTI. ....	126
Figure 4.10. The extended network of STI actors of government and their proposed actions.....	130
Figure 5.1. Rice paddy contribution to Philippine agricultural GVA, 2000 to 2020. ..	138
Figure 5.2. Gross value added of the Philippine rice industry, 2000 to 2020. ....	139
Figure 5.3. Rice farm harvest prices for the Philippines, 1991 to 2019. ....	139
Figure 5.4. Rice production and area harvested in the Philippines, 1961 to 2019. ....	140

Figure 5.5. Rice yield in the Philippines and Central Luzon, 1987 to 2020.....	142
Figure 5.6. Rice trade of the Philippines, 1960 to 2019. ....	143
Figure 5.7. The Philippines' innovation system relationship with and participation in the rice global value chain.....	154
Figure 5.8. Value chain segment support and participation of intermediary organizations in the Philippine rice industry.....	172
Figure 6.1. Mango contribution to Philippine agricultural GVA, 2000 to 2020. ....	254
Figure 6.2. Gross value added of the Philippine mango industry, 2000 to 2020. ....	254
Figure 6.3. Export value of Philippine mangoes, 2000 to 2020. ....	255
Figure 6.4. Top ten mango exporting countries and the Philippines by export value, 2000 to 2019. ....	256
Figure 6.5. Top ten mango exporting countries and the Philippines by quantity exported, 2000 to 2019. ....	256
Figure 6.6. Mango production, area harvested, and the number of trees in the Philippines, 1990 to 2020. ....	258
Figure 6.7. Philippine mango supply utilization, 2000 to 2020. ....	260
Figure 6.8. Utilization percentage of mangoes for export, 2000 to 2020.....	260
Figure 6.9. Mango yield in the Philippines, Ilocos, Central Luzon, and Zamboanga, 1990 to 2020. ....	263
Figure 6.10. The Philippines' innovation system relationship with and participation in the mango global value chain.....	273
Figure 6.11. Value chain segment support and participation of intermediary organizations in the Philippine mango industry.....	296
Figure 7.1. Individual industry case diagrams and the combined case study diagram of this dissertation.....	398
Figure 7.2. The desired impact of innovation intermediation for the rice and mango industries of the Philippines. ....	453

## List of Tables

Table 2.1 Differences Between Producer-driven and Buyer-driven Chains .....	18
Table 2.2 Variables that Contribute to GVC Governance Type.....	19
Table 2.3 Similarities and Differences of NIS, SIS, and RIS .....	33

Table 2.4 Trajectories of the Co-evolution of GVCs and ISs .....	39
Table 2.5 Interaction of GVCs and ISs and the Requirements to Shift Governance Structures.....	42
Table 2.6 Types and Roles of Systemic Intermediary Organizations .....	52
Table 2.7 Type and Roles of Intermediaries Involved in Systemic Transitions.....	53
Table 2.8 Type and Roles of Intermediaries in Agricultural Industries .....	54
Table 2.9 Type and Roles of Public and Private Intermediaries .....	57
Table 2.10 The Four Roles Performed and Key-capabilities Built by Intermediary Organizations.....	71
Table 3.1 Different and Similar Characteristics of the Philippine Rice and Mango Industries .....	84
Table 3.2 List of Industry Experts Interviewed.....	89
Table 3.3 List of Participating Intermediary Organizations .....	92
Table 4.1 Volume and value percentage share of grains and priority high-value crops in agricultural exports, 2016 to 2020.....	112
Table 4.2 Summary of Agri-Food Business Sector-Related Strategies and Policies from Selected PDP Chapters .....	118
Table 4.3 List of Priority Research Areas and Programs under the HNRDA 2017-2022 .....	122
Table 4.4 Potential Industries per Region Delineated by Sector .....	127
Table 4.5 List of Key Policies for GVC-IS Interaction and Development.....	134
Table 4.6 Key Public and Private Sector Organizations in the Philippine AFB Sector	135
Table 5.1 Regional Distribution of Volume of Rice Production in the Philippines, 1987 and 2020 .....	141
Table 5.2 Rice Paddy Production Capacity of the Philippines, Thailand, and Vietnam, 2019 .....	144
Table 5.3 Estimate of Government R&D Budget for the Philippine Rice Industry (US\$ 2010 constant price) .....	145
Table 5.4 Average costs of rice production in the Philippines, Thailand, and Vietnam, crop year 2013-2014 (in Philippines Pesos per kilogram) .....	146
Table 5.5 The Phases and Goals of the Rice Industry Roadmap 2030.....	149

Table 5.6 Financial Structure and Position of Key Actors in the Milled Rice AFB Sector, 2015 .....	165
Table 5.7 The Participating Intermediary Organizations in the Philippine Rice Industry .....	170
Table 5.8 Innovation Intermediary Roles Emphasized by Organization Type in the Rice Industry .....	173
Table 5.9 Innovation Intermediary Key-Capabilities Emphasized by Organization Type in the Rice Industry.....	184
Table 5.10 Roles Performed by Participating Intermediaries in the Rice Value Chain	205
Table 5.11 The Roles Performed by Innovation Intermediaries in the Philippine Rice Industry, a Domestic Market-Oriented Industry.....	225
Table 5.12 The Key-Capabilities Built for Innovation Intermediaries in the Philippine Rice Industry as a Domestic Market-Oriented Industry .....	226
Table 5.13 Summary Comparison of Philippine Rice Industry Intermediaries' Role Performance.....	244
Table 5.14 Summary Comparison of Philippine Rice Industry Intermediaries' Key-Capabilities .....	248
Table 6.1 Top Mango Producing Countries in the World and the Philippines, 2019 ..	257
Table 6.2 Regional Distribution of Mango Production in the Philippines .....	264
Table 6.3 Estimate of Government R&D Budget for the Philippine Mango Industry (US\$ 2010 constant price) .....	266
Table 6.4 The Targets, Strategies, and Interventions of the Mango Industry Roadmap 2017-2022 .....	271
Table 6.5 Agreements, Standards, and Certifications Relevant to the Mango Industry	275
Table 6.6 Financial Structure and Position of Key Actors in the Fresh Mango AFB Sector, 2017 .....	287
Table 6.7 The Participating Intermediary Organizations in the Philippine Mango Industry .....	293
Table 6.8 Innovation Intermediary Roles Emphasized by Organization Type in the Mango Industry .....	297
Table 6.9 Innovation Intermediary Key-Capabilities Emphasized by Organization Type in the Mango Industry.....	309
Table 6.10 Roles Performed by Participating Intermediaries in the Mango Value Chain .....	329
Table 6.11 The Roles Performed by Innovation Intermediaries in the Philippine Mango Industry, an Export Market-Oriented Industry .....	352

Table 6.12 The Key-Capabilities Built for Innovation Intermediaries in the Philippine Mango Industry as an Export Market-Oriented Industry .....	353
Table 6.13 Summary Comparison of Philippine Mango Industry Intermediaries' Role Performance.....	374
Table 6.14 Summary Comparison of Philippine Mango Industry Intermediaries' Key-Capabilities .....	378
Table 7.1 Different and Similar Issues in the Philippine Rice and Mango Industries .	385
Table 7.2 A Comparison of the Philippine Rice and Mango Sectoral Innovation Systems .....	387
Table 7.3 Existing Policy Response Comparison for the Rice and Mango Industries.	393
Table 7.4 Similarities and Differences in Intermediary Role Performance by Organization Type.....	401
Table 7.5 Internal and External Factors that Affect Intermediary Role Performance...	409
Table 7.6 Similarities and Differences in Intermediary Key-Capability Building by Organization Type .....	417
Table 7.7 Internal and External Factors that Affect Intermediary Key-Capability Building .....	431
Table 7.8 Innovation Intermediary Role Performances in the Rice or Mango Value Chain Segments.....	440
Table 7.9 Intermediary Key-Capability Building and Applications in the Rice and Mango Value Chains.....	448
Table 7.10 Similarities and Differences in Intermediary Role Performances in Domestic (Rice) and Export (Mango) Market-Oriented Industries .....	454
Table 7.11 Similarities and Differences in Intermediary Key-Capability Building and Needs in Domestic (Rice) and Export (Mango) Market-Oriented Industries .....	464
Table 8.1 Summary of Effects on Intermediary Role Performance and Key-capability Building and Application.....	478
Table 8.2 Literature Gaps and How this Dissertation Addressed Each.....	485
Table 8.3 Proposed Innovation Intermediation Value Chain Performance Framework .....	488

## **List of Appendices**

Appendix 1: Interview Guide for Industry Experts Template.....	536
Appendix 2: Letter of Request for Participation for Innovation Intermediaries .....	538
Appendix 3: Interview Guide for Innovation Intermediaries Template .....	539
Appendix 4: Interview and FGD Schedule.....	542
Appendix 5: Participating Intermediary Organization Write-ups .....	543
Appendix 6: Interview Consent Form Template .....	665
Appendix 7: Gantt Chart Schedule of the Dissertation Journey.....	666
Appendix 8: Philippine Employment Percentage Distribution by Major Industry Group .....	669
Appendix 9: Philippine Rice Supply Utilization 1995-2020.....	670
Appendix 10: List of Locally Available Rice Technologies from the DA-BAR's Research and Development, and Extension Agenda and Programs 2016-2022 Report .....	671
Appendix 11: Philippine Mango Supply Utilization 2000-2020.....	672
Appendix 12: List of Locally Available Mango Technologies from the DA-BAR's Research and Development, and Extension Agenda and Programs 2016-2022 Report (Several technologies may apply to other fruits and crops) .....	673

### **List of Abbreviations**

AFB	Agri-food Business
AFID	Agriculture and Fisheries Information Division
AgriCOOPh	Philippine Family Farmers Agriculture-Fishery-Forestry Cooperatives Federation
ASEAN	Association of Southeast Asian Nations
ATI	Agricultural Training Institute
BAR	Bureau of Agricultural Research
BOI	Bureau of Investment
CALABARZON	Cavite, Laguna, Batangas, Rizal, and Quezon
CDA	Cooperative Development Authority
CEO	Chief Executive Officer
DA	Department of Agriculture
DBM	Department of Budget and Management
DOH	Department of Health
DOST	Department of Science and Technology
DTI	Department of Trade and Industry
ESETS	Extension Support, Education and Training Services
EU	European Union
FAO	Food and Agricultural Organization of the United Nations
FDA	Food and Drug Administration
FGD	Focus Group Discussion
FPA	Fertilizer and Pesticide Authority



GA	Government Agency
GAP	Good Agricultural Practices
GDP	Gross Domestic Product
GERD	Gross Expenditure on R&D
GMP	Good Manufacturing Practices
GNCRDPS	Bureau of Plant Industry – Guimaras National Crop Research, Development and Production Center
GRECON	Confederation of Grain Retailers
GVA	Gross Value Added
GVC	Global Value Chain
HACCP	Hazard Analysis Critical Control Point
HVCDP	Department of Agriculture – High-Value Crop Development Program
HWT	Hot Water Treatment
i <sup>3</sup> S	Inclusive Innovation Industrialization Strategy
IA	Industry Associations
IQF	Individual Quick Freeze
IRRI	International Rice Research Institute
IS	Innovation System
ISO	International Organization for Standardization
ITDI	Industrial Technology Development Institute
KIBS	Knowledge-Intensive Business Services
LGU	Local Government Unit

LMFRC	Luzon Mechanized Farmer and Rice Consumer Facebook Group
MFA	Mabaling Farmer's Association
MFP	Mango Farming in the Philippines Facebook Group
MSME	Micro-, Small-, and Medium- Enterprises
MSTQ	Metrology, Standards, Testing, and Quality
NEDA	National Economic Development Authority
NFA	National Food Authority
NGO	Non-government Organization
NIA	National Irrigation Administration
NIASD	National Innovation Agenda and Strategy Document
NIC	National Innovation Council
NIS	National Innovation System
NMAT	National Mango Action Team
NPAL	National Pesticide Analytical Laboratory
NPO	Non-Public Organization
NPQSD	<i>National Plant Quarantine Services Division</i>
NRP	Department of Agriculture – National Rice Program
NSIC	National Seed Industry Council
OBM	Original Brand Manufacturing
ODM	Original Design Manufacturing
OECD	Organization for Economic Cooperation and Development
OEM	Original Equipment Manufacturing
OFW	Overseas Filipino Worker

PAKISAMA	Pambansang Kilusan ng mga Samahang Magsasaka
PCAARRD	Philippine Council for Agriculture, Aquatic, and Natural Resources R&D
PDE	Profairtrade Development Enterprise, Inc.
PDP	Philippine Development Plan
PHILMECH	Philippine Center for Postharvest Development and Mechanization
PHILRICE	Philippine Rice Research Institute
PITC	Philippine International Trading Corporation
PMIFI	Philippine Mango Industry Foundation, Inc.
PMRH	Philippine Mango Raisers Haven Facebook Group
PRI	Public Research Institute
PSA	Philippine Statistics Authority
R&D	Research and Development
RCEF	Rice Competitiveness Enhancement Fund
RIIC	Regional Inclusive Innovation Centers
RIS	Regional Innovation System
RTL	Rice Tariffication Law
RTO	Research and Technology Organizations
SETUP	Small Enterprise Technology Upgrading Program
SIS	Sectoral Innovation System
SMG	Social Media Group
SPS	Sanitary and Phytosanitary Standards

STI	Science, Technology, and Innovation
TIS	Technological Innovation System
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNIDO	United Nations Industrial Development Organization
VC	Value Chain
VHT	Vapor-Heat Treatment
WTO	World Trade Organization

## **CHAPTER I**

### **INTRODUCTION**

#### **Section 1.1 Introduction**

Inclusion and participation in Global Value Chains (GVCs) allow countries to develop by enabling their local industries to participate in the global economy and maximizing an industry's ability to create value and learn by accessing the global market (Gereffi and Fernandez-Stark, 2018). As world markets continue to connect themselves (Gereffi, Humphrey, Kaplinsky, and Sturgeon, 2001), countries will need to create opportunities for their local producers and micro-, small-, and medium- enterprises (MSMEs) to be able to participate in their industry's respective GVCs, and this is true for agricultural or agri-food business (AFB) industries too (Humphrey and Memdovic, 2006). Particularly for AFB value chains, supporting the participation of developing country producers and firms aids in the pursuit of several Sustainable Development Goals, especially in the rural areas (Humphrey and Memedovic, 2006; Fernandez-Stark et al., 2012). However, this is not an automatic process and will require local industries to be internationally competitive if they wish to gainfully benefit from GVC integration and participation (Altenburg, 2007).

Lee, Szapiro, and Mao (2018) find that the state of a country's innovation system (IS), whether it be understood on a national (Edquist, 2005), sectoral (Malerba, 2002), regional (Cooke, 2001), or cluster (Porter, 1998; 2000) level, affects the ability of its local producers and MSMEs from gainfully participating in GVCs, let alone AFB chains. Moreover, the current state of the IS effectively binds the capabilities and learning

processes of producers, MSMEs, large firms, and other actors (e.g., government, universities) that are a part of the innovation ecosystem (Malerba, 2002; Malerba and Mani, 2009). Recent research by Lema, Pietrobelli, and Rabellotti (2018) supports these claims and posits that it is now no longer viable to separate the discussion between GVCs and ISs. Instead, a more apt understanding is that these two systems co-evolve and endogenously affect each other (Pietrobelli and Rabellotti, 2011). Because of this connection, existing innovation gaps and barriers may limit the integration and participation of local producers and MSMEs in GVCs (Partners, 2007; Chunhavuthiyanon and Intarakumberd, 2014; Lema, Rabellotti, and Sampath, 2018). Additionally, these limitations are more evident in developing countries where innovation gaps are more present (Intarakumnerd and Chaminade, 2011).

The Philippines is a developing country that exhibits several systemic gaps, constraints, and barriers (Quimba, Albert, and Llanto, 2017). During the Duterte Administration (2016 to 2022), the country began implementing several key policies that seek to address these systemic issues and focus on integrating local producers and MSMEs into their respective GVCs. The first is the Philippine Development Plan 2017-2022 (PDP), which outlines the government's plans to tackle the myriad of systemic issues that the country faces. Another is the Inclusive Innovation Industrialization Strategy (i<sup>3</sup>S), which seeks to aid in the integration and participation of local industries in their respective GVCs. Common between the two policies are strategies offered to develop the Philippines' AFB industries. For policies specific to agricultural development, the country's Department of Agriculture (DA) set forth a 12-point strategy to develop its many AFB industries.

Moreover, the DA is slowly expanding its ‘no cluster, no assistance’ policy that effectively pushes producers to organize themselves to gain development assistance like inputs and machinery from the government. The objectives of these policies push for healthy domestic competition and innovation and aspire towards being globally competitive. The PDP, i<sup>3</sup>S, and the DA highlight two industries: the Philippines’ rice and mango industry.

According to the Philippine Statistics Authority (PSA) data, production has grown substantially since the Green Revolution of 1966 (Dawe, 2006; Hayami, 2010). However, efforts to innovate and upgrade through farm mechanization have not taken a similar path, leading to high labor costs (National Economic Development Authority [NEDA], 2017). Coupled with this issue is the advent of the Rice Tariffication Law (RTL), which effectively removes quantitative restrictions on imported rice and instead replaces this with tariffs. This change now poses a problem to local producers as they are still unable to compete with the lower prices offered by other rice exporting countries (Department of Agriculture [DA], 2018; Ranada, 2019). As a result, the local rice industry is now on a path toward developing itself to compete against the importation of the countries’ table staple through a DA-led thirteen-year industry development roadmap (DA, 2018).

Despite being the Philippines’ third most exported fruit, the mango industry’s standing in the world market has significantly dropped since the early 2000s (Food and Agricultural Organization of the United Nations [FAO], 2021). Though mango exports to the Philippines are rising, the industry is still unable to compete as it did due to the many issues plaguing the industry. According to Fernandez-Stark, Couto, and Gereffi (2017), the Philippine mango industry faces four main issues: a deficit of scale economies, the

low uptake of modern technology, a lack of linkages between the government and the private sector, and poor adherence to global standards. To address these issues, the country is beginning its industry revitalization plan via a five-year roadmap (Department of Agriculture – High-Value Crop Development Program [DA-HVCDP], 2017).

Without question, the public and private sectors need to work together in addressing the common and distinct issues these two AFB industries face. A cited and studied way to catalyze resolving these issues and promoting innovation is through the support and participation of innovation intermediaries. These are organizations that go-between for two or more parties to aid in the innovation and upgrading process, create long-lasting relationships, and help overcome barriers to innovation (Howells, 2006; Partners, 2007; Nakwa, 2013; Sutthijakra and Intarakumnerd, 2015; Ramirez, Clarke, and Klerkx, 2018; Go, 2019).

Thus, given this brief background and context, the Philippine rice and mango industries become pertinent cases to study the support that innovation intermediaries may provide and perform to aid in the further integration and participation of producers, MSMEs, and other industry actors in their respective GVCs.

The succeeding Section 1.2 presents the research gaps that form the basis for the theoretical underpinnings to address the research problem. Following this, Section 1.3 provides a brief discussion of the contribution of this study. Section 1.4 then offers the overarching objectives and research question the dissertation seeks to address. Next, Section 1.5 describes the overall scope of the study by succinctly describing the method used to conduct the research. Next, Section 1.6 provides the definitions or



operationalization of the three major concepts used in this study: GVCs, SIS, and innovation intermediaries. Finally, Section 1.7 outlines the structure of this dissertation.

## **Section 1.2 Statement of the Problem**

Provided the context in Section 1.1 and discussed further in later chapters, this section briefly presents the theoretical gaps that this study addresses related to innovation intermediaries.

Although much research has been done on the subject (Howells, 2006; Partners, 2007; Nakwa, 2013; Sutthijakra and Intarakumnerd, 2015; Ramirez, Clarke, and Klerkx, 2018; Go, 2019), the researcher finds several literature gaps. The first of these is the lack of integrated research on innovation intermediaries in the co-evolutionary relationship between the IS and GVC. Most knowledge on the topic is done under the innovation systems literature (Van Lente et al., 2003; Howells, 2006; Klerkx and Leuwis, 2008; Klerkx and Leuwis, 2009; Kivimaa et al., 2019), with a few under the GVC perspective (Vik and Kvam, 2018; Ramirez, Clarke, and Klerkx, 2018). Moreover, of those in the GVC perspective, none have studied innovation intermediation under the value chain lens, considering the roles performed in each value chain segment and how intermediaries work throughout an entire value chain system.

Next, in innovation intermediary literature, organization type also matters in role performance (Van Lente et al., 2003; Klerkx and Leuwis, 2009; Intarakumnerd and Chaoroenporn, 2013a). Though previous research has done well in studying and creating intermediary typologies (Van Lente et al., 2003; Klerkx and Leuwis, 2008; Kivimaa et al., 2019), newer organizations have taken the mantle of innovation intermediation

(Ramirez, Clarke, and Klerkx, 2018; Asha and Raju, 2019), and these need to be examined further to determine their primary roles in a system. Moreover, as intermediation evolves (Howells, 2006), more in-depth studies of their roles and services would serve to develop our understanding and application of them.

Third, common among intermediaries is the need to build key-capabilities for successful role performance (Sutthijakra and Intarakumnerd, 2015). However, apart from Sutthijakra and Intarakumnerd's (2015) and Go's (2019) study, previous research on key-capabilities of intermediaries has not been direct in discussing a framework for intermediary capability development, often only discussing certain actions required to improve performance (Partners, 2007; Iizuka, 2009; Chaoreonporn and Intarakumnerd, 2013a). Moreover, these studies on capabilities are, again, found in innovation studies, with little to none in the GVC literature. Thus, further inquiry into innovation intermediary capabilities under a value chain lens or the applicability of the key-capabilities initially posited by Sutthijakra and Intarakumnerd (2015) is of great interest, especially considering the co-evolutionary dynamics between ISs and GVCs.

In addition to the lack of key-capability studies in the GVC literature, there is also a dearth of innovation intermediary capability studies in agriculture, AFB, or resource-based industries, as the studies under the key-capability framework have only been done on manufacturing and service industries (Sutthijakra and Intarakumnerd, 2015; Go, 2019). Moreover, although previous research on intermediaries in these industries exists (Klerkx and Leuwis, 2008; Iizuka, 2009; Ramirez, Clarke, and Klerkx, 2018), these studies have primarily focused on the roles of intermediary organizations and provided several

allusions to capabilities required. Thus, a study on the framework's applicability in agricultural, AFB, or resource-based industries is necessary.

Finally, if one were to focus on the industries mentioned above, a sectoral innovation systems perspective (Malerba, 2002) may be the most appropriate approach to better understand intermediation in these industries. One portion of this perspective that needs further study is the effects of demand conditions on the system, institutions, and the actors involved, in this study's case, innovation intermediaries. Hence, taking demand conditions as a factor in intermediation performance may be a worthwhile exercise.

### **Section 1.3 Research Contribution**

This study contributes to the literature by examining innovation intermediary role performance and key-capability building under the GVC-IS co-evolutionary relationship model (Lema, Pietrobelli, and Rabellotti, 2018; Lema, Sampath, and Rabellotti, 2018). It also considers newer organization types that previous studies have not thoroughly observed. Moreover, the study contributes to the GVC literature by applying a role performance and key-capability building framework to the value chain approach. An additional contribution is the consideration of differing demand conditions and their effects on intermediary role performance and key-capability building and application. Finally, this research provides new and further evidence and knowledge on innovation intermediaries in the context of a developing country and in AFB value chains.

## **Section 1.4 Research Objective**

The primary objective of this research is to develop a richer understanding of how innovation intermediaries perform their roles and build key-capabilities as they aid producers, MSMEs, and other actors in upgrading and innovating in their respective value chains. From a more theoretical standpoint, this study integrates the literature on innovation intermediaries from the perspectives of ISs, GVCs, and their co-evolutionary relationship. Moreover, in a more practical position, another objective of this study is to offer policy and management implications for the overall AFB sector and rice and mango industries of the Philippines. These implications primarily apply to the further integration of innovation intermediaries in the response of these industries and more general implications and suggestions for policy. To achieve these objectives, this study is guided and answers the following main research question: How do intermediary organizations perform their roles and build necessary key-capabilities to support the inclusion and further participation and upgrading of various players in AFB GVCs?

## **Section 1.5 Scope of the study**

The study employed a constructivist perspective and a qualitative approach to the research design (Creswell, 2014). Specifically, the researcher adopted a descriptive multiple case-study method, guided by Yin (2003a; 2003b; 2018). This method was deemed most appropriate for the study as it allows us to delve deep into the rich and multivariate contextual conditions of chosen cases. As Yin (2018) states, it is suited to answering ‘how’ and ‘why’ research questions. Moreover, by adopting several theories and concepts as definitions and analytical frameworks, the multiple case-study approach enables the researcher to present fuller descriptions of each case and the ensuring cross-

case analysis (Yin, 2003b; 2018). The adopted frameworks also work to limit and delimit the study's boundaries.

As a descriptive multiple-case study, the study employs several theories to explain the findings from the cases. In designing the research, the primary investigator adopted an embedded design that allows the use of more than one unit of analysis. Each case is delimited to the Philippines' intermediaries in the rice or mango industries. Although the overarching case appears to present its unit of analysis at the sectoral level, the embedded design allows the researcher to choose a more minute unit of analysis. As such, the actual unit of analysis used in this study is on the organization level, and its units of observation are on the organization and individual levels. It is important to note that each organization in this study is not to be taken as a case. Instead, the cumulative experiences and observations from each organization form the cases. In Chapter III, a figure depicting this study's embedded multiple case-study design is offered to represent the research visually.

Nonetheless, to provide a brief description of the entire study, the ensuing report conducted two case studies on intermediaries in the rice and mango industries of the Philippines. An accompanying cross-case analysis is offered after presenting the findings of each case. Regarding the number of intermediary organizations in the study, 18 organizations participated, where both industries share three organizations, eight are unique to the rice industry, and seven distinct organizations participated from the mango industry. Given these numbers, the case of intermediaries in the rice industry is composed of 11 intermediaries, while the mango case has a total of ten organizations. Data for the cases were primarily drawn from 11 interviews with government experts and the academe, 42 interviews and two focus-group discussions with intermediary representatives,

intermediary partners, and value chain actors, and secondary desk research. The researcher also took several actions to triangulate the data and raise the validity and reliability of the findings, conclusions, and implications arising from this study. These actions range from gathering data from various sources, requesting a verbal interview and recording consent, validating write-ups by representatives, and conducting secondary desk research.

### **Section 1.6 Operationalization of Key Concepts**

This section provides the operationalized definitions for key concepts that this study adopts. Three main concepts require definitions: GVCs, sectoral innovation systems (SIS), and innovation intermediary. These concepts are delved into further in the literature review (Chapter II).

For GVCs, the researcher defines these as the complete, globally linked set of activities that trace the production process of commodities or services from the inputs required to the delivery to the final consumer (Gereffi et al., 2001; Frederick, 2016). As this study examines AFBs, the researcher further specifies AFBs as value chains that include both the fresh crop and processed production processes. Moreover, apart from investigating the production process, this study considers the enabling environment of GVCs, including institutions and actors surrounding these. Finally, as this study looks at two specific crop industries of the Philippines, the global aspect comes into how the two local value chains interact with the rice and mango GVCs, respectively.

The second concept that requires proper operationalization is the sectoral innovation system (SIS), as Malerba (2002) defined. Compared to other innovation

system categories, the strength of the SIS lies in its ability to analyze sectors. Specifically, the SIS approach centers on firms and other actors' capabilities and learning processes (Malerba and Mani, 2009). Furthermore, Malerba and Mani (2009) and Intarakumnerd (2017) outline seven main elements of an SIS that make comparative work between sectors doable: firms, other actors, networks, demand conditions, institutions, the knowledge-base, and interaction of the main processes.

This study operationalizes an innovation intermediary by adopting the definition of Howells (2006, p. 720) as “an organization or body that acts [as] an agent or broker in any aspect of the innovation process between two or more parties.” To further specify these organizations, the researcher accepts several organization type categorizations proposed by several studies (van Lente et al., 2003; Klerkx and Leeuwis, 2009; Ramirez, Clarke, and Klerkx, 2018; Kivimaa et al., 2019; Asha and Raju, 2019). Moreover, to consider an organization as an intermediary, they must also be performing brokering, consultancy, mediating, and resource providing roles as defined by Partners (2007), and need to build key-capabilities to enhance their networks and resources (Sutthijakra and Intarakumnerd, 2015; Go, 2019).

## **Section 1.7 Structure of the Dissertation**

Following this introductory chapter, Chapter II presents a review of related literature that first begins with a conceptual review of GVCs and ISs, and how these two systems relate to one another to create their co-evolutionary relationship. Following that is a discussion on the distinguishing characteristics of AFB industries and value chains. Then, a comprehensive discussion on innovation intermediaries is offered, focusing on their different organization types, role performance, and key-capability building

mechanisms. The literature gaps initially presented in Section 1.2 are described in much greater detail closer to the end of the second chapter. Concluding the chapter is a presentation of adapted and defined versions of Partner's (2007) four intermediary roles and Sutthijakra and Intarakumnerd's (2015) and Go's (2019) four intermediary key-capabilities that serve as the analytical frameworks for this study.

Chapter III houses the research methodology of the dissertation. First, it discusses how the research questions address the literature gaps presented in the previous chapter. Then, the following section describes the case study method, offers the case study design, and sets the parameters for choosing the cases and participating organizations. The chapter also details the research procedure, the data collection process, how the data was analyzed, the measures to ensure data validity and trustworthiness, and the scope and limitations of the study.

The succeeding Chapter IV provides the broader context for agriculture, AFBs, and the innovation system of the Philippines. It describes the sector's economic performance, the issues surrounding it, and government responses to promote innovation and upgrading in its AFB sector.

Chapters V and VI are the individual case study reports on intermediaries in the Philippine rice and mango industries. Each chapter follows a similar structure by first describing the distinct issues and context of the industries, the industry-specific government responses, and the GVC-IS map of the industries. They then proceed to the individual case study findings on how organization type, value chain segment support and participation, and primary market orientation affect the role performance and key-capability building and application of the participating intermediaries.



Chapter VII presents the cross-case analysis, which begins with comparing the two industries' issues, SIS, policy responses, and value chains. Finally, the analysis proper is set to answer the three sub-questions posed in this study.

Finally, Chapter VIII offers the main conclusions of this study on the role performance and key-capability building of innovation intermediaries and how these organizations aid in the integration and participation of producers and MSMEs in the AFB sector. Moreover, this chapter presents the theoretical, policy, and management implications drawn from the findings of this thesis. To end, it also offers directions for future research.

## **CHAPTER II**

### **REVIEW OF RELATED LITERATURE**

#### **Section 2.1 Introduction**

This chapter establishes the theoretical and conceptual background for this dissertation by reviewing previous studies related to the primary topic of this study: how intermediaries perform their roles and build their key-capabilities in AFB global value chains. The researcher can draw several gaps in the current literature, leading to his primary research questions and methodology.

The review of related literature is structured as follows. First, Section 2.2 provides a foundation for GVCs and their critical concepts of governance and upgrading. Following this, Section 2.3 discusses the different ISs and their primary facets. Next, Section 2.4 examines how GVCs and ISs interact and co-evolve with one another, revealing how structural gaps hamper developing countries' ability to maximize gains from their relationship. Section 2.5 then distinguishes AFB value chains from other industries by showing its unique traits and challenges in value chain integration and innovation. Ensuing all of these is Section 2.6, which gives a comprehensive discussion of innovation intermediaries. This section discusses how innovation intermediaries have been studied in the past, the different types of organizations that may be considered intermediaries, and most importantly, the critical concepts of intermediary roles and key-capabilities. Succeeding these is Section 2.7, which points to the literature gaps this research attempts to address. Finally, this chapter ends with Section 2.8, which presents the analytical framework this study employs.

## **Section 2.2 Global Value Chains**

A value chain is the complete set of activities that describes the production processes of products or services up to how these arrive at the final consumer (Frederick, 2016). Value chains are also referred to as supply chains, commodity chains, production chains, activity chains, or product pipelines (Sturgeon, 2001). Describing a value chain includes activities such as design, branding, and after-sales support. As a chain, it presents the linkage of activities that add value to the product or service (Sturgeon, 2001). Kogut (1985) defines adding value or value-added as a process's economic contribution in the chain to the total cost of a product or service. One may measure 'value' through profits, value-added, or price mark-ups (Gereffi, Humphrey, Kaplinsky, and Sturgeon, 2001). The economic value-added of each activity in a value chain often varies. The smile curve (Shih, n.d.; Gereffi and Fernandez-Stark, 2018), as shown in Figure 2.1, is a good representation of how different value-adding activities contribute to varying economic values. This chain of value-adding activities is called the smiling curve because it looks like a person's smile, where the left and right tips represent the edge of a smile, and these gradually curve downwards to the bottom of the smile.

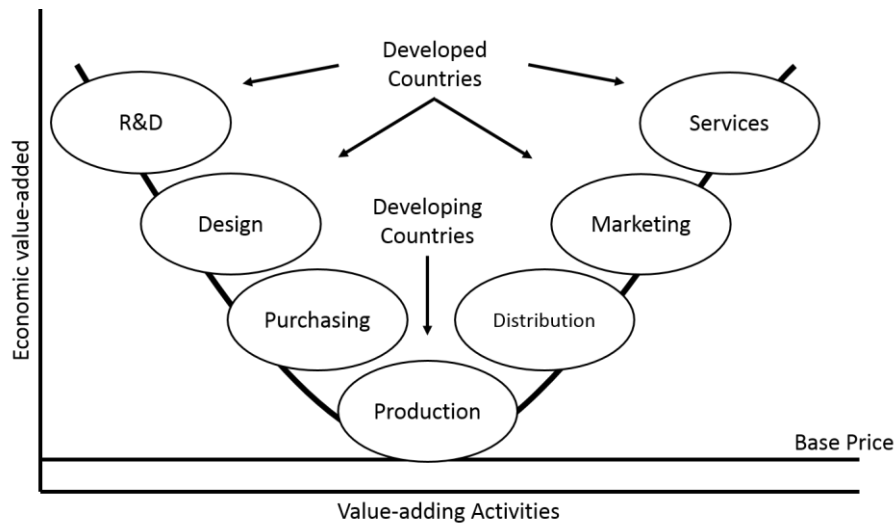


Figure 2.1 An example of a smile curve conceptualized by Shih.

Note. Adapted and modified from Shih (n.d.) and Gereffi and Fernandez-Stark (2018).

According to Shih (n.d.), higher value seems to come from the chain's first and last few activities. These activities are more often knowledge-intensive and do not require a high degree of standardization and mechanization. Simply focusing on production activities provides the least value-addition. If firms participate in or integrate other activities by moving either to the left or right of the curve, they gain more value-added. Citing Nike as an example, Mudambi (2008) shows the smile curve in work with how Nike keeps design, branding, and marketing activities while outsourcing the manufacturing to other firms. Furthermore, Mudambi explains that activities similar to those done by Nike are more often found in advanced economies, and the lower value-adding activities locate themselves in emerging economies and developing countries.

With how interconnected the world is now, a product or service's entire value chain may not necessarily be limited to a single country but traverses through several nations. Most products today involve actors and linkages across different parts of the world. This globally linked chain is what Gereffi (1994) initially described as a global

commodity chain and is now known more widely as the GVC (Gereffi et al., 2001). Gereffi (1994) initially described different chains as producer-driven or buyer-driven. The primary difference between both is the types of firm links they foster. Producer-driven chains exhibit more links with affiliated or subsidiary firms and other multinational companies, and buyer-driven chains link with more independently managed firms. According to Frederick (2016), the types of products most often produced by these chains create differences. Buyer-driven chains involve more products that rely on product innovations in design and marketing. On the other hand, producer-driven chains comprise more technology- or capital-intensive products that may require a sizeable R&D investment. Table 2.1 presents a summary of the differences between producer-driven and buyer-driven chains.

Simply describing the processes of an industry's or a product's GVC is not enough. Understanding who controls these chains and how those who find themselves in the lower-value activities go *up* the chain have been significant themes and points of interest in GVC research (Humphrey and Schmitz, 2001; Gereffi et al., 2001; Gereffi, 2018a). Two key concepts in GVC analysis are *governance* and *upgrading*.

Table 2.1 Differences Between Producer-driven and Buyer-driven Chains

Chain Type	Chain Leaders	Linkage Focus	Production Characteristics	Barriers to Entry	Industry Examples
Producer-driven chains	Transnational manufacturers	Vertical integration	<ul style="list-style-type: none"> <li>• Well-coordinated production network</li> <li>• Chain leaders have a high degree of control and influence over backward and forward linkages</li> </ul>	<ul style="list-style-type: none"> <li>• Access to critical product and process technologies</li> <li>• Intra-organizational processes (i.e., just-in-time production, modular production, customization capabilities)</li> </ul>	Capital- and technology-intensive industries: automobiles, aircraft, heavy machinery, spacecraft, computers
Buyer-driven chains	Retailers, branded marketers, and manufacturers	Network (Horizontal) integration	<ul style="list-style-type: none"> <li>• Decentralized production networks</li> <li>• Multiple export points, mostly in developing countries</li> <li>• Highly competitive, locally owned, globally dispersed production systems</li> </ul>	<ul style="list-style-type: none"> <li>• Trust and relationship building (i.e., clustering, inter-firm collaboration, business matching, client-firm relationship)</li> <li>• Trade policies (e.g., protectionist policies)</li> <li>• Creating the brand</li> </ul>	Labor-intensive and consumer goods industries: fashion, food, toys, consumer electronics

Note. This table is adapted and summarized from Gereffi (2001) and Gereffi (2018b).

### 2.2.1 Governance

Gereffi et al. (2001) define *governance* as the “non-market coordination of economic activity” (p. 4). This coordination shows how chains are organized and managed and who leads these chains. According to Gereffi, Humphrey, and Sturgeon (2005), three variables dictate the governance structure of a GVC: the complexity of transactions, the codify-ability of information and knowledge, and suppliers’ capabilities. They evaluate these variables as either high or low. Under different combinations, they observe five types of governance structures, as shown in Table 2.2.

Table 2.2 Variables that Contribute to GVC Governance Type

Governance Type	Complexity of transactions	Codify-ability of information and knowledge	Capability of suppliers
Market	Low	High	High
Modular	High	High	High
Relational	High	Low	High
Captive	High	High	Low
Hierarchy	High	Low	Low

Note. Gereffi, Humphrey, and Sturgeon (2005) note that while eight combinations of the three determinants are possible, two are unlikely to occur (low-low-high; low-low-low), and one does not create a governance structure per se (low-high-low). Adapted from Gereffi, Humphrey, and Sturgeon (2005).

Gereffi, Humphrey, and Sturgeon (2005) and Gereffi and Fernandez-Stark (2018) describe the five governance types as follows:

1. *Market* – also denoted as arms-length transactions; this governance structure does not require cooperation between participating firms. With the low complexity of transactions and high capability of suppliers and product codification, it is easier for buyers to select sellers based on price. The main governing body is not a lead

firm but the price mechanism set for a product or service. An example of this governance type is the China motorcycle sector of Vietnam (Fujita, 2010)

2. *Modular* – this type of governance occurs when a product or service has particular specifications required by buyers or chain leaders. Since suppliers in modular chains are competent, switching costs for buyers are not high. Nevertheless, compliance standards start to come into play in this governance type. Though buyers or chain leaders share product specifications, suppliers bear the burden of manufacturing the product and meeting the standard required. Information technology and information exchange processes are highly relevant in this type. The Thai automotive industry, mainly structured to supply parts for Japanese automotive companies, is an example of this governance type (Intarakumnerd and Chaoroenporn, 2013a)
3. *Relational* – this structure occurs when a product has a low chance of codification, thus challenging a supplier's learning or transferring of knowledge. In addition, the information and knowledge involved in these transactions are often tacit and require repeated interaction and sharing between chain leaders and their suppliers. Hence, these linkages require a degree of trust between parties, regulated by social and spatial proximity, family ties, ethnic ties, and reputation, among others. As building trusted linkages take time, costs associated with transferring to new partners are often high. An example of an industry that exhibits a relational governance pattern is the garments industries of East Asian countries (Gereffi, Humphrey, and Schmitz, 2005)
4. *Captive* – in captive chains, suppliers are dependent on chain leaders because of low suppliers' competence but a high degree of complexity and codification



required of products. Leaders in these chains highly monitor their suppliers' operations, ensuring that they meet the standards set for their products. Firm leaders will also invest in training or *upgrading* their suppliers to stabilize their supply capability. However, firm leaders will only invest in activities that do not encroach on their core competencies or activities. An example of this is investing in streamlining assembly processes. In cases where firm leaders invest a significant amount in their suppliers, transfer costs for both parties will be high. However, in cases where the supplier or captured suppliers make little investment, transfer costs would be significantly high on the supplier side. The specific Honda motorcycle value chain in Vietnam presents an example of this governance type (Fujita, 2008)

5. *Hierarchy* – though not as common in today's world, this governance structure involves a complete vertical integration of a product's processes by a chain leader. Hierarchical structures occur because transactions are complex, but the possibility of codification and supplier competency is low. A leader will need to invest heavily in monitoring and training activities to meet its products and standards. Thus, most hierarchical chains exhibit the development and manufacturing of products in-house rather than needing outside suppliers or producers. The very early stage of the United States electronics industry exhibited a hierarchical structure where large, vertically integrated firms controlled the telephone, radio, television, and computer electronics sector (Gereffi, Humphrey, and Schmitz, 2005)

As an additional point to the dynamics of the governance structures, Gereffi, Humphrey, and Sturgeon (2005) say that governance types can change as industries evolve. Gereffi and Fernandez-Stark (2018) further state that multiple governance structures may be present in a GVC and these structures interact with one another, creating opportunities and challenges for upgrading. Figure 2.2 shows a visual representation and summary of Gereffi, Humphrey, and Sturgeon’s (2005) governance structures.

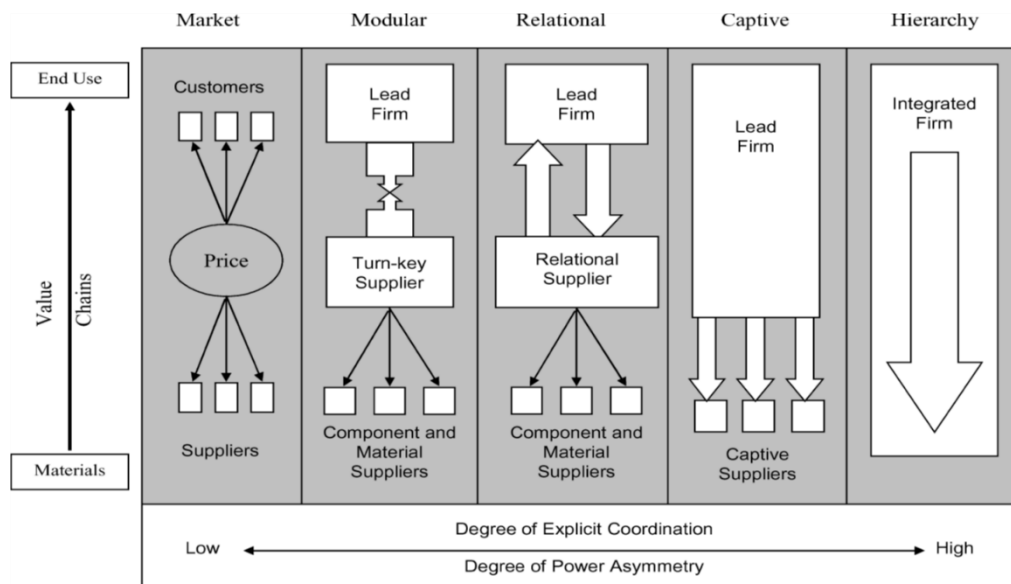


Figure 2.2. Governance structures in GVCs.  
Note. Lifted directly from Gereffi, Humphrey, and Sturgeon (2005).

### 2.2.2 Upgrading

*Upgrading* is “the process by which economic actors—nations, firms, and workers—move from low-value to relatively high-value activities in global production networks” (Gereffi, 2005, p. 171). One of the themes prevalent in GVC analysis studies is that the governance structure organized by chain leaders reflects the pathways of

upgrading available for firms part of the value chain. An example of how chain leaders may control upgrading paths is gleaned through Dolan and Humphrey's (2000) study on the UK's buyer-driven, fresh vegetable value chain. The authors show how supermarkets control upgrading by determining the requirements for a product. For example, supermarkets may dictate what products should be produced following specific characteristics in the quality and packaging, among others.

Moreover, they may also indicate necessary processes, or they may leave that to the producer's discretion. Through these controls, chain leaders like the supermarket limit the upgrading paths possible for producers or firms. Chain leaders may dictate a specific upgrading path, or producers and firms may attempt to discover processes to achieve requirements. Nonetheless, with the immense literature on upgrading (Gereffi, 1994; Gereffi, 1999; Ponte and Ewert, 2009; Barrientos, 2001; Fernandez-Stark, Bamber, and Gereffi, 2014; Gereffi and Bair, 2018), there are numerous ways for local producers and firms to move up the value chain.

Gereffi (1994, 1999), in his studies on the garment industry and automotive industry, first describes upgrading in a sequence of capabilities that evolve and reflect firms climbing a value chain. He claims that firms first enter the assembly of chain leaders' products in a global value chain. Then, as these local firms develop, they can move to local production and sourcing of parts these chain leaders require. Gereffi describes this phase as original equipment manufacturing (OEM). Next, with the capability to produce these parts and understand the assembly process, these local firms may *upgrade* by designing products for their chain leader. Gereffi calls this process original design manufacturing (ODM). Finally, culminating all these capabilities, local firms may turn

into ‘chain leaders’ themselves by creating their brands and becoming original brand manufacturers (OBM). This process, according to Gereffi, initially reflected how firms moved up a value chain. However, this was not without criticism. Humphrey and Schmitz (2002) and Lema (2012) mention that, during meetings with the Science Policy Research Unit and Institute of Development Studies of the University of Sussex, Bell posits that these phases are not always clear cut. Bell describes Gereffi’s characterization as a “benign escalator” (Humphrey and Schmitz, 2002, p.5). Though moving from assembly to OEM may be possible, becoming an ODM or OBM may be a tremendously challenging feat as chain leaders would try to keep their position by preventing local firms from upgrading and restricting the codification and flow of knowledge (Humphrey and Schmitz, 2002).

Nonetheless, following Gereffi’s upgrading characterization, Humphrey and Schmitz (2002) suggest four upgrading trajectories widely accepted by GVC scholars, even Gereffi. Humphrey and Schmitz (2002) and Gereffi and Fernandez-Stark (2018) classify upgrading these as follows:

1. *Product upgrading* – a movement toward higher-value product lines (e.g., ordinary fruit production towards organic fruit production (Fernandez-Stark, Bamber, and Gereffi, 2012))
2. *Process upgrading* – occurs when an organization can transform inputs more efficiently through the introduction of new or superior technology or a reorganized production system (e.g., the introduction of contract farming to farmers (Briones, 2014a))

3. *Functional upgrading* – gaining new functions or vacating current functions and moving towards more significant skill development and higher-value activities (e.g., learning to process (dried, puree) fruits by fruit farmers (Fernandez-Stark, Couto, and Gereffi, 2017))
4. *Chain or inter-sectoral upgrading* – where producers or firms move into another industry that may be new or associated with their current chain (e.g., television production to production of computer monitors (Humphrey and Schmitz, 2002))

### **Section 2.3 Innovation Systems**

Altenburg (2007) states that one limitation of the GVC approach is that it overemphasizes the global aspect of chains and overshadows the local and regional chains, which are more relevant to poor, small, and rural producers. Moreover, Lema, Pietrobelli, and Rabellotti (2018) add that GVC participation is dependent on a country's local context. Thus, implementing policies that promote GVC integration may require a paired approach that spans several boundaries of a country's local context. One such complementary approach is the IS, which considers the entire innovation environment.

Fagerberg (2005) writes that many innovation activities heavily rely on external sources and not just on the person or organization undergoing the innovation process. Meaning innovators themselves do not innovate on their own but are also supported by their environment. This environment includes organizations or actors (such as other firms, governments, universities, and research centers) and institutions (such as laws, norms, and culture) (Edquist, 2005). As a system, the focus centers on the network of actors and institutions, particularly how their linkage operates and how they influence and complement each other (Fagerberg, 2005). As a network, feedback loops within the

system either strengthen or weaken its existing structure. In the context of innovation<sup>1</sup>, the innovation system encompasses all-important market and non-market interaction, learning processes, networks, and factors that contribute to the creation, transfer, adoption, adaptation, diffusion, and use of knowledge, technology, and innovations.

According to Edquist (2005), using the IS approach has several strengths and weaknesses. The IS centers on innovation and learning processes by adopting a holistic, interdisciplinary, historical, and evolutionary perspective as its strengths. This approach considers numerous factors and determinants to innovation to not leave anything of value out of the equation. Furthermore, the IS emphasizes the reality of the innovation process as a non-linear process and that firms involved in innovation are interdependent on one another. One of its numerous determinants is the role of institutions and how these institutions influence and complement the innovation process. The IS also encompasses a broader range of what it considers innovation, including other types such as organizational innovations.

Regarding the approach's weaknesses, Edquist states that due to its over-encompassing nature, there may be discrepancies in understanding several concepts. One example he cites is the term “institution.” For example, some scholars refer to the actors or the “rules of the game” or both as institutions. Another conceptual issue is what exactly constitutes the innovation system. However, many scholars agree that it is primarily made

---

<sup>1</sup> The Oslo Manual (Organization for Economic Cooperation and Development [OECD], 2005) classifies innovations as *new* products (both goods and services), processes, marketing methods, and organizational methods. Mairesse and Monhen (2010) add that innovations do not necessarily need to be new to the world but may be new to a firm, a region, a country, or even a community.

up of a network of actors and institutions that must be left open and flexible to any additions or subtractions (Lundvall, 1992; Cooke, 2001; Lundvall, Johnson, Anderson and Dalum, 2002; Edquist, 2005; Breschi and Malerba, 2005; Lema, Pietrobelli, and Rabellotti, 2018).

Nevertheless, Edquist (2005) argues that it is still essential to set boundaries for ISs. According to him, there are three ways to delimit ISs: spatially or geographically, sector, and activities. First, Edquist defines spatial and geographical systems as the administrative boundaries between regions or nations and areas with high cohesion in the innovation process. By cohesion, he cites three possible operationalizations: evidence of localized learning spillovers, mobility of skilled workers, and presence of innovation-related collaboration and partnerships among organizations within the region. Second, the primary delimiting factors of an IS by sector are specific technology fields or product areas. Edquist adds that sectoral systems also consider parts of geographical boundaries under the purview of a sector. Finally, when discussing the activities that constitute the boundaries of an IS, Edquist mentions ten activities<sup>2</sup> that are often present. Nevertheless, he adds that the activities that define an IS are constantly subject to change and may vary depending on the other delimiting factors. Given these delimitations, the innovation studies literature (Edquist, 2005; Fang, 2015; Malerba, 2002; Cooke, 2001) commonly discuss and delimit ISs in three ways: a national, sectoral, or regional innovation system.

---

<sup>2</sup> The ten common and important activities found in ISs by Edquist (2005) are: (1) R&D, (2) competence building, (3) new product markets, (4) articulation of demand side quality requirements, (5) creating and changing organizations, (6) networking, (7) creating and changing institutions, (8) incubating activities, (9) innovation financing, commercialization, and adoption activities, and (10) consultancy service provision.

Freeman first used the term national system of innovation (NIS) (Edquist, 2005). Then, the term was used almost interchangeably with the overall IS. However, currently, scholars use NIS more as a policy-oriented approach that seeks to understand the similarities and differences of innovation processes between countries (Fang, 2015). The key emphasis of NIS is the significance of policies that influence innovation in a country. The approach considers the geographic boundary of a state and its power in implementing its policies (Edquist, 2005). The strength of the NIS approach lies in its ability to depict differences between national-level innovation capabilities and specialties. However, its broad focus limits the effectiveness of learning about specific notions of innovation (Fang, 2015).

One such aspect of innovation that the NIS may have a challenge in assessing are specific sectors, and it is in this regard, that the SIS comes into play. Malerba (2002) defines SIS as a “set of new and established products for specific uses and the set of agents carrying out market and non-market interactions for the creation, production and sale of those products” (Malerba, 2002, p. 250). Rather than focusing on the national policy aspect of innovation, this approach places firms’ capabilities and learning processes as the central proponent and unit of analysis for innovation and production. The given knowledge base, technologies, inputs, demands, and institutional context specific to economic sectors of a sectoral system bind its capabilities and learning processes (Malerba, 2002; Malerba and Mani, 2009). SIS contain seven main elements (Malerba and Mani, 2009; Intarakumnerd, 2017):

1. *Firms in the sector* – the key actors who possess specific learning processes, capabilities, organizational structures, beliefs, expectations, and goals



2. *Other actors* – the organizations or individuals who also possess their learning processes, capabilities, organizational structures, beliefs, expectations, and goals. Examples of organizations are suppliers, users, universities, government agencies, financial institutions, and trade associations. Examples of individuals are consumers, entrepreneurs, users, and scientists
3. *Networks* – firms and actors interact and connect through market and non-market relationships. Interactions may be through various communication, exchange, collaboration, competition, and command processes. These connections formed or exercised through the sectoral system network may be sources of innovation. Each sectoral system network structure and interaction will vary from one another
4. *Demand* – may be composed of domestic and international individual consumers, firms, and public agencies differentiated by their size, knowledge, learning processes, and competencies and influenced by various institutional contexts
5. *Institutions* – a set of norms, beliefs, laws, routines, habits, practices, standards, and more, influence agents' actions and interactions in a sectoral system of innovation. Institutions have a significant effect on the rate of technological change, organization of innovative activity, and performance. Institutions may vary between formal (e.g., laws and regulations) to informal (e.g., beliefs and traditions) adoptions and vary by sectoral, national, or international levels. Higher levels (national and international) may have different effects on sectors. Some national or international institutions may foster an environment far more suited for particular sectors than others. On the other hand, some sectoral

institutions may also emerge as critical national institutions, thus becoming relevant for other economic sectors

6. *Knowledge-base* – every sector has its specific knowledge base, technologies, and inputs. The available sectoral knowledge affects the rate of innovation, type of learning, firms' capabilities, and other actors. Knowledge is also particular to individual firms, does not diffuse quickly and automatically to others, and is only absorbed by firms through differential abilities gained over time
7. *Main processes and co-evolution* – through a sectoral system, innovation occurs due to systemic interactions between the elements. As these elements interact, they also co-evolve and, over time, transform the sectoral system leading to changes in a sectoral system's boundary

Coombs et al. (2003) argue that the SIS also has its limits in that the approach does not touch upon inter-sectoral interactions and that the discussion on demand and market knowledge is limited. Moreover, Fang (2015) argues that the definition of sectors is often too broad, that the innovation process and selection of relationships are not focused on, and that the approach is associated with high technology sectors.

Another IS approach is the regional innovation systems (RIS). These RISs consider the role of local or regional actors at the center of their analysis (Cooke, 2001). Moreover, a RIS may be delimited to a particular spatial region or geographic location in a country or taken in a broader context. It may also refer to regions of the world, such as Southeast Asia, East Asia, and Latin America. One limitation posed by Doloreux and Parto (2004) is the lack of a unified method for defining the scope and scale to label a location as a RIS.

An additional approach that combines aspects of SISs and RISs is industry clusters. Porter (1998, 2000) describes clusters as a geographic agglomeration of interconnected firms, other actors (e.g., local/regional government agencies, trade associations, universities), forward and backward linkages of suppliers and customers, and institutions connected by a particular standard technology or industry that both compete and cooperate. Moreover, clusters are connected laterally to other related industries that exhibit horizontal and vertical linkages (Enright, 2003). An example of this is the California wine cluster's connection with tourism and food clusters located in California (Porter, 1998). The primary motivation for firms to be part of a cluster is the possibility of enhanced interaction and knowledge diffusion and decreased transaction costs due to the geographic proximity provided within the cluster, among others (Sonobe and Otsuka, 2006, 2011).

Breschi and Malerba (2005) describe four common elements of clusters. First, an essential ingredient in firms agglomerating and building a thriving innovation cluster is learning through networking and interacting. However, access to localized knowledge and capabilities of cluster-located firms depends on the cluster's ability to form and sustain active lines of communication within its boundary. The second element is a shared pool of resources available to members of the cluster. These shared resources may be exogenous (e.g., universities and public research institutes (PRIs)) and endogenous to the cluster (e.g., specialized and skilled labor). Next and like the previously discussed SIS, the available knowledge base, technologies, inputs, demands, and institutional contexts also bind the learning processes and capabilities of clustered firms and other actors. Finally, clusters are always part of a more extensive innovation system, whether it be a regional, sectoral, or national system.

The three different innovation systems discussed have their strengths and weaknesses in their analysis of various aspects of innovation. Table 2.3 summarizes the similarities and differences between the three systems.

Additionally, for specific technology fields, one may also take the ‘functions of innovation systems’ approach in analyzing ISs (Hekkert et al., 2007). Compared to the IS approaches discussed, the functions approach highlights systemic transitions and how technologies develop by assessing seven functions: entrepreneurial experimentation, knowledge development and diffusion, influence on the direction of search, market formation, legitimization, resource mobilization, and the development of positive externalities (Bergek et al., 2008; Iizuka and Gebreeyesus, 2016).

## **Section 2.4 The Co-evolutionary Relationship of GVCs and ISs**

Learning how GVCs and ISs vary in their approach to firm and industrial development, the next step will clarify how these two approaches complement and build upon each other. However, it is first essential to address a few misconceptions regarding the definitions of *upgrading* and *innovation*. According to Morrison, Pietrobelli, and Rabellotti (2008), the most confounding misconception is the seeming interchangeability of the two concepts in the GVC literature. Lema, Pietrobelli, and Rabellotti (2018), citing Taglioni and Winkler (2016), claim that some scholars consider upgrading as innovation and vice-versa. However, they counter this argument with other scholars, such as Ponte and Ewert (2009), and find that particular upgrading paths, such as product and process upgrading, do not necessarily coincide with their innovation counterparts. Hence, they posit that scholars and practitioners alike take a much broader view of actions that the current literature considers upgrading.

Table 2.3 Similarities and Differences of NIS, SIS, and RIS

Innovation System	Focus	Key notions or concepts	Boundary	Limitations	Key Similarities
National	<ul style="list-style-type: none"> <li>• Policy-oriented approach to promote or influence the innovation process</li> <li>• Power of the state in implementing policies</li> </ul>	<ul style="list-style-type: none"> <li>• Industry development policy</li> <li>• Science and technology policy</li> </ul>	<ul style="list-style-type: none"> <li>• Nation-bound</li> <li>• Not sector-specific</li> </ul>	<ul style="list-style-type: none"> <li>• Broad</li> <li>• Limited in learning specific notions of innovation</li> </ul>	<ul style="list-style-type: none"> <li>• Presence of the ten expected IS activities as listed by Edquist (2005)</li> <li>• Interaction between the different elements of an IS's level</li> <li>• Importance of institutions in influencing innovation</li> <li>• The comparative ability between two or more similar IS levels</li> <li>• Globalization influencing the different IS levels</li> </ul>
Sectoral	<ul style="list-style-type: none"> <li>• Capabilities and learning processes of firms</li> <li>• Co-evolutionary processes between SIS elements as a driver of sectoral growth and change</li> </ul>	<ul style="list-style-type: none"> <li>• Knowledge and technological base</li> <li>• Actors and networks</li> <li>• Institutions</li> </ul>	<ul style="list-style-type: none"> <li>• Specific to a product area or technology field</li> <li>• Not geographically bound, may span across the world</li> </ul>	<ul style="list-style-type: none"> <li>• Literature gap in discussing inter-sectoral interactions and demand conditions</li> <li>• Sectors may be too broad, usually associated with high-technology sectors</li> </ul>	
Regional	<ul style="list-style-type: none"> <li>• Interaction of actors in a specified locale or region</li> </ul>	<ul style="list-style-type: none"> <li>• Tacit knowledge</li> <li>• Costs of interaction</li> <li>• Localized or region-specific networks</li> </ul>	<ul style="list-style-type: none"> <li>• Region-bound, may be supra-regional (e.g., ASEAN, EU)</li> <li>• It may be sector-specific or span several sectors located in a region</li> </ul>	<ul style="list-style-type: none"> <li>• Lack of unified method in defining the scale and scope of a RIS</li> </ul>	

Note. The contents of this table are adapted from Cooke (2001), Malerba (2002), Chang and Chen (2004), and Edquist (2005).

Similarly, Morrison, Pietrobelli, and Rabellotti (2008) point to another misconception between upgrading and innovation. The authors claim that upgrading is also thought of as an innovation outcome while both terms are used interchangeably. Moreover, Ponte and Ewert (2009) argue that the current definition of upgrading seems limited. They believe that upgrading may occur even if a firm decides to *downgrade* per se as long as it leads to higher profitability or likely positive outcomes.

It is thus important to realize that upgrading and innovation do not overlap and that, as concepts, both are distinct from one another (Lema, Pietrobelli, and Rabellotti, 2018). To address these misconceptions, Morrison, Pietrobelli, and Rabellotti (2008) argue that scholars “stick to the concept of upgrading defined as innovation producing an increase in the value-added (p. 45)”. Furthermore, innovation, through the development of a firm’s technological capabilities, does not need to refer to *climbing up the chain* but instead deepening a firm’s current capabilities within the same part of the chain that may lead to additional functions within the same chain, or allow firms to sustain their current standing (Ponte and Ewert, 2009). Furthermore, the local industrial and organizational context – the IS – also influences a firm’s capability to innovate, apart from the level and depth of its technological capabilities. Box 2.1 provides Morrison, Pietrobelli, and Rabellotti’s definitions of technological capabilities and their elements based on the seminal works of Lall (1992) and Bell and Pavitt (1993).

**Box 2.1. Technological capabilities and its elements**

*Capabilities* – organization-specific knowledge accumulated over time. It is the sum of individual and collective skills and experiences.

*Technological capabilities* – the technical, managerial, and organizational skills firms require to efficiently utilize technology and achieve technological change.

*Investment capabilities* – skills necessary for an investment. These may include assessing project feasibility and profitability, and specifying details of the project (e.g., required technology, human resources).

*Production capabilities* – skills required for the efficient operation and its development over time.

*Linkage capabilities* – skills that establish technology linkages among and between innovation actors.

Note. Adapted from Morrison, Pietrobelli, and Rabellotti (2008).

One crucial way the GVC and IS approaches complement each other is by addressing each other's primary weaknesses (Lema, Rabellotti, and Sampath, 2018). For GVCs, the IS approach fills the gap in its overemphasis and reliance on the power and influence of chain leaders. For IS, the GVC approach extends assessments outside a region or a country, thus enabling the analysis to include the international inward and outward dimensions of knowledge flows. However, this simple addressing of weaknesses may not be enough to complement each other. It is also crucial that a country builds and further develops its IS as it integrates itself into GVCs, especially for developing countries (Lema, Pietrobelli, and Rabellotti, 2018).

Lema, Rabellotti, and Sampath (2018) posit that the IS and GVC approaches are relational and further complement each other through a co-evolutionary relationship. They propose a framework that highlights the co-evolutionary nature of both approaches that, in turn, seeks to explain the dynamics of building the innovation or technological

capabilities of local firms. Also, they demonstrate this co-evolutionary relationship through different stages of co-evolution and possible trajectories as the outcome.

Figure 2.3 provides a visual representation of Lema, Rabellotti, and Sampath's framework. The grey and lighter grey arrows represent how the GVCs and ISs contribute to the learning and capability building of the local firms, or, in this study's case, local producers and MSMEs<sup>3</sup>. The black arrows represent feedback loops that indicate how the two systems co-evolve as they interact with the local producers and MSMEs, the centerpiece of this framework.

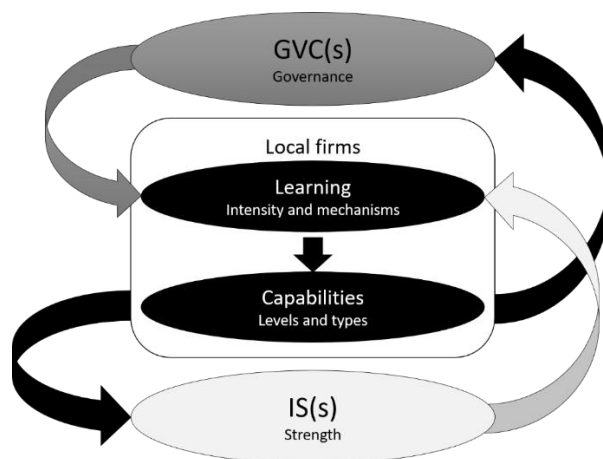


Figure 2.3 The co-evolutionary relationship between GVCs and ISs and their effect on local firms' innovation process or producers and MSMEs.

Note. This figure is adapted and modified from Lema, Rabellotti, and Sampath (2018) and Lema, Pietrobelli, and Rabellotti (2018).

<sup>3</sup> For the purposes of this study, the researcher adopts the categorization set by the Magna Carta for Micro, Small, and Medium Enterprises (Republic Act No. 9501) of the Philippines that categorizes MSMEs whose total assets, inclusive of loans but exclusive of lands, as follows: Micro – not more than 3-million Pesos (US\$ 60,000.00), Small – 3-million and one Pesos up to 15-million Pesos (US\$ 60,000.02 to US\$ 300,000.00), and Medium – 15-million and one Pesos up to 100-million Pesos (US\$ 300,000.02 to US\$ 2,000,000). These values are converted at a rate of US\$ 1.00 = Php 50.00.



The darker grey arrow links the GVC to local producers and MSMEs, allowing them to learn about global demands, consequently providing an opportunity to integrate themselves into the GVC. However, the prevailing governance structure of the GVC may either limit or open opportunities for integration and avenues of learning. Similarly, the lighter grey arrow links a country's IS, subject to its strength, to its local producers and MSMEs. This relationship may provide the necessary skills, knowledge, extension services, and other institutional support. The black arrows indicate how local producers and MSMEs influence the two systems. The current stock of capabilities received from the IS may influence how and where local producers and MSMEs engage in GVCs. Any changes to these capabilities may influence the GVC's governance structure. The opposite black arrow from capabilities to the IS will indicate the system's necessary skills and knowledge sought by local producers and MSMEs. The GVC and the IS then continuously evolve as they interact and respond to local producers and MSMEs' required and available knowledge and capabilities. Nevertheless, Lema, Rabellotti, and Sampath (2018) note that other forms of interaction may occur, such as a more direct interaction between GVCs and ISs due to the presence of multinational corporations. However, this framework highlights the relationship between the two approaches and how these affect the development of local producers and MSMEs – a critical relationship, especially for developing countries.

Under this relationship, Lema, Rabellotti, and Sampath (2018) propose three possible stages in the co-evolutionary process. The first is the *preliminary development stage*, where a production system and IS are not yet fully formed or created. However, sufficient and required enabling capabilities may be available, allowing local producers and MSMEs to participate in GVCs. The governance structures that dominate this stage

are captive or hierarchy patterns. The following *expansion and strengthening stage* enable local producers and MSMEs to build their capabilities and absorptive capacity. The governance patterns may expand towards modular or relational chains. The difference then lies in the *codifiability* of knowledge that will either see local producers and MSMEs challenged to meet the buyers' demands (modular) or have buyers always in close (face-to-face) interactions with local producers and MSMEs. In either case, the knowledge and capability requirements will need a denser and more coherent IS. The third stage is the *maturity stage*, where an even stronger IS allows for creating new knowledge that supports the development of even more robust capabilities. In this stage, local producers and MSMEs may compete on the same footing as the chain leaders, especially in developing countries. This stage may last for a significant amount of time. It may also broaden, deepen, and shift GVCs, assuming that the IS remains strong and continuously strengthens local innovation capabilities.

Lema, Rabellotti, and Sampath (2018) then arrange the three stages into four possible trajectories that they claim scholars have empirically found in their research on GVC participation and sectoral development. They, however, note that these four trajectories are only some of the possible paths the co-evolution of the GVC may take and that these paths may diverge over time. Nonetheless, to illustrate their concept of co-evolution, they wish to begin with these four trajectories: *gradual*, *in-out-in*, *aborted*, and *retrograding*. Table 2.4 summarizes the four possible trajectories and their effects on the local producer and MSME capabilities, the IS, the GVC, and some example countries and industries Lema, Rabellotti, and Sampath (2018) find that exhibit the trajectories.

Table 2.4 Trajectories of the Co-evolution of GVCs and ISs

Trajectories	Local producer and MSME capabilities	Innovation system	Value chains	Examples
<b>Gradual</b> (1)→ (2)→ (3)	Gradually and cumulatively strengthened	IS is sufficiently robust and strengthened by involvement in GVC	Value chains expand and strengthened with more rewarding and learning-intensive roles	Chile: salmon China and India: electronics, automotive, and space industry China: mobile phone and electric two-wheeler
<b>In-out-in</b> (1)→ (3), skipping (2)	Strengthened in successive jumps; waivers in between GVCs and IS for sources of knowledge and building capabilities	Strong enough to support value chain development	GVCs fail to provide learning opportunities; interrupted VC development; sequencing of local and global value chains	Brazil: footwear India: pharmaceuticals Korea: toys, musical instruments, and helmets
<b>Aborted</b> Stuck between (1) and (2)	Unchanged or hardly develops	Fragmented and unable to support chain development; limited absorptive capacity	Stagnant participation; limited learning in essential tasks	Bangladesh: aquaculture Kenya, Lesotho, and Swaziland: textiles
<b>Retrograding</b> Reverting from (1) to reduced innovation capacity	Weakened	Very weak IS; unable to support chain development; negatively affected by chain leaders' strong bargaining power	Change or exit from the value chain	Thailand: cassava Gabon: timber

Note. (1) – Preliminary development stage; (2) – Expansion and strengthening stage; (3) – Maturity stage. Modified from Lema, Rabellotti, and Sampath (2018).

#### 2.4.1 GVC and IS in developing countries

Lema, Rabellotti, and Sampath's (2018) framework and discussion make strengthening the IS to reap the benefits of GVC integration evident. Therefore, countries need to ensure that they can strengthen their ISs and, in turn, the capabilities of their local producers and MSMEs. This strengthening is especially crucial for developing countries where fragmentation and structural gaps in their local NIS, SISs, and RISs are common (Intarakumnerd and Chaminade, 2011).

These structural holes (Nakwa, 2013) or innovation gaps (Intarakumnerd and Chaminade, 2011) may take the form of cognitive gaps, managerial gaps, market-oriented gaps, or systemic gaps (Partners, 2007; Klerkx and Leeuwis, 2009). These gaps may vary within the context of different IS types or within the context of a firm.

Regarding market-oriented gaps, Partners (2007) highlights four specific gaps commonly found:

1. *Information gaps* – difficulties in product or service development identification due to the lack of required technologies
2. *Access gaps* – challenges in acquiring existing knowledge and technologies
3. *Transfer gaps* – negotiation challenges
4. *Translation gaps* – inability to understand new or existing knowledge and technologies

Likewise, Woolthuis, Lankhuizen, and Gilsing (2005) list four systemic failures that countries need to address:

1. *Infrastructure failures* – the lack of physical, knowledge, information technology, and other supporting infrastructures that support innovation

2. *Institutional failures* – the existence or lack of institutions that hinder innovation. These are further segmented into hard and soft institutions:
  - a. *Hard institutions* – “formal, written, consciously created institutions” (p. 612); e.g., technical standards, laws, regulations, and legal systems
  - b. *Soft institutions* – informal, spontaneously created institutions or implicit rules of the game, e.g., social norms and values, culture, ‘the way things are done,’ societal trust
3. *Interaction failures* – the excessive strong or weak interactions that hinder innovation. Strong network failure examples are the lack of open-mindedness to new ideas and technologies, the dependency on partners, or being led in the wrong direction. Weak network failures are the lack of sharing between networks, inability to learn from others, and absence of a feedback loop in innovation
4. *Capabilities failures* – the lack of necessary competencies, learning, knowledge, resources, capacity, and skills hinder a firm from innovation

Addressing these gaps and failures is essential for developing countries to maximize gains from GVC integration.

Moreover, a well-established IS may also allow shifts in the governance structures of the GVC. Pietrobelli and Rabellotti (2011) posit that developing countries would like to see their local producers and MSMEs participate in GVC governance structures that rely less on captive and hierarchical patterns, resulting in their constituents’ greater competency. To this end, Pietrobelli and Rabellotti present what institutional and organizational requirements are necessary for local producers and MSMEs to move from

low supplier capability or competence patterns to governance structures that seek high competence. Table 2.5 presents their ideas.

Table 2.5 Interaction of GVCs and ISs and the Requirements to Shift Governance Structures

	Governance type	Determinants	Innovation systems
1	Market	↓ complexity ↑ codification	MSTQ organizations are important
2	Modular	↑ supplier capability ↑ complexity	Education and training organizations are important
3	Relational	↑ codification ↑ supplier capability ↑ complexity	MSTQ organizations are important Education and training organizations are important 'Local' systems and complementary knowledge are important
4	Captive	↓ codification ↑ supplier capability ↑ complexity ↑ codification	MSTQ not as essential Education and training organizations are important MSTQ organizations are important
5	Hierarchical	↓ supplier capability ↑ complexity ↓ codification ↓ supplier capability	Low R&D organizations may gain from GVC interaction Improved technical skills expected from GVC interaction

Note. MSTQ – metrology, standards, testing, and quality. Adapted and modified from Pietrobelli and Rabellotti (2011).

Pietrobelli and Rabellotti (2011) believe that governance structures 1, 2, and 3 are more likely to occur if the IS is well-structured, complete, and connected. In contrast, structures 4 and 5 transpire when the IS is fragmented. For structures 4 and 5, GVC leaders may compensate the weaknesses of the current IS structure, but it will most likely

restrict upgrading opportunities, as evidenced in other studies (Gereffi and Bair, 2018). As for specific shifts, they believe it is possible to move from patterns 5 and 4 to 2 or 3 with the development of metrology, standards, testing, and quality (MSTQ) organizations for the prior and ‘local’ systems for the latter. Similarly, if the IS supports the capability and competence development of its local producers and MSMEs, governance structures may shift towards modular or relational chains.

A positive consequence of GVC integration for developing countries is that it may help reduce poverty, especially in rural areas (Humphrey and Memedovic, 2006; Altenburg, 2007). Furthermore, GVC participation may accelerate the achievement of other development goals (United Nations Industrial Development Organization [UNIDO], 2011). As an approach, GVC analysis may aid in identifying *poverty nodes* (Nadvi and Barrientos, 2004), locations that host a group of poor producers, or disadvantaged MSMEs. Knowing where the poor are located allows governments to tailor particular value chain interventions with a pro-poor stance (UNIDO, 2011) that may promote pro-poor employment in various industries (Lee, Gereffi, and Barrientos, 2011). Unsurprising is that growth and chain development in agriculture appear to have higher positive effects on poverty reduction in developing countries, as evidenced by experiences in Africa and Asia (Nadvi and Barrientos, 2004; Humphrey and Memedovic, 2006; Narrod et al., 2009; Lee, Gereffi, and Barrientos, 2011; UNIDO, 2011; Fernandez-Stark, Bamber and Gereffi, 2012; Ponte, Kelling, Jespersen, and Kruijssen, 2014).

In the context of innovation in the agricultural sector, developed countries cannot simply directly transfer their agricultural technologies to developing countries (Bell and Pavitt, 1993). Moreover, innovation in agriculture is unique owing to the segmented

nature of agricultural production and location specificity of agricultural technologies; thus, the need for adaptive research and the unceasing demand for research on the ever-evolving effects of climate change, pests, and diseases on the sector is essential (Pardey, Alston, and Ruttan, 2010). Hence, studies that support the need for deeper GVC integration and innovation in agriculture continue to prove highly beneficial, especially for developing countries.

## **Section 2.5 AFB Value Chains**

Given the current setup of global agriculture, where primary products are processed through several downstream activities, a broader value chain category may be apt. De Backer and Miroudot (2013) classify GVCs that link agriculture with downstream activities as *agri-food business value chains*. These are, according to them, buyer-driven GVCs led by food processors and retailers, where integration and participation significantly mean meeting quality and food safety standards. Even as developing countries have a comparative advantage in agriculture (de Janvry and Sadoulet, 2016), De Backer and Miroudot, through their case study on Nutella, claim that developing economies do not necessarily relegate themselves to upstream activities along the value chain. Instead, both developed and developing economies exhibit a mix of upstream and downstream activities.

AFB industries differ from other industries in many ways, and one clear distinction is its characteristic as a natural resource-based industry. Crespi, Katz, and Olivari (2018) suggest that natural resource-based industries differ structurally from *conventional* (i.e., manufacturing) industries in four ways: (1) location specificity of products as agriculture products are endemic in their ecology; (2) transitions towards a



science-based production organization influenced by changes in technology (e.g., biotechnology, genetics) but limited by local scientific and technological capabilities; (3) emergence of a network of outsourcing and subcontracting; and that, (4) natural resource-based industries are common goods that risk over-exploitation and will need to be protected through collective action.

When it comes to sources of technologies or innovation, Pavitt (1984) classifies agricultural industries as *supplier-dominated* in his taxonomy of existing industries. In his taxonomy, he describes *supplier-dominated* industries as relatively smaller with weaker R&D and engineering capabilities than other categories of *production-intensive* or *science-based* industries. Furthermore, Pavitt claims that equipment and material suppliers, government-funded research, and extension services provide most technologies and innovations in *supplier-dominated* industries. These characteristics, nevertheless, are still evident (Fernandez-Stark, Bamber, and Gereffi, 2012; Manalo et al., 2019) when one considers upstream to midstream portions of AFB GVCs. Furthermore, Pavitt believes that the underlying motivation for applying technologies and innovation is primarily to cut production costs.

On the other hand, de Janvry and Sadoulet (2016) show that cost-reducing technologies are just one technology or innovation that agricultural industries adopt. They distinguish agricultural technologies into five categories:

1. *Land-saving/yield-increasing* – these are technologies that marked the Green Revolution in the 1960s, that include the generation of new high-yielding crop varieties, fertilizers, insecticides and pesticides, and the development of irrigation

2. *Labor-saving/cost-reducing* – the introduction of animals for plowing or hauling and farm mechanization
3. *Risk-reducing* – adopting farm systems or processes that allow producers to be more resilient to shocks. These may also include producing new crop types that are climate, pest, and disease tolerant
4. *Quality-improving* – developing and planting crops with enhanced shelf-lives or more nutritious, such as golden rice in the Philippines (Zimmermann and Qaim, 2004)
5. *Externality-reducing or enhancing* – examples of externality-reducing technologies are those that reduce water pollution, pesticide use, and soil erosion. In contrast, externality-enhancing technologies are “carbon sequestration, agroecology, agroforestry, and biodiversity preservation in traditional farming systems” (p.654)

Regarding upgrading in agricultural chains, Ponte and Ewert (2009) contend that the characterizations accepted and defined by the literature do not fully capture the reality and the challenges faced by producers and MSMEs involved in AFB value chains. The scholars point to five challenges to the accepted view of upgrading. First, they claim that product and process upgrading for AFB industries are often difficult to distinguish as some new processes create new products (i.e., one may consider organic or sustainable produce as product upgrading but also requires particular process upgrades that allow a producer to classify and certify their products as organic or sustainable). Second, they argue that process upgrading with increased efficiency as an outcome of improved technological capabilities and innovation does not adequately consider the importance of matching global standards. Complying with food safety standards implies that improving

production processes may not be more efficient, cost-saving, or profit-maximizing for the producer or MSME. Producers may perceive matching these standards as a condition or barrier to entry rather than a driver to upgrade, especially in these buyer-driven chains (Humphrey and Memedovic, 2006).

Moreover, Ponte and Ewert's third challenge is that the literature often relates upgrading to the production process but does not fully express the need to upgrade in other related activities. Participating and competing in AFB GVCs will require upgrading outside of the production process. These are often the challenges of producers and MSMEs in developing countries (e.g., matching strict logistics and delivery schedules, consistently delivering homogenous products, or having adequate management capabilities (Ballesteros and Ancheta, 2020).

Fourth, they challenge the idea of always aiming for *higher-quality* products; aiming for *high-quality* can be a barrier but may also be an entry point for lower-quality but high quantity sales of a similar product. Ponte and Ewert cite the success of Australia's Penfold wines which carry *low* range wines, as part of their endorsed flagship wines. The two scholars recommend creating a portfolio of related products as another strategy for upgrading.

Finally, Ponte and Ewert point to the significance of economies of scale in agriculture. Developing countries may not need to initially proceed through the classic upgrading mechanisms but may instead choose to undergo aggregation or agglomeration of produce. However, the challenge posed by the third point is essential to remember and tackle simultaneously. Producers may come together and sell their products collectively, but their products may need to be similar to another. Fernandez-Stark, Bamber, and

Gereffi (2012) suggest two agglomeration methods: cooperatives, outgrower, or contract farming. Cooperatives may search for multiple buyers and negotiate for higher prices. These organizations may also scale production by adding produce processing and act as a source of credit for their members. Unlike cooperatives, outgrower or contract farming schemes allow producers access to a guaranteed market. Another marked difference with cooperatives is that the buyer manages this system. Buyers organize producers and provide the necessary inputs, technical support, and credit to guarantee that the producers attain the required quality and sell all their produce to the buyer. This scheme, however, does not foster many opportunities for upgrading and innovation on the part of the producers. Another approach to capitalizing on economies of scale is by focusing on clusters. According to Pietrobelli and Staritz (2018), the cluster perspective may provide producers and MSMEs way to increase:

“...bargaining power, reduce buyers’ transaction costs of dealing with large numbers of [producers or MSMEs], provide a platform for sharing information and demonstrating new products, processes or technologies, and can facilitate [producers and MSMEs’] access to support services such as training, extension, or finance that may turn essential for upgrading with GVCs. By facilitating bulk purchasing of inputs or enabling large orders to be filled, horizontal linkages can help small firms generate economies of scale and interact with large buyers.” (p. 569)

## **Section 2.6 Intermediary organizations: types, roles, and key-capabilities**

One aspect of Pietrobelli and Rabellotti’s (2011) GVC and IS interaction analysis is the presence of third-party organizations. These third-party organizations may provide the necessary skills, capabilities, and linkages that aid local producers and MSMEs in influencing the GVC governance structure and possibly upgrade their respective AFB

value chains. In the broader picture of GVC and IS interaction, Pietrobelli and Rabelotti repeatedly mention the importance of MSTQ organizations and knowledge-intensive business services (KIBS). While specifically for agriculture, Fernandez-Stark, Bamber, and Gereffi cite the relative importance of cooperatives and extension service providers. These types of organizations that help build the capabilities of local producers and MSMEs and attempt to address barriers to upgrading and innovation are what the literature calls *innovation intermediaries*.

Howells (2006, p. 720) defines innovation intermediaries as “an organization or body that acts [as] an agent or broker in any aspect of the innovation process between two or more parties.” These intermediaries, sometimes called innovation brokers (Winch and Courtney, 2007), are often third-party individuals or organizations seeking to create a lasting relationship between their partners and themselves (Howells, 2006; Partners, 2007). Howells (2006) adds that intermediaries do not necessarily have to link their partners to others. Instead, intermediaries may also provide direct services to their partners that do not involve interactions with other organizations. Services that may present these are contract research, testing, and training work. Howells further explains that intermediaries likely began as organizations that supply direct services and evolved, adding mediating or brokering functions. Thus, intermediation covers a range of known and emerging functions involving direct service provision and linking interactions for their partners (Howells, 2006; Kivimaa, Boon, Hyysalo, and Klerkx, 2019).

More than just connecting parties, intermediaries are also active animators in ISs and allow for the creation of new interactions with previously disconnected actors or institutions (Howells, 2006; Partners, 2007; Klerkx and Leeuwis, 2008) and even

transform relationships within an IS (Lynn, Reddy, and Aram, 1996). Intermediaries may create or strengthen connections between firms (Foster and Ocejó, 2015), university and industry (Cardamone, Pupo, and Ricotta, 2015; Sutthijakra and Intarakumnerd, 2015; Friedman and Silberman, 2003), government and industry (Kivimaa, 2014; Intarakumnerd and Chaoroenporn, 2013a), firms within an industry (Lim, 2018), university and disadvantaged urban communities (Go, 2019), and many others. Furthermore, researchers (Howells, 2006; Partners, 2007; Sutthijakra and Intarakumnerd, 2015; Kivimaa et al., 2019; Go, 2019) find that intermediaries often aid in addressing innovation gaps present on different IS levels. Van Lente et al. (2003) add that intermediaries have a pivotal role in innovation systems undergoing transitions and not just during periods of stability.

Cornett (2009) finds that different interactions and relationships within an IS require various intermediary organizations. The intermediary types necessary depend on the actions required and the relationship desired by those seeking intermediation. Several studies attempt to categorize the various types of intermediaries. Van Lente et al. (2003) analyze how intermediaries interact as an innovation system undergoes systemic transitions. They categorize intermediaries into KIBS, Research and Technology Organizations (RTO), and (semi-)public or industry associations. They differentiate the three groups in terms of the intermediary's ownership, objective, skill or service provision, diversity of services, funding source, initiative and relationships, and international dimension. Based on Van Lente et al.'s (2003) typology, intermediaries differ primarily in ownership structure and primary objective. Intermediaries can provide various hard and soft services regarding the services they offer depending on their objectives. Table 2.6 describes these groups in much greater detail.

Similarly, Kivimaa et al. (2019), through a systemic review of intermediaries in literature, find that systemic intermediaries are only a part of the intermediary types. Like Van Lente et al. (2003), they studied intermediaries found in innovation systems and factor in the concept of sustainable systemic changes (i.e., sustainable transitions). They group intermediaries involved in sustainable transitions as systemic, region-based transition, niche, process, and user intermediaries. Kivimaa et al. (2019) differentiate these five groups through their context or level of action, emergence, intermediation goal, and normative position (divided into position and neutrality or interest). Compared to Van Lente et al.'s (2003) typology, Kivimaa et al. (2019) can show when a particular systemic intermediary is necessary and when they emerge. Table 2.7 presents the details of these categories.

Particularly for agricultural industries, Klerkx and Leeuwis (2009) categorize intermediaries into seven types. Like Kivimaa et al. (2019), they distinguish systemic intermediaries from other types. They describe innovation consultants for individuals, innovation consultants for collectives, brokerage organizations for peer networking, systemic intermediaries, internet portals, research organizations with an innovation agency, and education intermediaries. They characterize their typology by functions, coverage, ownership, funding source, and innovation focus. Table 2.8 presents their adopted typology of intermediaries in agricultural industries.

Table 2.6 Types and Roles of Systemic Intermediary Organizations

Type of Intermediary	Ownership	Objective	Service Provision	Service Diversity	Funding Source	Initiative and Relationships	International Dimension
1. KIBS	Private	Profit generated from clients	Both management (soft) and engineering (hard) services	Very diverse	Payment from clients	Usually, the client possible after advertising by KIBS, per-project basis, and primarily one to one	Often have practices abroad, willing to work internationally
2. RTOs	Semi-public	Supply of technical knowledge to industry; non-profit	Primarily 'hard'	Applied technical knowledge	Government funding and additional income from industry	Own programs where funding is sought, long term projects with possible industry participation, one to one or many	Finds difficulty due to public funding; although increasing in international activity
3a. IAs	Independent (controlled by members)	Supports the industry; non-profit	'Hard' and 'soft'	Diverse	Membership fees (or government subsidies)	From both the association and the industry, support is always available for the entire industry	National but for some industries, international
3b. Chambers of Commerce	Government	Supports commercial activity within a geographic area	'Soft'	Support and training	Annual fees for firms in its area and payment for other services	Advertises services, but usage depends on firms, repeated short-term interactions	Occasional aid in businesses investing in their area
3c. Innovation Centers	Government	Support for facilitating innovation	'Hard' and 'soft' with an emphasis on the latter	Support, training, and networking	Government funding	Approaches firms and willing to work with many	Occasionally
3d. University-liaison Offices	University	Earn additional income for their university	Often 'hard'	The brokerage of applicable knowledge (science-based)	University and industry	Takes the initiative for collaboration, both one to one and, if possible, with a group of firms	Often international but contested when funded publicly

Note. Modified from Van Lente et al. (2003).



Table 2.7 Type and Roles of Intermediaries Involved in Systemic Transitions

Type of Intermediary	Context or Level of Action	Emergence	Intermediation Goal	Normative Position	
				Position vis-à-vis Niche	Neutrality or Interest
1. Systemic Intermediary	System-level between multiple actors and interests	Normally established for intermediation	Pursues given system level (sustainability) goals; ambitiousness towards disruption to the existing system	An outsider to a given niche creates space for multiple, alternative niches	Typically regarded as neutral and unbiased, despite its interest in stimulating transitions
2. Regime-based transition intermediary	System-level between multiple actors and interests but works within a given mandate by the dominant regime	Existing actors subsuming intermediary roles; established by the dominant regime to intermediate for transition	Pursues given (sustainability) goals through more incremental or political means	An outsider to a given niche creates space for multiple, alternative niches	A player in the dominant system but pursuing or empowered for change
3. Niche intermediary	Between local projects or a higher level of aggregation	Often emerging when a niche (or technological innovation system) develops	Pursues given (sustainability) goals and solutions from a given niche (or technological innovation system (TIS)) perspective	Insider to given niche (or TIS)	A player in advancing a specific niche (or TIS)
4. Process intermediary	Within experimental projects or specific processes facilitating transitions	Established typically to provide day-to-day services in transition projects or processes	Implementing context-specific priorities, known through broader transition trajectories	Usually, outsiders to a given niche	Neutral or unbiased networker that does not have a specific agenda in the process
5. User intermediary	Between technology and usage, or niche technology and dominant design	Surfaces from users and consumers	Performs as a facilitator, representative, or broker of end-users	Insider or outsider to a given niche	Leans towards users' interests (sometimes even as activists)

Note. Modified from Kivimaa et al. (2019).

Table 2.8 Type and Roles of Intermediaries in Agricultural Industries

Type of Intermediary	Functions	Coverage	Ownership	Funding Source	Innovation Focus
1. Innovation consultants for individuals	Demand articulation; Network composition; Brokerage within an established network	Regional; Regional focus with national coverage; Both sub-sector and cross-sector oriented	For-profit private; Quasi-autonomous government agency; Non-profit foundations	Public/private through subsidies or shareholding; User payments	Generally incremental, and within individual firms; Short time horizons
2. Innovation consultants for collectives	Demand articulation; Network composition; Brokerage within an established network	National; Regional; Both sub-sector and cross-sector oriented	For-profit private; Quasi-autonomous government agency; Non-profit foundations	Public/private through subsidies or shareholding; Private collective through subsidies; User payments	Generally incremental and relevant for the collective of similar groups in the context of a production chain; Short time horizons
3. Brokerage organizations for peer networking	Demand articulation; Network composition	National; Sub-sector oriented	Non-profit foundations	Public through subsidies; User payments	Generally incremental and relevant for the collective of similar groups; Short time horizons
4. Systemic intermediaries	Demand articulation; Network composition; Research planning	National; Sub-sector oriented	Quasi-autonomous government agency; Non-profit foundations	Public through subsidies; Private collective through subsidies	Generally radical/systemic innovation and transitions; Higher system levels; Medium to long time horizons
5. Internet portals	Network composition	National; Sub-sector oriented with categorical subdivisions	For-profit private; Part of publicly financed research and advisory projects	Private through user fees; Public for project-related and other specific audiences	A broad range of links for operational, tactical, or strategic innovation issues; short time horizon
6. Research organizations with innovation agency	Demand articulation; Brokerage within an established network	Both sub-sector and cross-sector oriented	Quasi-autonomous government agency; Non-profit foundations	Public through subsidies	Incremental and radical; short to medium time horizons
7. Education intermediaries	Demand articulation; Network composition	National	Non-profit foundations	Public through subsidies	Circular innovation

Note. Modified from Klerkx and Leeuwis (2009).

Though the presented typologies illustrate a wide array of intermediaries, there are still some intermediaries that these groups may have not yet captured. Recent studies reveal some of these less-studied intermediaries. Lindberg, Lindgren, and Packendorff (2014) illustrate how non-government organizations (NGOs) act as intermediaries in their study on women and entrepreneurship in the Baltic Sea region. They find that the NGOs can collaborate between partners and successfully link communities to the innovation process. Foster and Ocejo's (2015) study on new cultural intermediaries show how professionals such as barbers, chefs, baristas, and bartenders act as brand ambassadors to broker arrangements within their industries. Go's (2019) study reveals how urban community-based credit cooperatives can link a university with communities through a university's social involvement programs and how the government may support cooperatives as intermediaries. Of the three presented typologies, Klerkx and Leeuwis allude to some of these less-studied organizations that provide intermediaries services or functions.

From these three typologies, one can highlight four common characteristics that appear to be significant when understanding intermediaries. The first is the objective or the function of an intermediary. As Howells (2006) also mentions, intermediaries do differ in the functions they perform. The second common characteristic is the network of an intermediary, described by Van Lente et al. as relationships, Klerkx and Leeuwis (2009) as coverage, and Kivimaa, et al. (2019) as the level of action and normative position. With intermediaries acting as a go-between for two or more parties, its network may be seen as a significant part of the intermediary's identity. The third common characteristic is an intermediary's source of funding. This characteristic may be necessary

as intermediaries are often distinguished as neutral, and their funding source may affect this perceived neutrality (Klerkx and Leeuwis, 2009; Winch and Courtney, 2007).

The fourth common characteristic is an intermediary's ownership structure. Intarakumnerd and Chaoroenporn's (2013a) study on public and private intermediaries in Thailand's automotive sector highlights how ownership structure differences may distinguish an intermediary's functions and roles. For example, they show that public intermediaries focus more on providing public goods for sectoral upgradings, such as policies that support the SIS. On the other hand, they find that private intermediaries are best suited for dealing with interactions within the sectoral system, such as promoting trust between actors in a system or technological diffusion to individual firms. Table 2.9 summarizes the differences in focus and activities of public and private intermediaries from their study.

Table 2.9 Type and Roles of Public and Private Intermediaries

Type	Dominant Role Provided (Based on Partners, 2007)	Services Offered	Requirements to Work Properly	Common Roles
Public	<ul style="list-style-type: none"> <li>• Consultant</li> <li>• Mediator</li> <li>• Resource Provider</li> </ul>	<ul style="list-style-type: none"> <li>• Public goods provision</li> <li>• R&amp;D</li> <li>• Industrial and Support Policies</li> <li>• Training</li> <li>• Facilities</li> <li>• Networking</li> </ul>	<ul style="list-style-type: none"> <li>• Consistent public funding</li> <li>• Clear government authority</li> </ul>	<ul style="list-style-type: none"> <li>• Mediation between and outside of industry network</li> </ul>
Private	<ul style="list-style-type: none"> <li>• Broker</li> <li>• Mediator</li> </ul>	<ul style="list-style-type: none"> <li>• Promote trust between members (in the case of IAs) and with private companies inside and outside of the industry</li> <li>• Technology diffusion</li> <li>• Assisting SMEs</li> <li>• International marketing</li> </ul>	<ul style="list-style-type: none"> <li>• Constant customers for funding</li> <li>• Competition for R&amp;D</li> </ul>	<ul style="list-style-type: none"> <li>• Support activities for each other</li> <li>• Consistent opportunities for personnel exchange</li> </ul>

Note. This table is adapted and summarized from Intarakumnerd and Chaoroenporn (2013a).

In their studies on a mango cluster in Peru and a palm oil cluster in Colombia, Ramirez, Clarke, and Klerkx (2018) also highlight the significance of ownership structure for intermediaries. Their findings support those of Intarakumnerd and Chaoroenporn as they find that publicly owned intermediaries were more effective in facilitating opportunities for the cluster by broadening the mango firms' network and assisting firm upgrading and improving coordination within the cluster. Similarly, the privately-owned intermediaries in Ramirez, Clarke, and Klerkx's study on the mango cluster provided technology diffusion, MSME assistance, and international market linkages. Furthermore, their study also validates Intarakumnerd and Charoenporn's claim of the need to delineate tasks between public and private intermediaries. Moreover, Ramirez, Clarke, and Klerkx found that a private firm was the central intermediary for the cluster in the palm oil cluster portion of their research. Though the privately-owned intermediary provided the services required by the cluster, it did so with its private interest in mind and not for the development of the entire cluster.

Despite having various intermediary types, intermediaries perform numerous functions (Howells, 2006). Most common is their role in linking various actors and institutions (Van Lente et al., 2003; Howells, 2006; Partners, 2007; Intarakumnerd and Chaoroenporn, 2013a; Sutthijakra and Intarakumnerd, 2015; Chunhavuthiyanon and Intarakumnerd, 2014). In addition, as an IS solidifies and evolves (Van Lente et al., 2003), intermediaries may also provide various functions that increase and change over time (Howells, 2006; Foster and Ocejo, 2015). However, intermediaries generally perform three primary functions: demand articulation, network formation, and innovation process

management (Klerkx and Leeuwis, 2009). To further distinguish an intermediary's functions, Partners (2007) posits that intermediaries generally perform four primary roles:

1. Consultant – providing expert knowledge and advice on technology acquisition or linkage requirements
2. Broker – negotiation and transaction of knowledge, skills, technology, or collaborative activities between parties
3. Mediator – creating interaction and collaboration opportunities between parties; conflict mediation between parties (Intarakumnerd and Chaoroenporn, 2013a; Intarakumnerd and Chaoroenporn, 2013b; Chunhavuthiyanon and Intarakumnerd, 2014)
4. Resource Provider – provision of financial resources for contracted partnerships and other forms of resources (e.g., training, physical resources, human resources) (Go, 2019)

Intermediaries often provide services related to one or a mix of the roles, but intermediaries rarely perform all four roles. Furthermore, Foster and Ocejó (2015), in their study on cultural intermediaries, posit that intermediaries may shift between roles as the production process changes or as their partners' requirements change (i.e., music production that goes through a process of production, selection, and promotion). Nevertheless, it may still be possible for intermediaries to perform all four roles at a given time. For example, Sutthijakra and Intarakumnerd (2015), in their study on the Thai hard disk drive industry,

and Go (2019), in his study on urban community-based cooperatives, demonstrate that intermediaries can perform all four roles but in different capacities and intensities.

Innovation intermediaries are also present in GVCs. However, they may not necessarily be described explicitly as innovation intermediaries. Gereffi and Fernandez-Stark, (2018) describe how GVCs require a set of stakeholders composed of the value chain players and other types of organizations and institutions like industry associations, educational institutions, and government agencies. They further mention that these other organizations and institutions are especially relevant as they have roles to play in developing their industry. Several of those organizations and institutions they mentioned have been categorized as innovation intermediaries in the IS literature but have not been recognized to the same extent in the GVC literature.

Still, several studies explicitly use the term intermediary. However, these studies primarily present intermediaries related to the international trade aspect of the value chains (Vik and Kvam, 2018). For example, Gereffi and Korzeniewicz (1990) find several intermediaries that take the role of trade agents, facilitating the import and export of products. Likewise, Perri and Buchan (2018) highlight the role of intermediaries as trade agents in their study on the differences between Eastern and Western hemisphere trade intermediaries. Interestingly, they find that intermediaries also bridge cultural gaps and cultural information asymmetries vital in bargaining. They also emphasize the importance of fostering trust between the importers and the exporting firms, especially the intermediary's trust forms with its partners.



Underlying intermediary role performance, Sutthijakra and Intarakumnerd (2015) posit that these organizations require a set of key-capabilities necessary to improve and perform their roles more successfully. These key-capabilities build over time as an intermediary develops itself and trains its staff. Sutthijakra and Intarakumnerd posit four key-capabilities that intermediaries must build to enhance their network and resources. The four capabilities they propose are:

1. *Network Capabilities* – the ability of an intermediary “to build relationships, stimulate linkages, and constantly coordinate between” (p. 191) the other institutions or organizations they partner with or intermediate. This relationship-building process fosters trust between partners to lower uncertainties and grow fidelity and performance (Adler and Kwon, 2002)
2. *Coordination Capabilities* – the ability of an intermediary to communicate between its partners and within the intermediary. In building trust, an intermediary and its staff's communication skills – interpersonal and negotiation – have to be used and developed. This capability is not just used when intermediating between partners. However, it must also be passed down and taught to the junior staff of the intermediary to further foster trust or quash conflicts
3. *Knowledge-building Capabilities* – the ability of an intermediary to gain, amass and utilize sector- or organization-specific knowledge that their partners desire from them as an intermediary. This capability includes the intermediary's current pool of skills and assets (e.g., human resources, technology) and identifying and acquiring needed knowledge (e.g., hiring skilled workers or undergoing further studies)

4. *Management Capabilities* – the ability of an intermediary to manage, implement, monitor, and evaluate projects or programs. Having and developing this capability is not just for the intermediary but also may be taught or used to aid its partners

Apart from these four key-capabilities, Sutthijakra and Intarakumnerd (2015) add that two underlying capabilities are also necessary to build the four key-capabilities effectively. These are strategic capabilities and learning capabilities. Strategic capabilities allow the intermediary to establish and utilize plans that guide and motivate the organization for success in its services. Learning capabilities provide the intermediary with avenues for individual and collective learning of tacit and codified knowledge. An intermediary must also strengthen its absorptive capacity to identify accurately and collectively learn from its intermediation process or training experiences (Cohen and Levinthal, 1990; Humphrey et al., 2018).

Following their approach, Go (2019) utilizes Sutthijakra and Intarakumnerd's four key-capabilities as part of his analytical framework in his study. However, he finds multiple observations for each capability overlapping with one another. Thus, Go adapts these four key-capabilities into the following:

1. *External Networking Capabilities* – the capability of an intermediary to create, encourage, and sustain relationships and linkages outside of its currently available network
2. *Internal Communication Capabilities* – this capability of an intermediary to sustain and deepen relationships and linkages within its currently available network

3. Knowledge-building Capabilities – the capability of an intermediary to increase and apply current or identify and acquire new sector- or organization-specific knowledge that their partners require of them
4. Project Implementation Capabilities – an intermediary's capability to implement and evaluate projects, programs, or policies from and with its partners

## **Section 2.7 Literature Gaps**

Based on this literature review, the researcher identifies several literature gaps regarding intermediaries and their occurrence in the co-evolutionary relationship of GVCs and ISs.

Firstly, this research wishes to fill the lack of integrated research on intermediaries between the GVC and IS literature. On the IS side of the literature, intermediary research is more advanced, with scholars analyzing deeper into the roles and key-capabilities of intermediaries (Sutthijakra and Intarakumnerd, 2015; Go, 2019). As presented in the early sections of this chapter, innovation intermediary studies in IS literature focus on developing the local capabilities of its domestic firms and how the context and development of a country's various IS levels may affect the roles and functions of intermediaries.

In this researcher's view, the same amount of work is not yet comparable in the GVC side of intermediary literature, even though GVC researchers mention the crucial role that extra or non-production process actors play in industrial development (Gereffi and Fernandez-Stark, 2018). It is necessary to identify innovation intermediaries and their roles related to inclusion and further participation and upgrading, especially as GVCs and ISs co-

evolve. Still, for those that study intermediation in the GVC, the work relegates itself primarily to identifying intermediary roles and suggested functions related to trading between firms in different countries (Gereffi and Korzeniewicz, 1990; Gereffi and Fernandez-Stark, 2018; Vik and Kvam, 2018; Perri and Buchan, 2018). Except for Ramirez, Clarke, and Klerkx (2018), there is a significant lack of research that assesses how intermediaries specifically aid in the further participation and upgrading of producers and MSMEs in GVCs.

Nonetheless, the significance of intermediaries in supporting innovation in ISs and upgrading in GVCs is clear. Thus, integrated research on how intermediaries perform their roles and functions in the GVC-IS relationship is necessary, especially at this time when the literature on the co-evolution of these two systems is developing (Pietrobelli and Rabellotti, 2011; Lema, Rabellotti, and Sampath, 2018; Pietrobelli and Staritz, 2018; Lee, Szapiro, and Mao, 2018).

In addition, newer types of organizations are exhibiting intermediary functions. One example of these is online social media groups that facilitate knowledge transfer, like Wang et al. (2012) and Cain and PolICASTRI (2011). However, these studies are limited to the education sector. However, a recent study by Asha and Raju (2019) also describes how a social media group is being used in Indian agriculture for trade and information sharing. Another example of an unconventional organization providing intermediary functions is the private firm in Ramirez, Clarke, and Klerk's (2018) study on the Colombian palm oil cluster. This dissertation seeks to also add to the literature by providing additional evidence of newer intermediary types, particularly looking into these newer types' role performance.

In addition, this study also adds to Intarakumnerd and Chaoroenporn's (2013a) work on dividing the intermediary responsibilities between public and private sector organizations. Apart from analyzing intermediary organizations across the value chain, comparing the different types of organizations is also done.

The second gap relates to the lack of comparative work on intermediaries in different parts of the same value chain. Although studies on intermediaries in GVCs are available (Gereffi and Korzeniewicz, 1990; Vik and Kvam, 2018; Ramirez, Clarke, and Klerkz, 2018), previous research has tended to focus on the roles of intermediaries in individual parts of a value chain. For example, Perri and Buchan (2018) and Vik and Kvam (2018) highlight the trade agent role of intermediaries. However, their analysis seems limited to the marketing level of the value chain (i.e., transactions on the export and import market level). Particularly for AFB value chains, Devaux et al. (2009), Devaux, Torero, Donovan, and Horton (2018), and Perez Perdomo, Klerk, and Leeuwis' (2010) studies focus on the upstream portions of the GVC. There is a need to investigate intermediaries that link both and work exclusively or inclusive of the upstream and downstream portions of the GVC. This study seeks to bridge this gap by assessing the similarities and differences of intermediaries present in different parts of the same GVC.

Thirdly, this research attempts to address a criticism placed on Malerba's (2002) SIS concept in that it lacks ample attention to demand conditions (Coombs et al., 2003). To address the critique, this study also analyzes intermediary roles and key-capabilities in sectors

that exhibit differing market orientations (i.e., domestic market-oriented and export market-oriented).

Fourthly, as Sutthijakra and Intarakumnerd (2015) showed, the success of an intermediary's role performance depends on building key-capabilities. Nevertheless, though intermediaries are present in GVC literature, none – to this researcher's knowledge – has attempted to study whether intermediaries involved in GVCs require similar or additional key-capabilities and if intermediaries in different parts of the same value chain differ in their key-capabilities.

Finally, a limitation posed in the intermediary key-capability studies of Sutthijakra and Intarakumnerd (2015) and Go (2019) is that they derive their evidence from high-tech manufacturing and service sector cases. Building on their work, this study will add to their work by observing intermediaries from the AFB industry sector, representing the resource-based industries.

## **Section 2.8 Conceptual and Analytical Frameworks**

### *2.8.1 Conceptual framework*

This study employs a research diagram to illustrate its conceptual framework. Furthermore, the diagram aids the investigator in framing the research and answering the research questions. The figure also serves to help visualize and lead the investigator in selecting the actors and inspecting the variables relevant to this study. Figure 2.4 presents the study's three independent and two dependent variables. The three independent variables are

organization type, value chain segment location, and primary market orientation, while the two dependent variables are an intermediary's roles and key-capabilities.

The three independent variables are derived from the literature gaps on the need for further evidence of role performance and key-capability building by newer organization types, further delineation of intermediary roles of private and public sector organizations, and the lack of a whole value chain approach in analyzing intermediary roles and key-capabilities and addressing the lack of attention on the demand conditions in SISs.

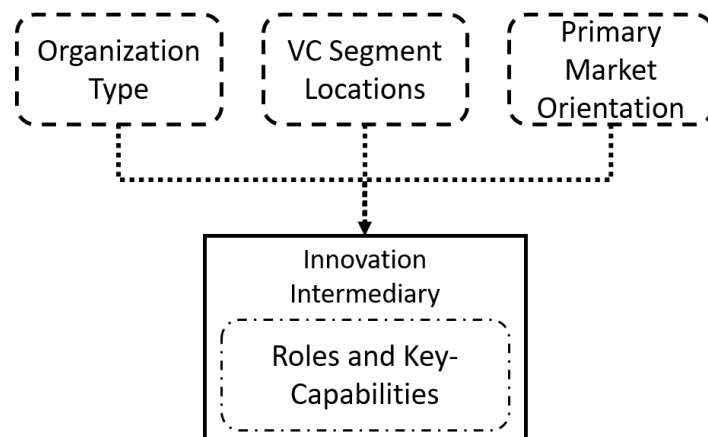


Figure 2.4. Research diagram portraying how the three main variables may affect an intermediary's roles and key-capabilities.

Note. 'VC' stands for the value chain. The lead investigator created this diagram for this study.

As a starting point for organization types, this study bases its initial identification of organization types on Van Lente et al. (2003) but also draws from the typologies provided by Klerkx and Leeuwis (2009) and Kivimaa et al. (2019). Following Van Lente et al. (2003), this study specifies what kind of organization the intermediary is and not in its generalized

typology (e.g., systemic intermediary, niche intermediary). From the organization types identified in the three mentioned studies, this study further classifies newer organizations that perform intermediary roles, such as Asha and Raju's (2019) and Ramirez, Clarke, and Klerkx's (2018) studies.

Regarding the whole value chain approach, Figure 2.5 presents a value chain for a general AFB GVC. It begins with the input supply and then proceeds to produce the raw agriculture product. Next, the chain proceeds to post-harvest processing and moves towards aggregation or assembly of the harvested products. Finally, some products either go through further processing into other products or are marketed as fresh products. Organizations interact with local and international players in their chains in the marketing segment.

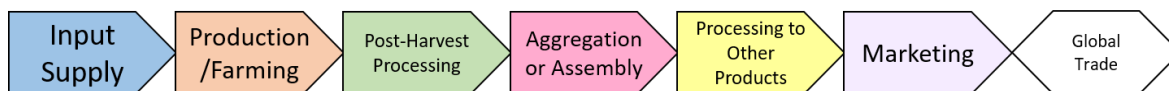


Figure 2.5. A general global value chain for agri-food business industries.

Note. The researcher based this figure on the value chains adapted for this study.

Following the SIS, several of the elements were considered for the study. Studies on demand conditions were needed more than others, so the researcher decided to focus on this element. Nonetheless, the other SIS elements of the AFB industries in this study are also contrasted to show the differences between them. Although these other elements may affect intermediary role performance and key-capability building, this study will focus on the demand conditions as the third primary independent variable.

This study differentiates demand through two types of market-oriented sales or development: export-oriented or domestic-oriented, representing how demand conditions



may affect intermediary role performance and key-capability building. This differentiation also serves as the foundation of the cross-case comparison between the two industries in this study. As will be discussed in the succeeding chapters, the mango industry represents export market-oriented chain integration or development. In contrast, the rice industry represents domestic market-oriented chain integration or development.

### 2.8.2 Analytical framework

This study integrates the frameworks of intermediary roles by Partners' (2007) and intermediary key-capability building by Sutthijakra and Intarakumnerd (2015), and as adapted by Go (2019), into the GVC-IS co-evolutionary relationship. Partners (2007) identifies four primary intermediary roles: *consultant*, *broker*, *mediator*, and *resource provider*. Based on these four primary roles, Sutthijakra and Intarakumnerd (2015) identify four key-capabilities of intermediaries: *network capabilities*, *coordination capabilities*, *knowledge-building capabilities*, and *management capabilities*. Go (2019) adapts these into *external networking*, *internal communication*, *knowledge-building*, and *project implementation capabilities*.

However, Go's (2019) adapted key-capabilities framework poses one glaring limitation. His adapted interpretation appears limited to one-time projects or programs and seems to miss the necessary building of managerial capabilities of an organization. Go, however, also points to the possibility of overlapping observations within Sutthijakra and Intarakumnerd's (2015) original framework, particularly the *networking* and *coordination capabilities*. Thus, this study opts to integrate both frameworks by adapting Go's (2019)

*external networking and internal communication capabilities* and Sutthijakra and Intarakumnerd's (2015) *knowledge-building and management capabilities*.

Several reasons explain the use and integration of the intermediary roles and key-capabilities with the GVC-IS co-evolutionary relationship framework. Firstly, the evidence of a dependent relationship between GVCs and ISs that Lema, Rabellotti, and Sampath (2018) and Lema, Pietrobelli, and Rabellotti (2018) present provides enough merit to argue that innovation intermediaries have a role to play in the GVC-IS relationship. Second, Partners' (2007) intermediary roles framework provides a broad yet differentiated set of intermediary roles that may apply to different industries. Moreover, Sutthijakra and Intarakumnerd (2015) and Go (2019) also employ Partners' framework in assessing the building of intermediary key-capabilities. Third, although this thesis focuses on resource-based industries, the frameworks may still apply as AFB industries display some facets of manufacturing and service industries in their food product processing and marketing value chain segments. Nevertheless, it is exciting and vital to observe how organizations perform intermediary roles and build key-capabilities in the classic agricultural or upstream portions of AFB GVCs. Table 2.10 presents the intermediary frameworks and their definitions used in this study.

Employing these frameworks, the researcher compares how the roles and key-capabilities of innovation intermediaries vary in their organization types, value chain segment locations, and primary market orientation. By listing and showing how each selected intermediary performs its roles and builds its key-capabilities, the researcher may draw

several common themes and policy and managerial implications based on the similarities and differences in changes of the three independent variables.

Table 2.10 The Four Roles Performed and Key-capabilities Built by Intermediary Organizations

Component	Definition
<i>Intermediary Roles</i>	
Consultant	Provision of <i>expert knowledge and advice</i> on technology acquisition or linkage requirements
Broker	<i>Negotiation and transaction</i> of knowledge, skills, technology, or collaborative activities between parties
Mediator	Creation of opportunities for <i>relationship-building</i> between parties through interaction and collaboration; <i>conflict mediation or resolution</i> between parties
Resource provider	Provision of <i>owned resources</i> for partners; Resources may take the form of finances, training, physical resources, and human resources, among others
<i>Intermediary Key-Capabilities</i>	
External networking capabilities	The capability of an intermediary to create, encourage, and sustain relationships and linkages <i>outside</i> of its current network
Internal communication capabilities	The capability of an intermediary to sustain and deepen relationships and linkages <i>within</i> its current network
Knowledge-building capabilities	The capability of an intermediary to <i>increase and apply current or identify and acquire new sector- or organization-specific knowledge</i> that their partners require of them
Management capabilities	The capability of an intermediary <i>to manage, implement, monitor, and evaluate</i> its own or its partnerships' projects and programs

Note. Summarized and adapted from Partners (2007), Sutthijakra and Intarakumnerd (2015), and Go (2019).

## **Section 2.9 Chapter Summary**

The prevailing studies on innovation intermediaries are primarily concentrated in the innovation studies literature. Furthermore, there is still a dearth of studies on intermediary roles and key-capabilities in resource-based industries, or, in this study's context, AFB industries. With newer evidence of a co-evolutionary relationship between GVCs and ISs, it may now be apt to integrate the understanding of intermediary roles and key-capabilities as these organizations interact with other actors in GVCs and ISs. This chapter reviewed and analyzed how innovation intermediaries build their capabilities and perform roles that address systemic gaps or holes in ISs that may further drive the GVC-IS co-evolutionary relationship and aid in the growth of developing countries, particularly poverty reduction of those involved in AFB industries.

This study adapted the existing frameworks of Partners (2007), Sutthijakra and Intarakumnerd (2015), and Go (2019) to describe and assess how differences in organization type, value chain segment location and primary market orientation affect an intermediary's role performance and key-capability building. Although these frameworks derived their evidence from the high-tech manufacturing and service sectors, applying these concepts in AFB industries may further provide additional insights to build these theories. Moreover, the unique characteristics of AFB industries and agricultural innovation may offer interesting findings and implications.

The next chapter gives this study's research questions and describes this study's research methodology.

## **CHAPTER III**

### **RESEARCH METHODOLOGY**

#### **Section 3.1 Introduction**

Chapter III discusses this study's research methodology. It is composed of six sections. Section 3.2 presents the dissertation's primary research, and sub-questions follow this introduction. In this section, the researcher also explains how each question responds to the literature gaps presented in the previous chapter. Succeeding this is Section 3.3, which describes the study's research method. This section includes an explanation of why and how the case-study approach is used and a discussion detailing this dissertation's overall case-study design and how the cases were chosen.

Section 3.4 details the entire research procedure from 2019 to 2022. It begins by retelling how the research questions and framework were conceptualized and then pointing to how the case units were selected. The ensuing sub-sections discuss how the data was collected and analyzed. Finally, the section explains the measures taken to ensure data validity and research trustworthiness.

Section 3.5 distinguishes this study's scope and limitations, and Section 3.6 ends this chapter by presenting a summary of its contents.

#### **Section 3.2 Research Questions**

With the five literature gaps presented in the previous chapter, this study asks one main research question and three sub-questions:

How do intermediary organizations perform their roles and build necessary key-capabilities to support the inclusion and further participation and upgrading of various players in AFB GVCs?

1. How do differences in *organization type* affect the roles and key-capabilities of intermediary organizations?
2. How do differences in *value chain segment* support affect the roles and key-capabilities of intermediary organizations?
3. How do differences in their partners' *primary market orientation* (export- or domestic-market) affect the roles and key-capabilities of intermediary organizations?

The researcher set the central question in such a way to address the gaps mentioned, albeit in a more generalized manner. The question tackles the need for more research on innovation intermediary roles in GVCs, the need to deepen the understanding of an intermediary's key-capabilities and how these are built, and the need to have more case examples of these concepts in AFB sectors. The question also presents the study's overarching conceptual and analytical framework: intermediaries' role performance and key-capability development. Moreover, the main problem sets the context of the study by looking into how intermediaries support the inclusion and participation of various AFB industry players in their respective GVCs. By inclusion, we mean the entry of players into the value chain, and by further participation and upgrading, we mean the deeper entrenchment or assimilation of currently active players in the value chain. Although inclusion, as defined, does involve innovation or upgrading in some form, the distinction

of inclusion and further participation and upgrading in the study is made to cover new entrants and current players.

Furthermore, on the use of ‘various players’ in the question, we deem it more appropriate to use the term as innovation intermediaries may not need to be selective of the players they intermediate, including large and influential players. Although an objective of an intermediary may be to aid those that have difficulty in inclusion, further participation, or upgrading in the value chain, the removal of consideration for prominent players in this study may paint an incomplete picture of the industries as these actors also play a significant role. To further illustrate this point, we find that several participating intermediaries interact with large and powerful players as they have the power to influence change in their respective industry’s value chains.

Each of the three sub-questions delves deeper into the three literature gaps. The first question seeks to answer how roles and key-capabilities vary between different intermediaries. Organizations may differ in their ownership structure, either from the public or private sectors (Intarakumnerd and Chaoroenporn, 2013a). Moreover, we may classify organization types as found in previous studies (Van Lente et al., 2003; Klerkx and Leeuwis, 2009; Kivimaa et al., 2019). More common types are government innovation centers, IAs or groups, and PRIs. Intermediaries may perform different roles, while some roles are more attuned to particular kinds of organizations. Though much research has been done on intermediary typologies, newer and less studied types of organizations or groups, such as social media groups (Asha and Raju, 2019), private companies (Ramirez, Clarke, and Klerkx, 2018), and NGOs (Lindberg, Lindgren, and

Packendorff, 2014), need to be given further attention. Apart from role performance, the question also compares key-capabilities of different types of intermediary organizations.

The second sub-question addresses the need for whole chain comparisons of intermediary roles and key-capabilities. As a set of processes, it is crucial to take an entire chain approach rather than studying individual segments of a value chain as previous studies have done before. A whole chain approach may be more viable for intermediaries as intermediaries provide services not just within the same value chain segment but may also serve as a go-between two or segments of the same value chain. Intermediary roles and key-capabilities may differ depending on what segments they work in or connect.

Finally, the third sub-question discusses how the GVC-IS relationship affects the development of a country's AFB industries. Specifically, this study attempts to answer this question by focusing on how a difference in primary market orientation – either export or domestic market-oriented development – may change an intermediary's role performance and key-capability requirements to support the integration and participation of its partners. In addition, by answering this question, the study may address the criticisms of the lack of demand conditions assessments in Malerba's (2002) SIS concept.

### **Section 3.3 Research Method**

To address the research questions of this study, the researcher began by referring to the works of Yin (2003a, 2003b; 2018), Stake (2003), Creswell (2014), and Creswell and Creswell (2015) to guide the creation of this dissertation's methodology.

Creswell (2014) claims that research should begin with a dominant research approach that allows the researcher to set the tone and direction of a research project.



Thus, this study approached the research problem from the constructivist worldview. This perspective enables the researcher to generate meaning from the responses of the research participants and, at the end of the research project, inductively create analytic generalizations (Creswell, 2014). With the lens of constructivism, this study employed a qualitative design that allows the researcher to explore the research phenomena on a much deeper level by addressing questions that often ask *what* and *how* of people, organizations, activities, events, and processes. Specifically, this research employed the case-study approach.

### *3.3.1 Case-Study Approach*

According to Yin (2003a), the case study approach is an empirical method that deliberately considers the contextual conditions of the subjects it chooses as cases. Furthermore, Yin (2003b) posits that researchers choose to conduct case studies when the research requires and possesses cases that offer rich and deep contextual conditions, which often showcase multiple variables and various data sources. Under the guidance of multiple theories as to the basis of analysis, it allows the researcher to provide a fuller description of the cases based on variables observed through the framework the theories provide (Yin, 2003b). The theories and frameworks also delimit the boundaries for each case and the points of comparison between cases. The theories and frameworks that form the boundaries of this study were described in Section 2.5 of the previous chapter.

According to Yin (2018), case studies are also appropriate for research questions that ask *how* or *why* regarding contemporary events that the researcher has little to no control over. Therefore, with the main research question and sub-questions posed as *how* questions, the researcher deemed a case-study approach most suitable for this study.

Case studies may be categorized under three types: exploratory, descriptive, and explanatory (Yin, 2003b). In particular, this study uses a descriptive design where it employs theories as a guide in setting the scope and depth of a case and describing the phenomenon that occurs (Yin, 2003b). In addition, the study attempted a longitudinal design to explain how the organizations evolved by asking how and why questions.

Another categorical aspect of case studies is whether a researcher studies single or multiple cases with either a holistic or embedded design. Single case studies are often chosen for cases that exhibit a critical, unusual, common, revelatory, or longitudinal case (Yin, 2018). On the other hand, multiple-case studies are chosen when one wants to investigate the similarities and differences of similar or contrasting cases (Yin, 2018). Whether one takes a holistic or embedded design depends on the number of units of analysis a case study has.

Moreover, in doing any form of research (Creswell and Creswell, 2015), and especially in case-studies (Yin, 2003a), the researcher needs to clarify and delineate the unit of analysis and the unit of observation the study intends to use. According to Creswell and Creswell (2015), a unit of analysis is the level at which the formal examination of the study will take place. These may be on a national, organizational, sectoral, or another level. On the other hand, a unit of observation is the unit in which the researcher will gather the data necessary to conduct the analysis. They also add that there may be multiple units of observation in a single research project.

In this dissertation's case, the unit of analysis is on the organizational level, and the unit of observation will be on an organization and individual level. However, this

study does not classify each organization it observes as a case; instead, the organizations chosen for this study are classified as embedded units of analysis.

Given the specifications required, the researcher chose to create an embedded multiple case-study design – a design that compares cases that exhibit embedded units of analysis (Yin, 2018). First, the researcher presents each case with a thick description of its contextual conditions and embedded units of analysis and in-depth examination of the intermediary organizations' role performance and key-capability building. Following these, the researcher also compares the cases to show how intermediary roles and key-capabilities vary with differences in organization type, value chain segment location, and primary market orientation.

Previous research on intermediaries and GVCs has also used the single or multiple case-study approaches (some examples are Gereffi, 1994; Van Lente et al., 2003; Ponte and Ewert, 2009; Lindberg, Lindgren, and Packendorff, 2014; Sutthijakra and Intarakumnerd, 2015; Ramirez, Clarke, and Klerkx, 2018; Go, 2019). Regarding GVC research approaches, this study aims to align itself with the industrialist approach. Morrison, Pietrobelli, and Rabellotti (2008) describe the industrialist school as an approach that exudes a more micro-centered methodology that typically collects qualitative data and employs case-studies. They further explain that archetypal industrialist studies focus on competitiveness, industry, cluster, and local development experiences or policies.

### 3.3.2 Case Selection

For case selection, this research followed the ideas of Stake (2003), who suggests leaning towards cases that offer better *opportunities to learn*. Stake explained that the chance to learn might mean taking the cases that are most accessible to the researcher or the ones that allow the researcher to spend an ample amount of time.

For its cases, the researcher decided to study how intermediaries differ from or are similar in their roles and key-capabilities in *two* AFB GVCs, particularly the rice and mango industries of the Philippines. Though GVC research on the Philippines has been done before, none has focused on how intermediaries aid in the further integration and participation of value chain actors and how intermediaries aid in allowing these actors to innovate or upgrade in their respective value chains.

The Philippines is an essential and interesting setting as its agricultural, manufacturing, and scientific development policies are now framed toward the integration and participation of its industries in their respective value chains. Furthermore, different policies also target the development of different IS levels in the country. Compared to previous industrial development policies where innovation was relegated as a supporting policy (Alabastro, 2006), now, the government aims to bring innovation to the forefront of its development plan. The Philippine Development Plan 2017-2022 exhibits policy directions that promote the development of the NIS. The various industrial and commodity roadmaps and R&D agendas convey the context for building the SISs and RISs in the Philippines. For the Philippines to fully exploit the benefits of the GVC-IS relationship, however, the country needs to address its already present systemic gaps, constraints, and barriers to innovation (Quimba, Albert, and Llanto, 2017). Moreover,

these policies also mention the roles and services of certain organizations associated with innovation intermediation (Howells, 2006; Partners, 2007). With the mention of these organizations, the Philippines becomes an appropriate country to study the roles and key-capabilities of these organization types that are critical to the nation's development.

Choosing to study cases and intermediaries in AFB GVCs is also essential for the Philippines. First, integration into GVCs exhibits poverty reduction (Humphrey and Memedovic, 2006) and may help in doing so for the country. Several studies also add that developing AFB industries in rural areas generates even more significant poverty-reducing effects (Nadvi and Barrientos, 2004; Humphrey and Memedovic, 2006; Narrod et al., 2009; Lee, Gereffi, and Barrientos, 2011; UNIDO, 2011; Fernandez-Stark, Bamber and Gereffi, 2012; Ponte et al., 2014). The National Economic Development Authority of the Philippines (NEDA) (2017) claims that three-fourths of the Filipino poor live in these rural areas. The PSA (2020) supports this claim in their data that shows farmers, fisherfolk, and individuals living in rural areas comprise the highest poverty incidence among vulnerable groups in the country. Thus, studying how to improve integration in AFB GVCs becomes vital for the country.

Second, as Pardey, Alston, and Ruttan (2010) argue, innovation in these chains is unique in that agriculture production is segmented in nature, requires location-adapted R&D, and experiences continuously evolving impacts from climate change, pests, and diseases. As a result, doing direct technology transfer may seldom work (Bell and Pavitt, 1993). Thus, it is crucial to focus on learning how intermediaries build their key-capability to be more successful in performing their intermediary roles.

The researcher selected the rice and mango industries as both sectors are part of the Philippine government's priority industries for development (NEDA, 2017; Department of Trade and Industry [DTI], 2017). Incidentally, following the suggestions of Stake (2003) in choosing cases, the researcher found these industries accessible and allowed ample space for research. Apart from these, several key differences and commonalities between the two industries make these compelling cases to study and compare.

The most significant of these characteristics and a key reason why these two industries were also chosen is their difference in the primary market orientation, where the rice industry represents a domestic market-oriented development direction and the mango industry as the one directed towards export market development, making these two industries suitable cases to answer the research questions. Apart from being claimed in their respective commodity roadmaps, supply utilization data from the PSA also exhibit the difference in their market orientation. Figure 3.1 and Figure 3.2 present the supply utilization of rice and mangoes in the Philippines, respectively. In the rice industry, annual utilization has caught up with local production and leftover stocks from the previous year. Without rice imports, the country will not be able to meet local demand. Thus the industry exhibits a need for more development to meet the needs of the domestic market.

Conversely, the mango industry shows a continuous drop in its exports. However, the data cannot account for processed mango products exported as the PSA considers mangoes used for processing as part of domestic consumption. Nevertheless, the government aims to have the Philippines regain some of its exporting prowess from the past despite the very high domestic demand. Therefore, developments in the industry

must be made towards the export market to achieve this. Thus, making the industry more export market-oriented.

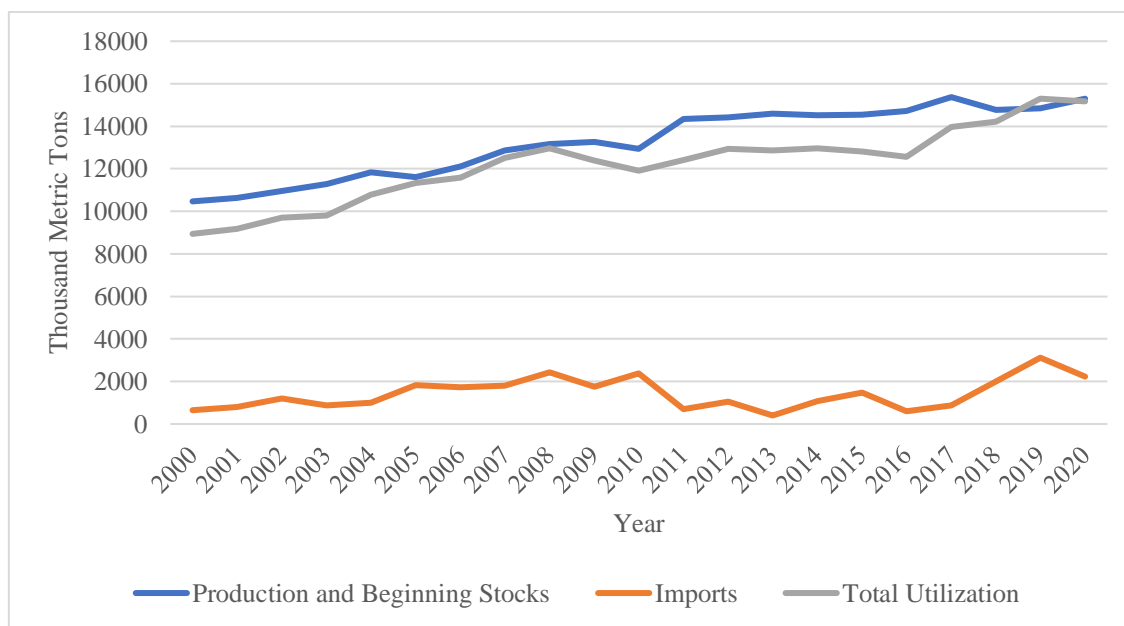


Figure 3.1. Supply utilization of rice in the Philippines, 2000 to 2020.

Note. Data source: Philippine Statistics Authority (PSA).

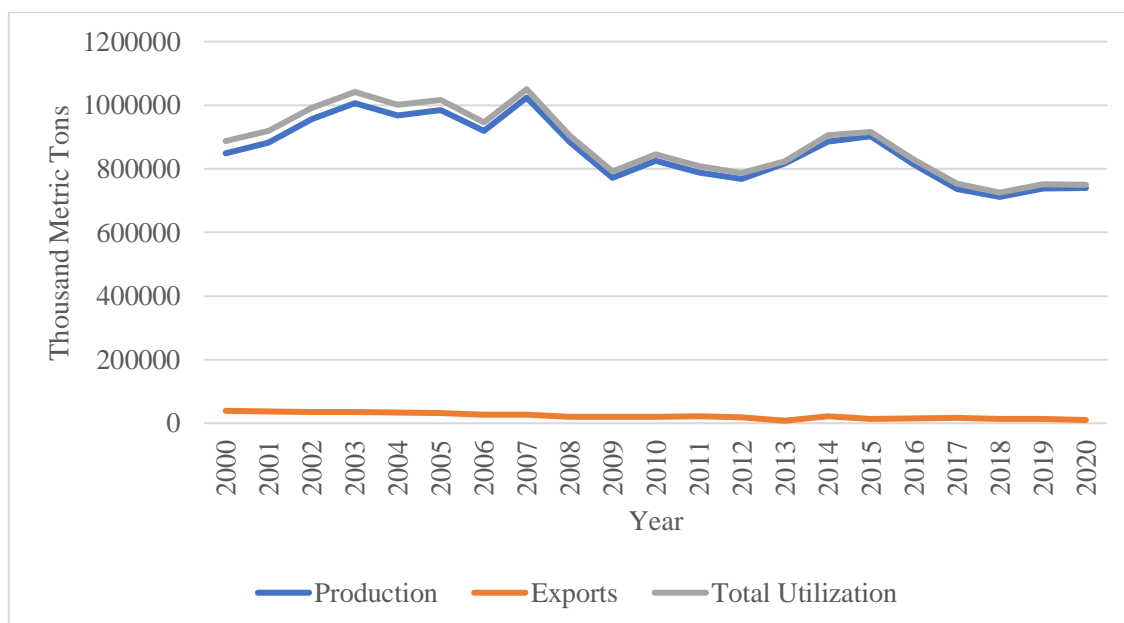


Figure 3.2. Supply utilization of mangoes in the Philippines, 2000 to 2020.

Note. Data source: PSA.

Table 3.1 shows the similar and distinctive characteristics of these two industries. Chapter 5 on rice and Chapter 6 on mangoes elaborate on their unique circumstances, and Chapter 7 tackles both industries together.

Table 3.1 Different and Similar Characteristics of the Philippine Rice and Mango Industries

	Rice	Mango
Differences	<ul style="list-style-type: none"> <li>• Domestic market development direction</li> <li>• Seed-based</li> <li>• Considered an essential crop</li> <li>• Two cropping season</li> <li>• Transition to an open-market economy</li> </ul>	<ul style="list-style-type: none"> <li>• Export market development direction</li> <li>• Root crop/tree</li> <li>• Considered a high-value crop</li> <li>• Relatively year-round production</li> <li>• Declining position in global trade</li> </ul>
Similarities	<ul style="list-style-type: none"> <li>• Issues with scale economies</li> <li>• Relatively small-scale production capabilities</li> <li>• Strong horizontal relationships</li> <li>• Low uptake of modern (mechanized) technologies</li> <li>• Significance and abundance of traders (i.e., middle traders)</li> <li>• Importance of consolidation in their value chains</li> <li>• Priority AFB areas</li> <li>• Presence of several innovation intermediaries</li> </ul>	

Note. The author gathered the information based on his initial research and interviews with public and industry documents and experts.

This study also lends itself to Ramirez, Clarke, and Klerkx's (2018) call to advance the movement towards typologies for intermediaries in AFB industries by taking the rice and mango industries as cases. Moreover, this study also follows Batterink et al.'s (2010) recommendation for more empirical research on assessing brokerage and multi-faceted orchestration processes in innovation networks. Finally, this study adds to Morrison, Pietrobelli, and Rabellotti's (2008) call for further research in learning how intermediaries involve themselves in developing local technological capabilities and how



they develop and adopt new technologies, and influence the level and direction of sectoral development.

### 3.3.3. Case Study Design

One suggestion Yin (2018) offers to make case studies stronger, and more manageable is to create a graphic representation of the research itself. Establishing such a research design figure allows the researcher and their readers to grasp the confines of the case or cases, their contextual conditions, and embedded units of analysis more clearly, if applicable (Yin, 2018). Figure 3.3 presents a visual representation of this dissertation's embedded multiple case-study design. The following section discusses the researcher's procedure in selecting the organizations participating as his embedded units of analysis and how he proceeded through the entire study.

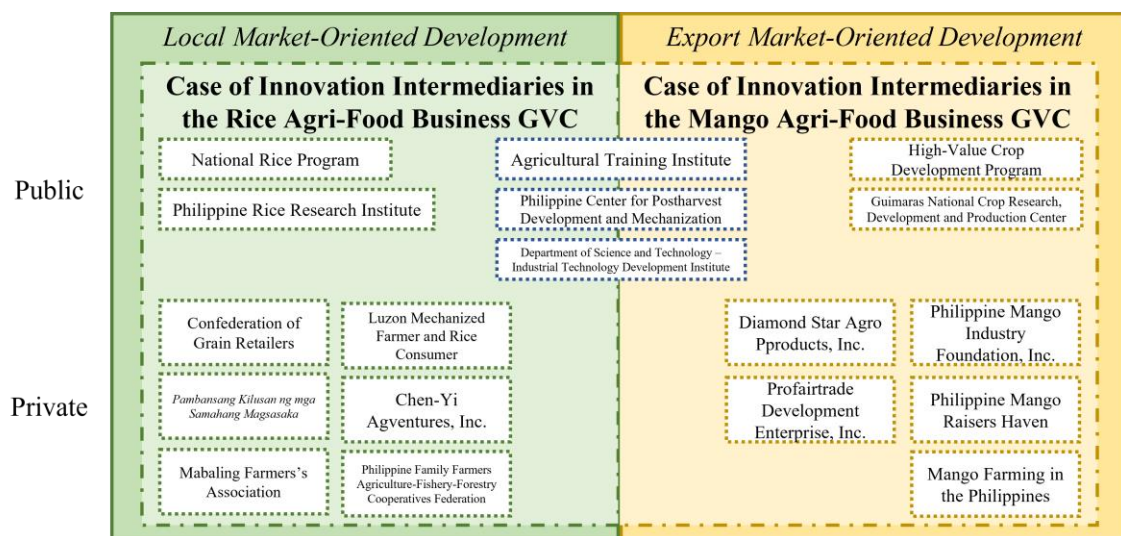


Figure 3.3. The study's embedded multiple case-study design.

Note. The researcher crafted this figure based on Yin's (2018) case-study design guide.

As depicted by the broken-lined rectangles, this study involves two cases: innovation intermediaries in the rice AFB GVC and innovation intermediaries in the

mango AFB GVC. The outer box presents the overarching context of each case. For the rice industry case – colored in green – the context is one of domestic market-oriented development. On the other hand, the mango industry’s case context – colored in yellow – has a more export market-oriented approach. The smaller rectangles within each case are the embedded units of analysis. In this study’s case, each shape represents one identified innovation intermediary that works in the rice or mango industries. Some organizations also provide services in both sectors. These organizations are placed overlapping between both cases.

In presenting the case studies, each report follows a similar format of the (1) industry’s current situation and issues, (2) the government’s policy to develop the said industry, (3) a description of the significant actors, processes, and institutions of the industry’s IS and, in its AFB GVC, and (4) a presentation and discussion of the selected innovation intermediaries in each industry. The case-study comparison following the two case study chapters compares and contrasts findings from the individual cases under three sub-sections of the similarities and differences between intermediary role performance and key-capability building by (1) organization type, (2) value chain segment location, and (3) primary market-orientation.

## **Section 3.4 Research Procedure**

### *3.4.1 Conceptualization of Research Questions and Framework*

In 2019, the researcher initially proposed a study that compared the role performance and capability building of innovation intermediaries found in the three main industrial sectors of agriculture, manufacturing, and services. At that time, the agricultural

industry he was considering as a case was the rice industry. The study also rooted itself in the GVC approach (Gereffi et al., 2001) and the co-evolutionary relationship between the GVC and IS (Lema, Rabellotti, and Sampath, 2018; Lema, Pietrobelli, and Rabellotti, 2018). For innovation intermediaries, the researcher also adopted the definitions and concepts from Howells (2006), Partners (2007) for roles, and Sutthijkra and Intarakumnerd (2015) and Go (2019) for key-capabilities.

To build the research framework and map the GVCs for the initial study, the researcher conducted a pilot study by interviewing several experts from the three industries. In June 2019, his panel advised him to focus on a single industry or sector. After several consultations with his research supervisors and doing desk research, he decided to focus on the AFB sectors and selected the rice and mango industries of the Philippines. The reasons for choosing these two industries are discussed in Section 3.3.2.

The research questions have always asked *how* or *why* and evolved towards covering specific aspects of innovation intermediaries in AFB GVCs. As the researcher developed the case study design and research framework, these questions have undergone several revisions.

One of the first items he needed to map out was the respective value chains for the rice and mango industries of the Philippines. Although value chains for these industries were available from other studies (Mataia et al., 2019; Fernandez-Stark, Couto, and Gereffi, 2017), this study needed to see how the IS interacted through the value chains. Apart from mapping, the researcher also needed to list organizations that performed intermediary roles in the value chain. To know these, he conducted another pilot study

that interviewed several rice and mango industry experts from November 2019 to January 2020.

A total of 11 persons were interviewed from the government sector and academe. The researcher attempted to interview experts from the private sector. However, he was not allowed to do so as the private sector experts would either be unavailable or did not respond. Nevertheless, the experts interviewed had ample interactions with the private sector, and they were able to share some of their perspectives. The researcher met all industry experts, except for one he initially interviewed online but later followed up with a face-to-face interview. Table 3.2 shows the list of the industry experts the researcher met. The attached Appendix 1 presents the interview guide template for industry experts.

During the pilot study with experts, the researcher discovered that many had difficulty understanding the term *innovation intermediary*. For them, the term *intermediary* suggests the term *middlemen*, which is often negatively associated or connoted. Thus, the researcher started using the term *innovation-enabling organizations* to allow respondents to grasp the concept better and veer away from the negative connotation. During interviews, he further explained the revised term using the definition of innovation intermediaries adopted in this study. However, the revised terminology is applied only during the data gathering period of the study, and the term *innovation intermediary* or *intermediary* is used in writing the dissertation.

Table 3.2 List of Industry Experts Interviewed

	Name	Affiliation	Interview Date
Rice	Dr. Piedad Moya	IRRI	December 10, 2019
Industry	Dr. Jesusa Beltran	PHILRICE	December 20, 2019
	Dr. Jaime V. Manalo	PHILRICE	December 20, 2019
	Alice B. Mataia	PHILRICE	December 20, 2019
	Dr. Flordeliza Lantican	UP-Los Baños	November 18, 2019
Mango	Dr. Ramon C. Barba	UP-Los Baños	November 18, 2019
Industry	Lilian Pateña	UP-Los Baños	November 18, 2019
	Dr. Flordeliza Lantican	UP-Los Baños	November 18, 2019
	Dr. Elda Esguerra	UP-Los Baños	December 10, 2019
	Nelie Gacutan	DTI-Region VII	January 9, 2020
	Jun Iglamo	DTI-BOI Region VII	January 9, 2020
	Engr. Regine Patiño	DA-HVCDP	December 17, 2019

Note. Contacted and interviewed based on reports read and inquiries to government agencies by the researcher and leads provided by one of the researcher's sub-advisers and researcher's colleagues. Abbreviations are as follows: IRRI – International Rice Research Institute, PHILRICE – Philippine Rice Research Institute, UP – University of the Philippines, DTI – Department of Trade and Industry, BOI – Board of Investment, DA-HVCDP – Department of Agriculture – High-Value Crop Development Program.

From the pilot study interviews, the researcher ascertained the value chain segments, processes, technologies, institutions, and actors in the rice and mango industries. These maps are presented in the succeeding case report chapters. Apart from the maps, the researcher was also more clearly able to grasp the critical differentiating points between the two industries. Furthermore, he was able to see the consolidation of paddy rice and fresh mangoes as a highly significant portion of these Philippine AFBs. He was also able to specify the variables of this research further, revise the research questions and concepts, and craft the case study design into their more concise versions.

### *3.4.2 Case Units Selection*

For the selection of intermediary organizations for each of the cases, the researcher initially used the typology of Van Lente et al. (2003) and Partners' (2007) roles classification as the criteria for the industry experts to denote what organizations in the rice or mango industries may be considered as innovation intermediaries. Apart from their input, the researcher also selected key organizations often mentioned in published industry reports. The criteria for selection were as follows:

#### A. Criteria for Organization Type

- a. KIBS (e.g., consultancy firms)
- b. RTOs (e.g., research institutes)
- c. IAs (i.e., local, regional, and national levels)
- d. Chambers of commerce
- e. Innovation centers (e.g., government offices)
- f. University-liaison offices (e.g., university technology transfer offices)

#### B. Criteria for Roles that Enable Innovation

- a. Brokerage
- b. Consultancy
- c. Mediation
- d. Resource Provision

Apart from the six organization types, the researcher added three other types of intermediary organizations. One of these non-government organizations (NGOs) or non-public organizations (NPOs), as suggested by an expert interviewed. Another type is private companies that perform some intermediary roles. Although unconventional since

private companies are usually not third-party organizations, the researcher started considering these firms as case units upon interviewing two companies that exhibit resource provision and brokerage roles. The third type of intermediary is online social media groups that differ from the internet portals that Klerkx and Leeuwis (2009) classify. Due to the physical restrictions placed by governments to combat the spread of COVID-19, the researcher joined several social media groups in hopes of interviewing intermediary partners such as farmers and growers. He saw the group's interaction and noticed that the group is also used as a space for consulting and brokerage of products, knowledge, and technologies. Previous research has also observed that these three organizations act as innovation intermediaries (Lindberg, Lindgren, and Packendorff, 2014; Ramirez, Clarke, and Klerkx, 2018; Asha and Raju, 2019).

This study has 11 intermediary organizations for the rice industry and ten intermediary organizations for the mango industry. Participating intermediary organizations add up to 18, where both industries share three intermediaries. Of these, three are government agencies (GA), four are PRIs, four are IAs, three are online social media groups (SMG), two are private firms, and two are NGOs. Table 3.3 summarizes all the intermediary organizations participating in this study.

Table 3.3 List of Participating Intermediary Organizations

Rice Industry	Mango Industry	Shared Between Both
1. Department of Agriculture – National Rice Program (NRP)	1. Department of Agriculture – High-Value Crops Development Program (HVCDP)	1. Agricultural Training Institute (ATI)
2. Philippine Rice Research Institute (PHILRICE)	2. Bureau of Plant Industry – Guimaras National Crop Research, Development, and Production Center (GNCRDPC)	2. Philippine Center for Postharvest Development and Mechanization (PHILMECH)
3. Confederation of Grain Retailers (GRECON)	3. Philippine Mango Industry Foundation, Inc. (PMIFI)	3. Department of Science and Technology – Industrial Technology Development Institute (DOST-ITDI)
4. Pambansang Kilusan ng mga Samahang Magsasaka (PAKISAMA)	4. Mango Farming in the Philippines (MFP) Facebook Group	
5. Mabaling Farmer’s Association (MFA)	5. Philippine Mango Raisers Haven (PMRH) Facebook Group	
6. Luzon Mechanized Farmer and Rice Consumer (LMFRC) Facebook Group	6. Diamond Star Agro Products, Inc. (Diamond Star)	
7. Chen Yi Agventures, Inc. (Chen Yi Agventures)	7. Profairtrade Development Enterprise, Inc. (PDE)	
8. Philippine Family Farmers Agriculture-Fishery-Forestry Cooperatives Federation (AgriCOOPh)		

Note. The abbreviations are official abbreviations or assigned by the author for brevity’s sake.

The researcher wishes to note the existence of one industry association that has been steadily growing its presence and sense of leadership in the mango industry. Although the researcher attempted to contact the organization, the association eventually declined to participate in the study. Nonetheless, the researcher acknowledges its presence, and the mention of the organization is made in relevant chapters, but the



organization's identity will remain masked. Although alluded to in this study, information and data regarding this specific organization are solely based on industry reports and observations made by the researcher.

#### *3.4.3 Data Collection*

In selecting the organizations and interviewing participants, the researcher employed a purposive approach. It provided the best way to ensure that chosen persons and those who agree to interviews possess the necessary knowledge to answer the questions raised by this research. In addition to purposive sampling, the researcher conducted snowball interviewing as well. Performing the study in this manner meant that the researcher contacted other pertinent and possible interview participants mentioned or recommended by those previously interviewed.

Once the organizations and interview participants were selected, the researcher contacted them to request interviews. While reaching out to and interviewing the selected intermediary organizations, the researcher also asked for aid in contacting and setting up meetings with some of their partners. These additional interviews with intermediary partners aided the validation of intermediary responses and further broadened the narratives of each case. Apart from intermediary partners, the researcher also sought private sector interview participants that did not necessarily partner with any of the intermediaries in this study. Doing so allowed him to ask how non-partners innovated or upgraded and whom they approached for support. Several private sector partners interviewed were university researchers, farmers or growers, input suppliers, cooperatives, local traders, retailers, exporters, rice millers, rice and mango product or by-product

processors, and organization members or affiliates. Appendix 2 presents a request letter for participation and an interview template sent to selected organizations and participants.

The researcher collected data for this study primarily through numerous semi-structured interviews. In total, the researcher conducted 42 interviews composed of 45 individuals. In addition to the interviews, the researcher conducted two focus group discussions (FGDs) with the staff members of AgriCOOPh and several indigenous people mango-growing partners of PDE. Appendix 3 shows the interview guide template for interviews or focus group discussions with innovation intermediary representatives and private sector actors.

The researcher also did secondary desk research to add to and validate points raised during the interviews. Claims found through secondary desk research were also asked to several interview or FGD participants for validation. These secondary sources were also used to build and add to the contextual narratives of the two industries and to fill in facts about the organizations interviewed (e.g., number of employees, standards and certifications attained, technologies available, programs, and projects).

Initially, the data collection phase should have only been from March to July 2020. However, due to COVID-19 travel restrictions, the researcher could not meet or visit all the organizations and intermediary partners. Although travel was restricted, the researcher continued the data collection by conducting the interviews via online video-calling applications or through phone calls with intermediary representatives and partners that agreed. These interviews were conducted from March 2020 to November 2021. Appendix 4 summarizes the schedule of the interviews and FGDs conducted for this research.

As mentioned, the researcher joined three social media groups catered to the production and trade of rice or mangoes. Apart from conducting several interviews with a few members of these groups, he also attempted to have some members answer a short open-ended survey. Unfortunately, despite several calls and requests for survey participants, the survey only yielded three respondents from the two mango groups and none from the rice group. Because of the low turnout, the researcher decided to abandon the survey. Nonetheless, calls for individual interviews with members were made, and these yielded several participants whose data were included in the study.

#### *3.4.4 Data Analysis*

As the data collection phase ensued, the researcher wrote individual write-ups for each intermediary organization participating in the study. Each essay contained a brief history and description of the services the organizations provided, a plotting and assessment of intermediary roles they performed, and key-capabilities that they have built or are continuing to build. Simple data shells that contained the intermediary role and key-capability data were made for each organization. Plotting and assigning responses and actions to specific roles and key-capabilities were made under the definitions of roles and key-capabilities in Chapter II. Intermediary representatives interviewed were allowed to validate and comment on their organization's write-up. However, not all provided feedback for their organization write-ups. Nonetheless, the researcher attempted to triangulate the information provided through secondary reference materials he could find online or through interviews with other value chain actors. Appendix 5 covers the 18 case organization reports.

After creating the individual reports, the researcher collated all the data and began proper data analysis. To answer the research questions, especially the sub-questions, he thematically analyzed the data in three parts: organization type, value chain segment supported, and primary market orientation. The succeeding individual chapters on rice and mango and the following comparative chapter all follow a similar pattern of data assessment.

When analyzing roles and key-capabilities by organization type, the researcher decided to assess the data based on the roles or key-capabilities emphasized rather than reiterating each point of every organization. Asterisk marks (\*) represent the emphasis on the roles and key-capabilities of the intermediary representatives during the interviews, with three marks as highly emphasized and one mark as lightly or not emphasized. The basis for assigning higher or lower marks to each concept was centered on each organization's role and key-capability data shells and supported by the interviews with other value chain actors and partners. Under this system, the researcher could compare the roles and key-capabilities of varying organization types more easily. More asterisk marks do not mean certain roles or key-capabilities are more critical than others. Instead, these are used solely as a visual representation of the roles and key-capabilities that the participating organizations underscore.

To provide further analytical generalizations on intermediary roles, the researcher took a second step in assessing organization type differences by comparing public and private organizations in a broader spectrum. To do so, he adopted a similar assessment done by Intarakumnerd and Chaoroenporn (2013a) in their study on the differences between public and private intermediary organizations in Thailand. In its tabularized form,

the researcher shows which roles both types perform and which they may focus on, and the similarities and differences between this study's findings and those of Intarakumnerd and Chaoroenporn's (2013a).

For the effect of value chain segment support on intermediary roles, the researcher analyzed the data by plotting the roles performed by each intermediary in every value chain segment they supported. In doing so, the researcher could draw insights based on where specific organizations focused their work or where they lacked participation. Besides distinguishing the data by organization types, insights into what roles are performed in different segments were also done. Finally, we did a thematic analysis of how differences in value chain segments support these intermediary key-capabilities.

The individual industry chapters first present how intermediaries change or focus on specific roles and build key-capabilities to assess the effects of primary market orientation differences. Building upon these, the researcher again adapted Intarakumnerd and Chaoroenporn's (2013a) assessment of public and private intermediaries' roles, albeit several changes to the analysis are made. Roles for each broader type are given, but specific roles are more underlined than others. More like the original assessment, suggested services or actions and requirements to succeed are offered. These suggestions and conditions are based on the successful efforts and experiences of intermediaries participating in this study. Finally, the assessment includes implications for the general industry to enable more successful innovation intermediation.

The comparative chapter highlights the assessment of commonalities and variations caused by changes in primary market orientation. In writing the chapter, the researcher continually analyzed the findings of both cases under the lens of differing

demand conditions. Comparisons between the rice and mango industries' intermediary organizations by organization types and value chain segment support were made under this notion. Notwithstanding, similarities between intermediaries from both industries were also found.

Based on the findings from Chapters V and VI and the comparisons in Chapter VII, the researcher drew several conclusions and implications. Therefore, individual industry inferences are discussed in their respective chapters. Likewise, those drawn from the comparisons are discussed in Chapter VII. Nonetheless, the most significant conclusions, management implications, and policy implications are discussed in Chapter VIII, where these are more fleshed out and underscored.

#### *3.4.5 Data Validation*

The researcher employed the validity and reliability strategies suggested by Yin (2003a) and Creswell (2014) to ensure validity. First, the researcher secured data triangulation primarily by validating responses from key informants and intermediary representatives with interviews or FGDs from their partners or other private sector actors active in their respective industries. The researcher created individual English or Tagalog interview protocols for the following: (1) industry experts, (2) key-informant intermediary representatives, (3) key-informant intermediary partners or industry actors, and (4) FGDs with partners. Notwithstanding, secondary desk research, documents received from the organizations, and fieldwork observations also aided in the validation of responses from interview participants.

The researcher also presented or asked interview and FGD participants for their consent to join the research. Appendix 6 provides the interview consent template this study used. However, not all research participants were given the opportunity for a signed consent form due to the physical limitations posed by the COVID-19 pandemic. For most of the interviews, the researcher asked for the participant's permission to hold the interview or FGD before beginning and their verbal consent during the interview. Moreover, the researcher requested the permission of interviewees to record the conversation for referencing during the writing process. The researcher also sought permission to mention the names of the organizations interviewed. The identities of the specific intermediary representatives, partners, and private sector actors interviewed are kept confidential. In addition to these, as one of the interviews and an FGD included indigenous peoples, the researcher also requested the approval of the National Commission on Indigenous Peoples – Zambales Region as part of the Philippine government's research ethics protocols when interviewing or including indigenous peoples as part of any research study conducted.

Another strategy to ensure validity is having the intermediary representatives check sections of the case-study reports or the dissertation to ensure that the researcher correctly understood and interpreted the data. These representatives were granted an opportunity to comment on the study's findings. However, not all of those contacted for comments and validation responded. The researcher also presents results that may run counter to or vary significantly from the propositions or major themes initially thought.

To further highlight transparency in this research, Appendix 7 presents a Gantt chart that illustrates the journey of this dissertation from the expert interviews conducted to the final submission.

### **Section 3.5 Scope and Limitations**

The researcher delimits the scope of the research in four ways. First, the research is delimited only to the intermediary organizations presented in this study. While other organizations may perform intermediary roles, the researcher primarily chose organizations recommended by industry experts as they may play more significant roles in their respective GVCs. Nevertheless, the researcher also included organizations that he discovered performed several intermediary roles during the study's data collection phase. Regarding industry clusters, although the researcher initially attempted to delimit the choices of interview areas based on the production capabilities of specific regions, agglomeration of food processing MSMEs (as in the case of Metro Manila and Cebu for the mango industry), and as recommended by the industry experts, he opened the interviews to cover various areas of the Philippines for possible interviewees that fit the participation criteria and were willing to be interviewed.

A second delimitation to this study will be the conduct of FGDs in place of individually interviewing some groups of participants. FGDs were chosen over interviews when groups of intermediary partners or actors were only available simultaneously at a given time.

Thirdly, the researcher delimited the study by his decision to investigate the rice and mango industries of the Philippines. Apart from the justification provided in Section



3.3.2, the researcher partly judged the feasibility of researching these industries based on his ability to gather contacts and willing participants in the said industries.

Fourth, the researcher further delimited the study by not asking about finance-related matters to all research participants. Several of the industry experts advised that asking about prices, purchases, sales, or other money-related matters may hamper the interest and consent of possible participants as these are sensitive issues. Nevertheless, when finances were brought up during the interviews of FGDs, the researcher tried to steer the discussion to a more general sense and refrained from asking or mentioning specific monetary values.

The limitations of this study are as follows. First, as this study uses a qualitative research design, this research generated major themes and findings through analytical generalization and not through statistical generalization. These analytical generalizations arise from explaining how and why innovation intermediaries perform their roles and build their key-capabilities in the manner they do. Moreover, the findings summarize comparisons based on differences in organization types, value chain segment involvement, and the primary market orientation of the participating organizations.

Second, participants' knowledge and available documents limit the study's findings to only what may be shared with the researcher or the public. The ability and willingness of participants to recall and describe details about important events and processes limit the findings of this research. Related to this, some participants may opt to bar access to specific pieces of information (e.g., industry or trade secrets). Therefore, this study only considers and presents information freely shared by its participants, documents provided, and those publicly available.

Third, this study is limited by the willingness and agreeability of the research participants approached by the investigator. Thus, this study does not contain an exhaustive list of all possible innovation intermediaries and value chain actors in the rice and mango sectors of the Philippines. It does, however, present a substantial amount of significant intermediary intermediaries and value chain actors. Throughout the organization selection and data collection process, some approached organizations or individuals were unable to participate due to various circumstances surrounding their organization and businesses (e.g., adverse effects of COVID-19 or lack of time availability). The identities of these organizations or individuals are not mentioned throughout this dissertation.

Fourth, the longitudinal design of this study is limited by the availability and organizational knowledge of representatives selected by the participating intermediary organizations. Although the participation request indicates that the study hopes to learn how the organization has developed over time, the selection of interview participants is solely left to the organization's discretion. Moreover, not all intermediaries could grant more than one opportunity for an interview. The study and knowledge gained are limited to interviews and secondary desk research conducted up to a certain period – November 2021. Nonetheless, the researcher retrieved much of the data required for the analysis.

Finally, this study cannot present a comprehensive cost structure or net value-added per segment of each GVC. This is because not all participants are willing to share or even participate if the discussion includes the costs and profits of their activities. So instead, this study relied on secondary sources and experts' opinions for the value-added towards each key actor in the rice and mango AFB sector.

### Section 3.6 Chapter Summary

A thorough discussion of the study's methodology is essential in conducting research, especially doctoral dissertations. By taking a constructivist perspective to qualitative research and an industrialist approach in GVC research, the researcher employed a case study method in his attempt to answer the question: *how do intermediary organizations perform their roles and build necessary key-capabilities to support the inclusion and further participation and upgrading of various players in AFB GVCs?*

Taking a descriptive multiple case-study design allowed the primary investigator to delve deeper into the evolving state of the Philippine rice and mango industries, specifically observing how intermediary organizations have and continue to support the innovation and upgrading of the value chain actors in these industries. Informed by an illustrative case study design, the dissertation is bound to these organizations' role performance and key-capability building. The design also helped inform the scope and limitations of the study.

To build on these cases, the researcher undertook various procedures to ensure the proper conduct of the dissertation. Before finalizing the research question and framework and selecting organizations, several industry experts were consulted. The data collection took close to two years to complete, owing to the restrictive effects of the COVID-19 pandemic. Nonetheless, 43 interviews and two FGDs were conducted under different modes. To ensure validity, the researcher employed several data triangulation strategies, including secondary desk research, interviews with non-intermediary participants, and sending of write-ups to research participants for validation and comments.

The succeeding chapters discuss the primary findings of this entire dissertation. Finally, the ensuing Chapter IV provides a thorough background on the Philippine innovation environment and the current state of its agricultural sector.

## **CHAPTER IV**

### **THE STATE OF THE PHILIPPINE AFB SECTOR AND ITS POLICIES FOR DEVELOPMENT**

#### **Section 4.1 Introduction**

Chapter IV provides the broader context of Philippine agriculture and the country's innovation system. The relevant development policies related to this dissertation's topic are also discussed in this chapter. There are four sections in this chapter. Section 4.2 presents the current state of the overall Philippine AFB sector by discussing its economic performance and the issues that mire the sector. The subsequent Sections 4.3 to 4.6 describe the central government policies surrounding agricultural and industrial development that target innovation and value chain inclusion, participation, and upgrading for the different stakeholders in the AFB sector. Finally, Section 4.7 provides a summary of the entire chapter.

#### **Section 4.2 The Current State of the Philippine AFB Sector**

The Philippines has been experiencing a continuous weakening in its agriculture sector in recent years. As Figure 4.1 reveals, the contribution of agriculture to the Philippines' gross domestic production (GDP) is generally declining, while the industry and service sectors exhibit maintained or stable growth. Furthermore, the gross value added by food and beverage product manufacturing has been volatile, as in Figure 4.2. Despite the decline in agriculture and the volatile growth of food and beverage manufacturing, Figure 4.3 shows that the production value for processed fruits and vegetables has grown 4.3 times since 2000, while its volume has increased by 2.6 times.

Similarly, Figure 4.4 indicates that rice, corn, and flour milling has grown by nearly three times its year 2000 value despite only going past its 2000 volume of production in 2017. Figure 4.4 highlights the significance of developing first-step processing activities such as milling. In the case of rice, corn, and flour, growth in the milling segment may be due to improvements in product quality or reduced grain losses.

Nevertheless, suppose the Philippines continues to exhibit a declining trend in its agriculture sector. In that case, it may be unable to fully capitalize or lose on the potential of its processed agricultural products. Therefore, further upgrading the upstream portions of the AFB value chain will be necessary to reverse the weakening state of its agriculture sector.

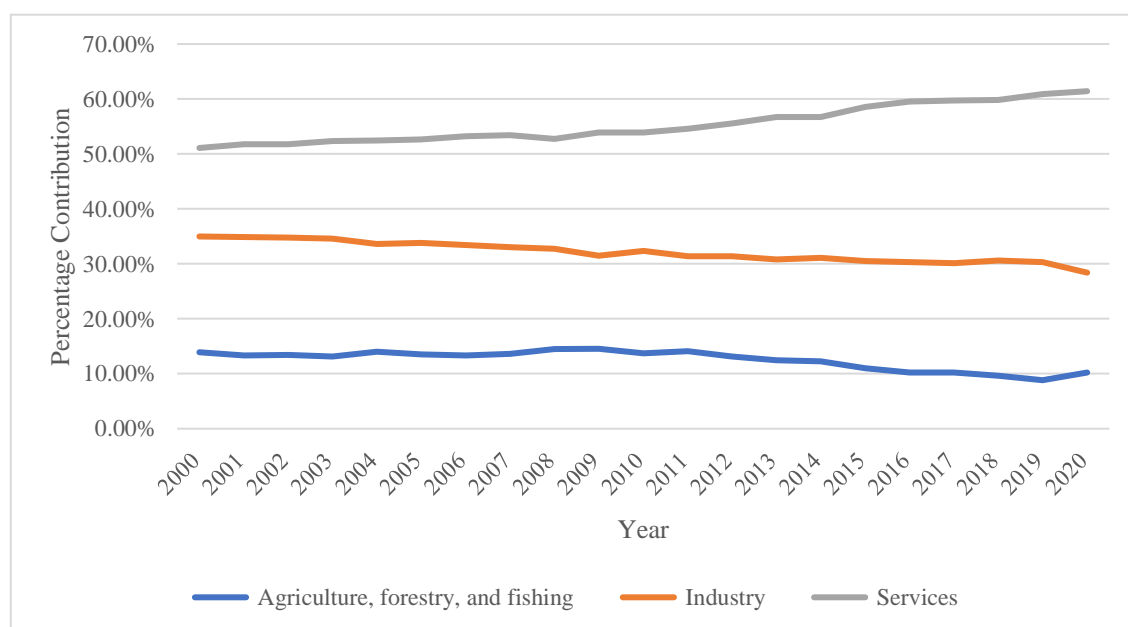


Figure 4.1. Percentage contribution of each economic sector to GDP, 2000 to 2020.

Note. Percentages derived from data using USD 2010 constant, 2010 = 100. Data source: Philippine Statistics Authority (PSA).

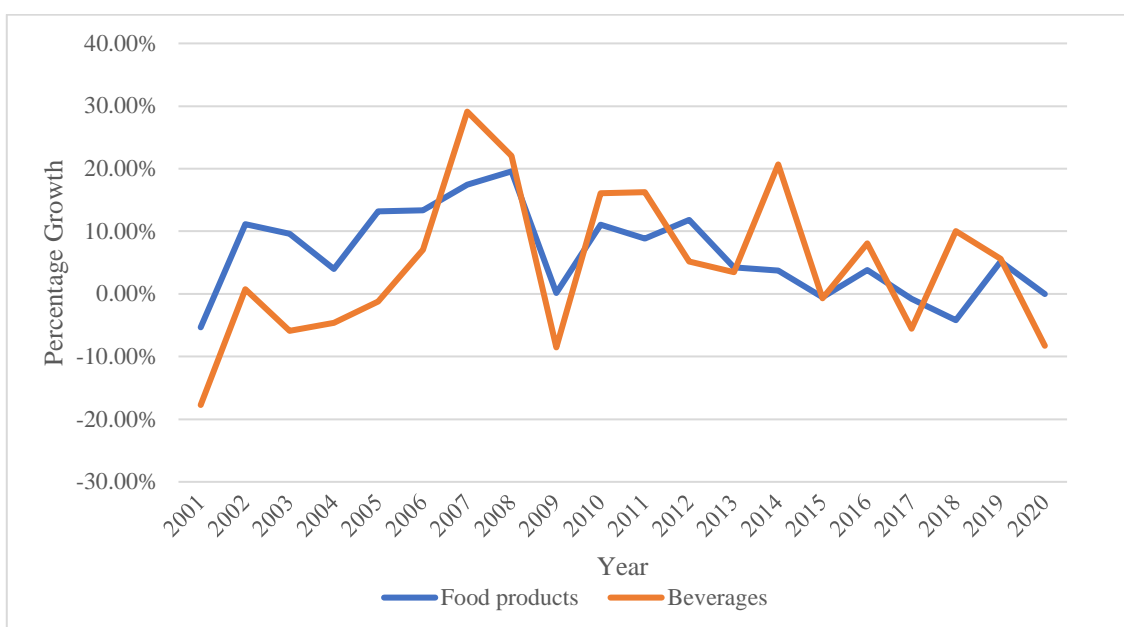


Figure 4.2. Percentage growth of food product and beverage manufacturing, 2000 to 2019.  
Note. Percentages derived from data using USD 2010 constant, 2010 = 100. Data source: PSA.

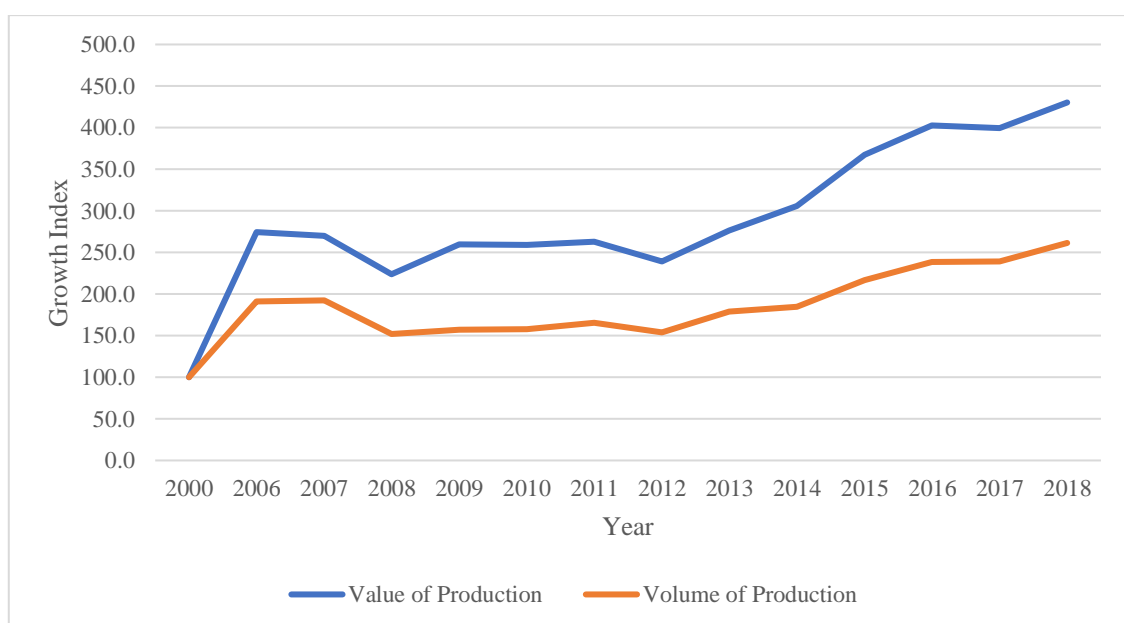


Figure 4.3. Value of production and volume of production growth of processed fruits and vegetables, 2000, 2006 to 2018.  
Note. Growth calculations use the year 2000 as its base year (2000=100). Data source: PSA.

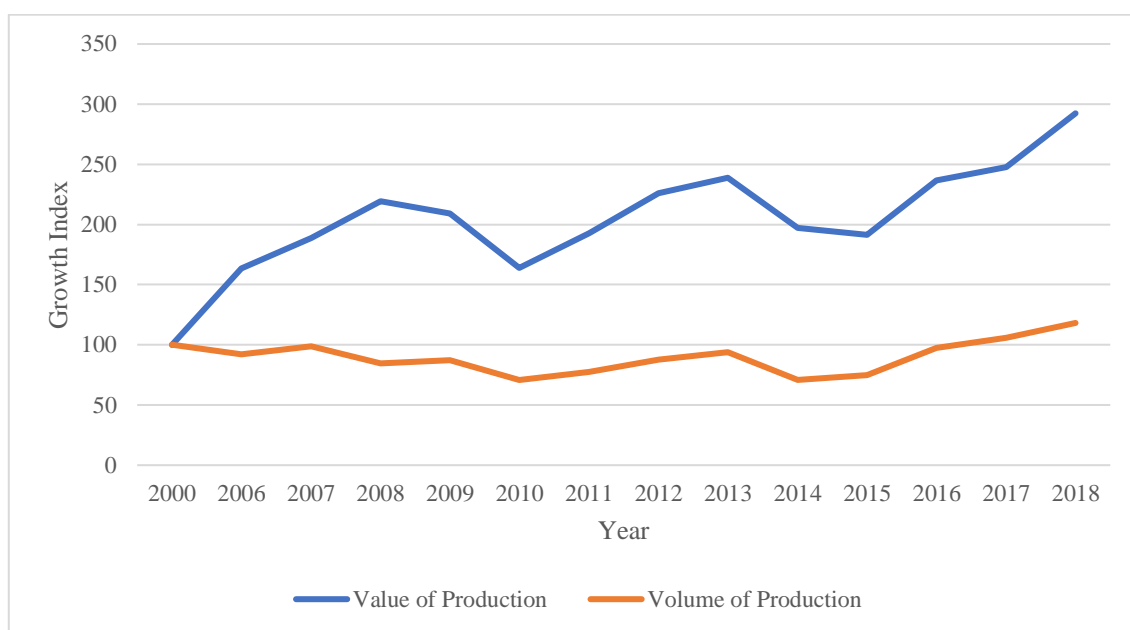


Figure 4.4. Value of production and volume of production growth of rice, corn, and flour milling, 2000, 2006 to 2018.

Note. Growth calculations use the year 2000 as its base year (2000=100). Data source: PSA.

According to the NEDA (2017), the absence of growth in agriculture may be attributed to the critical lack in developing its crops sub-sector compared to the livestock, poultry, and fisheries sub-sectors. As shown in Figure 4.5, other crops have contributed less than livestock, poultry, fisheries, and agricultural support activities apart from the paddy/rice sub-sector. In addition, several issues mire the crops sub-sector, such as weather-related vulnerabilities (i.e., typhoons and droughts), the coconut infestation in the Cavite, Laguna, Batangas, Rizal, and Quezon (CALABARZON) region, the limited adoption of high-yielding crop varieties, and limited crop diversification as the sector focuses too much on rice, corn, and coconut. Moreover, the NEDA assessment still finds limited accessibility between production areas and markets, aggravated by poor compliance with product standards and certification.



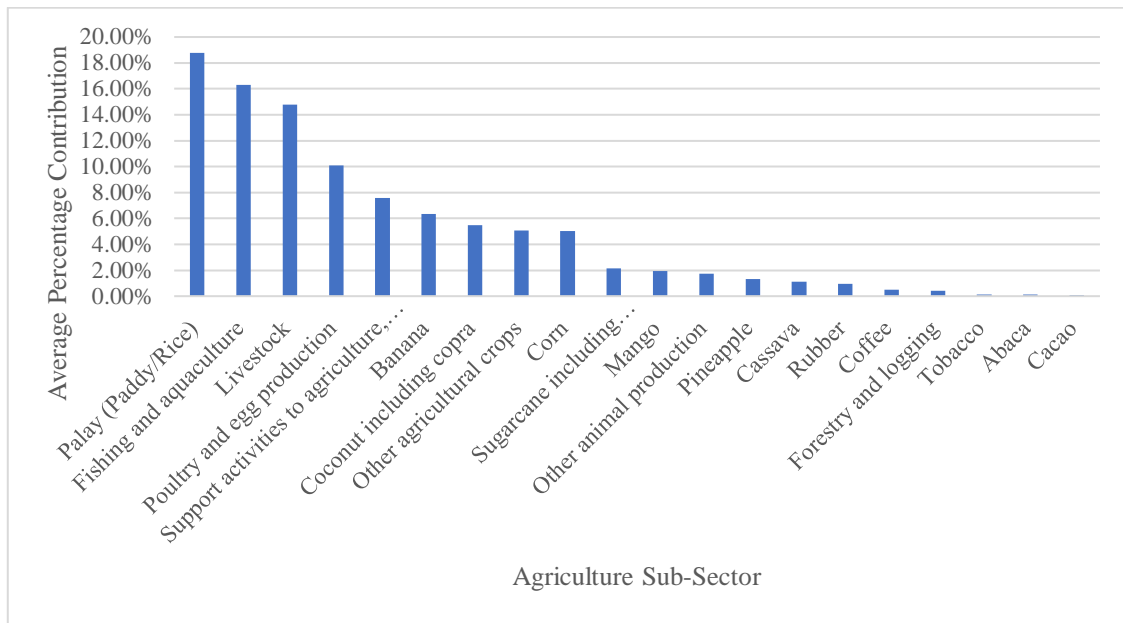


Figure 4.5. The average contribution of various sub-sectors to the agriculture, forestry, and fishing gross value added (GVA) from 2000 to 2020.

Note. Percentages derived from data using US\$ 2010 constant, 2010 = 100. Data source: PSA

The crops sub-sector may be split into grains and other crops. The grains sub-sector comprises paddy rice and corn, while all other crops fall under the second category. Certain institutions and agencies under the DA oversee the development and management of specified crops. For rice, there is the NRP, corn has the National Corn Program, the coconut industry has the Philippine Coconut Authority, tobacco has the National Tobacco Administration, the Sugar Regulatory Administration for sugarcanes, and fibers like abaca are under the purview of the Philippine Fiber Industry Development Authority. The HVCDP supervises almost all other unspecified crops. Currently, there are ten crops specified as priorities for development (DA-HVCDP representative, personal communication). These crops are (1) bananas, (2) pineapples, (3) mangoes, (4) coffee, (5) cacao, (6) rubber, (7) red onions, (8) sweet potatoes, and (9) upland and (10) lowland vegetables.

As shown in Figure 4.6, rice exhibits the highest contribution to the total production value in agriculture, averaging 19.36% from 2000 to 2020. Rice is followed by bananas, coconut, corn, other crops, sugarcane, mangoes, pineapple, cassava, and rubber, contributing an average of at least one percent each during the same period. Table 4.1 presents the amount and share of selected grains and priority high-value crops in total agricultural export from 2016 to 2020. As can be seen from the table, bananas, pineapples, and rubber have a more substantial export presence than other crops. Although mangoes seem to rank the third most exported fruit, their volume and value share are vastly inferior compared to the two fruits. Both rice and corn do not exhibit a particularly strong export presence in the grains sub-sector. While rice displays the highest contribution to total agricultural production value, a vast majority of its volume is sold in the domestic market, as rice is the staple food of the typical Filipino (DA, 2018).

Figure 4.7 shows a similar declining trend in agricultural sectoral employment as well. Even with this trend, the agriculture sector still hosts roughly a quarter of the working population. Data from the PSA revealed that an average of 89% of this quarter worked in agriculture, hunting, and forestry<sup>4</sup>. Furthermore, NEDA says that the agricultural population is currently an aging one with a range of 48 to 55 years old in its overall producer population and a range of 43 to 64 years of age in its extension workers. With its aging population, the NEDA also considers agricultural extension services a current weakness that lends itself to the slow diffusion and adoption of area-specific high-yielding crop varieties, farm practices, and technologies.

---

<sup>4</sup> See Appendix 8 for the disaggregated employment distribution data.

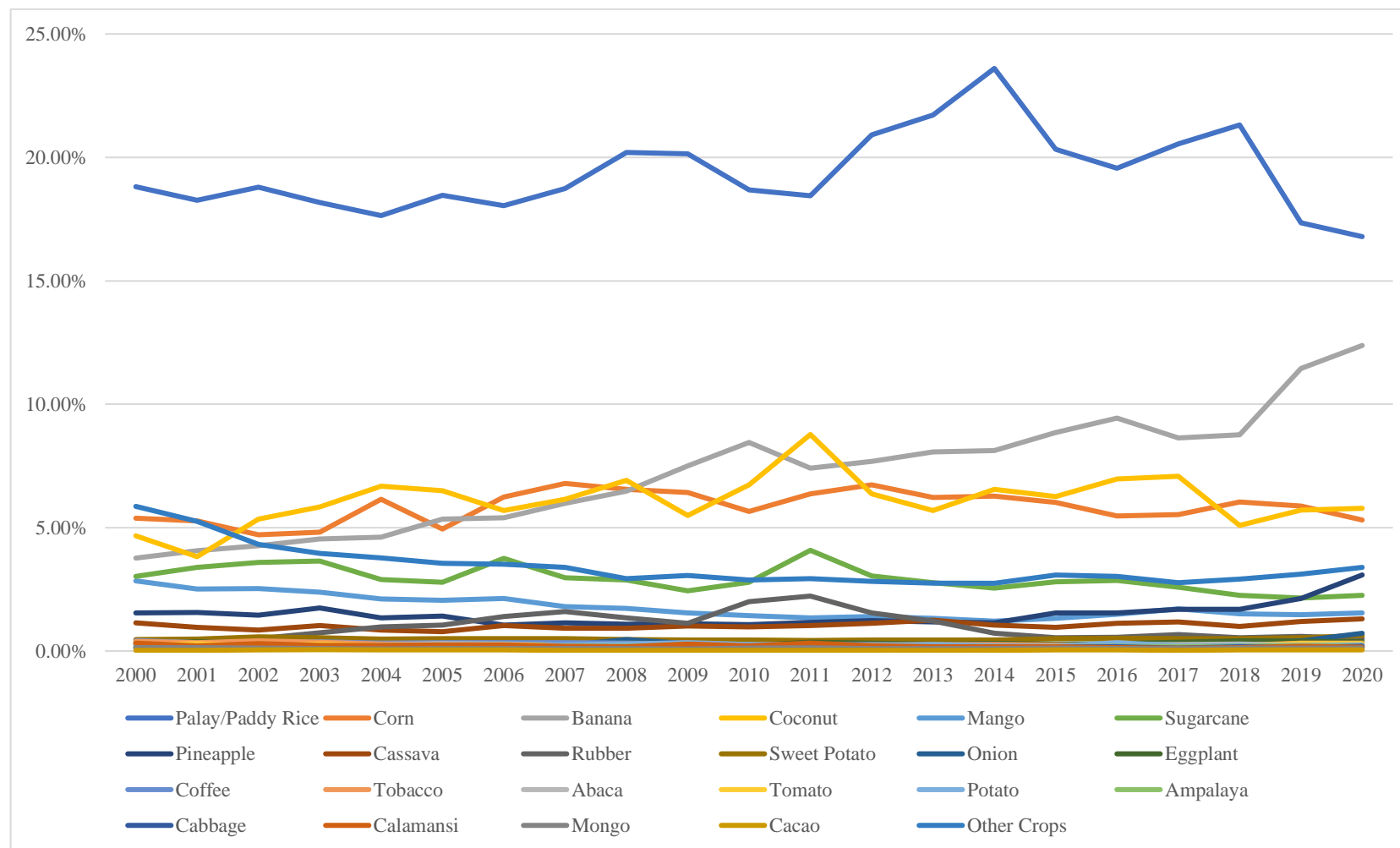


Figure 4.6. Percentage contribution of crop sub-sectors in the total value of production in agriculture, 2000 to 2020.

Note. Data source: PSA

Table 4.1 Volume and value percentage share of grains and priority high-value crops in agricultural exports, 2016 to 2020

Commodity	2016		2017		2018		2019		2020	
	Volume	Value % Share	Volume	Value % Share	Volume	Value % Share	Volume	Value % Share	Volume	Value % Share
<i>Grains</i>										
Rice	263.3	0.008	322.0	0.013	308.9	0.009	344.9	0.008	310.0	0.009
Corn	346.9	0.021	595.5	0.025	333.8	0.016	415.3	0.018	1,670.8	0.077
<i>High-Value Crops</i>										
Bananas	1,733,836.3	14.166	2,855,635.1	17.153	3,126,203.3	22.591	4,403,496.3	29.262	3,808,470.5	26.521
Pineapples	599,343.1	4.609	494,273.0	3.028	391,982.1	2.685	631,486.2	4.866	594,725.8	5.021
Mangoes	14,343.0	0.258	16,116.1	0.352	13,562.2	0.308	14,211.8	0.294	10,658.1	0.246
Coffee	5.9	0.001	-	-	17.1	0.002	14.2	0.002	17.8	0.003
Cacao	2,232.8	0.141	3,094.4	0.127	2,732.6	0.112	3,048.8	0.118	5,152.9	0.220
Rubber	66,965.7	0.726	132,732.2	1.564	118,109.7	1.335	124,272.0	1.209	158,328.8	1.585
Onions	601.3	0.010	548.3	0.008	121.0	0.002	379.2	0.007	163.0	0.004
Sweet	23.8	0.001	25.8	0.01	29.8	0.001	732.7	0.017	623.3	0.011
Potato										
Vegetables	645.0	0.014	704.8	0.014	909.5	0.014	1,200.6	0.016	1,419.1	0.034

Note. The unit for volume is million tons. Dash marks (-) mean no exports were done that year. Onions include red onions and other varieties. Vegetables count both upland and lowland vegetables, but these are not disaggregated further. Vegetables in this table only include cassava, eggplant, tomatoes, potatoes, ampalaya (bitter gourd), cabbage, and mongo (mung beans). Data from this table is adapted from PSA (2021a).

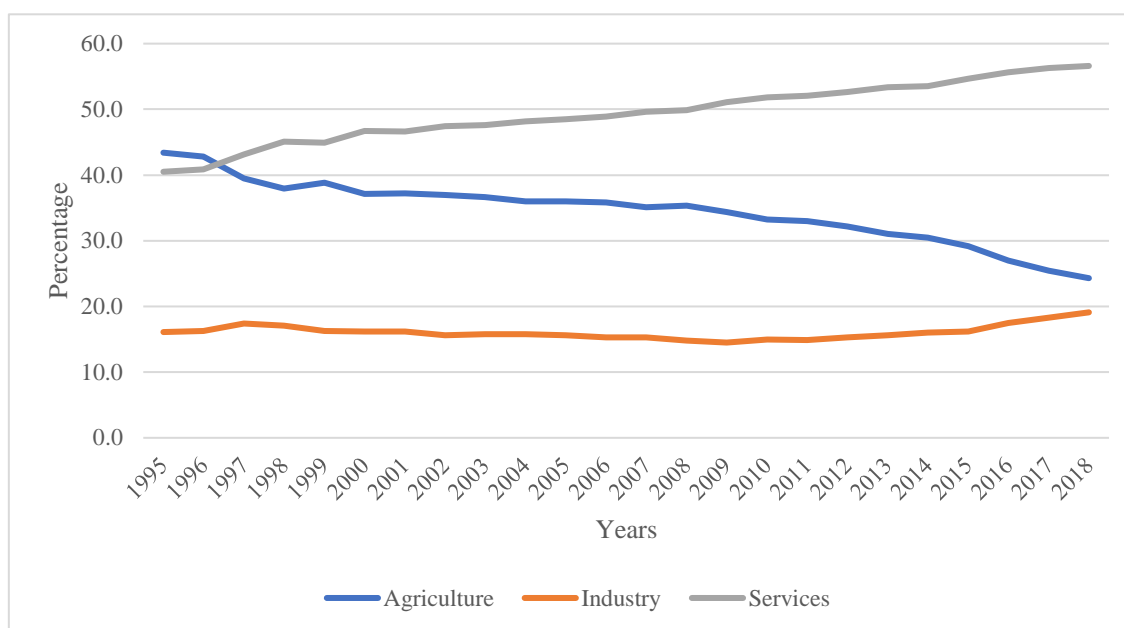


Figure 4.7. Economic sectoral percentage distribution of employment, 1995 to 2018.

Note. Data source: PSA.

NEDA further explains that underlying this lack of growth is the continued failure to address perennial challenges faced by agriculture. First among these is the limited access to credit and insurance that constrains producers from procuring the proper inputs, equipment, and facilities to aid in production. Accompanying this is the low uptake of farm mechanization and inadequate access to good post-harvest facilities. Targeting these will allow the sector to be more competitive as it lowers costs and lessens harvest losses during processing. A third issue is the development of irrigation systems. Through the National Irrigation Administration (NIA), the government, however, seems to be addressing this issue, with already 60.35% of three million hectares of irrigable lands serviced as of 2017 (National Irrigation Authority [NIA], 2017).

Succeeding these issues is the minimal support still given to R&D. According to data from the UNESCO Institute for Statistics and the PSA, the Philippines' overall GERD is minute, with values of 0.13% in 2013, 0.16% in 2015, and 0.1% in 2019, a far cry from the OECD's recommendation of country's GERD reaching at least one percent of GDP. This trend is not evident only in agriculture but in the overall innovation environment of the Philippines, which numerous scholars find weak (Israel, 1999; Patalinghug, 2003; Alabastro, 2006; Quimba, Albert, and Llanto, 2017; Albert et al., 2017). According to Cororaton (2003), there are numerous gaps in the R&D capability of the Philippines. He summarizes them into the following: low R&D investments by various sectors of the country, lack of clear network or linkage opportunities, lack of capable and skilled researchers and other science, technology, and innovation human resources, poor maintenance of capital assets, education mismatch, and misalignment of government agencies and its priorities. UNESCO (2015) notes that the Philippines truly needs to boost its R&D to catch up or at least compete with its Asian neighbors.

Another issue the sector faces is the longtime struggle with agrarian land reform. Began by the Macapagal administration in 1963 (Hayami and Kikuchi, 1981) and expanded further by succeeding administrations, land reform is still mostly incomplete, according to the NEDA. Due to its inadequate implementation, land reform in the Philippines also saw itself disrupted by premature and illegal conversion of agricultural lands to commercial or industrial lands. Additionally, population growth continues to pressure the further conversion of farmlands into settlement areas.

Finally, the NEDA finds overlapping functions across several government agencies that support the sector. Examples of these may be found in the extension services

provided by multiple agencies under the DA and local governments. Another instance may be the possibility of duplicative research funded by the DA's Bureau of Agricultural Research and the Department of Science and Technology's (DOST) Philippine Council for Agriculture, Aquatic, and Natural Resources R&D (PCAARRD). Although, these two R&D funding agencies convened together in 2018 to harmonize their work to avoid research duplications and better sharing of information and developments (Calzado, 2018). Nevertheless, an excessive number of functional overlaps may lead to crowding out of the private sector in providing their services instead. Likewise, these government agencies may see a dip in the productivity of those workers that experience functional overlaps.

The cohorts that may benefit most in addressing these problems may be individuals living the rural areas, where three-fourths of the Filipino poor reside (NEDA, 2017). As exemplified by Figure 4.8, the poorest groups in the country are farmers, fisherfolk, and individuals living in rural, primarily agriculture-focused, areas. Given the copious number of issues the Philippine AFB sector faces, developing and addressing these issues to aid in poverty alleviation may be the most significant reason.

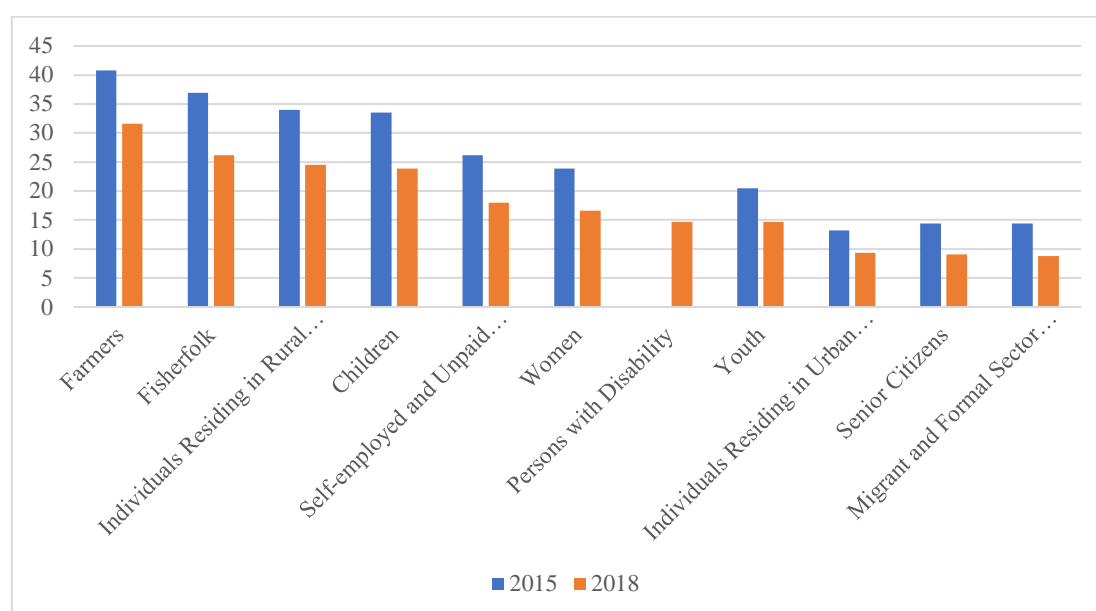


Figure 4.8. Poverty incidence among the basic sectors, 2015 and 2018.

Note. Data source: PSA (2020).

The Philippine government is implementing a multifaceted and multi-level approach to address these challenges. Since 2017, the government began multiple policies targeting GVC integration and innovation-led development not just for AFB industries but also for all sectors. Three primary policies attempt to foster the development of the Philippines' innovation systems and the ability of its industries to further integrate and participate in their respective GVCs. These policies are the PDP 2017-2022 which targets NIS development; the Harmonized National R&D Agenda (HNRDA) 2017-2022 which primarily targets SIS and RIS growth; and the  $i^3S$  which highlights the need to further integrate with GVCs. Under the  $i^3S$ , public and private entities created regional and commodity roadmaps to help boost RIS, SIS, and cluster development in their respective provinces and sectors. Specifically, for the AFB sector, the DA is implementing its One DA approach that forefronts a 12-point strategy seeking to develop and industrialize agriculture in all regions of the Philippines.



### **Section 4.3 The Philippine Development Plan 2017-2022**

The development of the Philippines' NIS centers on the PDP 2017-2022 (NEDA, 2017). This document outlines the country's current issues and the strategies the current administration plans to address the mentioned issues. The PDP is the backbone of the Duterte administration's (2016 to 2022) policy focus, formulation, and action. Furthermore, it is comprehensive in its scope and discusses multiple facets of Philippine development.

Particularly for the AFB sector, the PDP presents a strategic framework that hopes to produce greater economic access and opportunities for producers and MSMEs in the AFF sector. Included in the framework is a six-point agenda:

1. Improve productivity within the ecological limit, including the development of overall agriculture extension services
2. Further producer and MSME participation in value chains
3. Increase access to innovative financing
4. Grow entrepreneurship within the sector
5. Develop support institutions (i.e., land tenure and resource protection, access to irrigation, improved local government services, resolution of agrarian disputes)
6. Expand technology access

Moreover, the PDP chapters on agriculture (Chapter 8), manufacturing, and service industries (Chapter 9), building human capital (Chapter 10), and advancing the STI infrastructure and culture of the Philippines (Chapter 14) present several planned and currently being implemented strategies and policies to address the country's perennial

issues and develop its various industries. Table 4.2 summarizes these strategies and policies from the chapters mentioned that relate to development in the AFB sector.

Table 4.2 Summary of Agri-Food Business Sector-Related Strategies and Policies from Selected PDP Chapters

Chapter 8 – Expanding Economic Opportunities in Agriculture, Forestry, and Fisheries
<ul style="list-style-type: none"> <li>- Development of an integrated color-coded agricultural map that identifies the comparative advantage in agriculture of different areas</li> <li>- Hasten construction and retrofitting of disaster- and climate-resilient small-scale irrigation systems</li> <li>- Encourage the use of appropriate farming and fishing machinery, equipment, and new and better technologies</li> <li>- Bolster extension system</li> <li>- Promote an ecosystems approach to fisheries management</li> <li>- Commodity diversification through the endorsement of high value-adding and market potential products</li> <li>- Expand the sector through new forms of production and marketing models</li> <li>- Creation of more transportation and road networks to link production areas to markets</li> <li>- Organizing formal agricultural groups and clusters to generate economies of scale</li> <li>- Provision of capacity and capability building training for agricultural workers</li> <li>- Increase agricultural insurance coverage and accessible credit</li> <li>- Raise R&amp;D in production and post-harvest technologies</li> </ul>

*(Table 4.2 Continued)*

(Table 4.2 Continued)

---

Chapter 9 – Expanding Economic Opportunities in Industry and Services through *Trabaho at Negosyo* (Work and Business)

---

- Strengthen value chain linkages by implementing the comprehensive national industrial strategy, adopting a market-driven perspective for high-value agricultural products, and improving backbone and business services
  - Removal of restrictive economic provisions in the Constitution and repeal or amend relevant laws
  - Improve the investment incentive system and be aggressive in promoting investment
  - Develop industrial and service sectors, and adopt a cluster-based industrial development approach
  - Promote green manufacturing through the *Green Jobs Act*, and provide incentives
  - Place attention on developing service industries that are export-capable
  - Establish *National Quality Infrastructure*
  - Establish *Inclusive Innovation Centers*
  - Encourage technology adoption and innovation
  - Develop and expand the network for MSMEs, and provide access to finance; reassess MSME-related laws, and implement the *MSME Development Plan*
  - Expand the *Small Enterprise Technology Upgrading Program* and *Shared Service Facilities*
- 

Chapter 10 – Accelerating Human Capital Development

---

- Ensure access to good quality and globally-competitive Technical-Vocational Education and Training (TVET) Programs
  - Improve high education competencies in research, innovation, and extension services
  - In line with the previous, strengthen government-academe-industry linkages and partnerships, but also integrate the community in linkages, especially in applied research
  - Encourage retooling of skills to fit 21<sup>st</sup>-century requirements
- 

(Table 4.2 Continued)

(Table 4.2 Continued)

Chapter 14 – Vigorously Advancing Science, Technology, and Innovation
<ul style="list-style-type: none"><li>- Promote commercialization and utilization of publicly-funded R&amp;D technologies</li><li>- Develop the intellectual property rights system and culture</li><li>- Implement the <i>Startup Ecosystem Development Program</i></li><li>- Invest in R&amp;D and reach the recommended GERD of the OECD</li><li>- Further funding support for projects that fall under the <i>Harmonized National R&amp;D Agenda</i></li><li>- Increase funding for STI human resource development by expanding funding and coverage of STI scholarships</li><li>- Develop and implement further the <i>Balik (Returning) Scientist Program</i></li><li>- Strengthen the infrastructure and foster the culture of STI in the country</li><li>- Promotion of collaborative R&amp;D through the triple helix of government-academe-industry</li><li>- Encourage international STI cooperation and collaborative projects</li></ul>

*Note.* The researcher made this summary based on how the strategies presented in the PDP may address the issues mentioned above related to the agri-food business sector of the Philippines. Though the information for Chapter 10 only highlights education-related strategies, the entire chapter discusses strategies and policies on nutrition and health, basic, higher, and technical education, and labor.

In its entirety, the PDP takes a whole-government approach by tasking all levels of government to adjust their programs and services in adherence to the plans laid out, with the NEDA as the coordinating and lead agency. Other government agencies that oversee the implementation of the PDP and spearhead the agendas specific to AFB-related strategies are the DA, DOST, and the Department of Trade and Industry (DTI).

A more recent law and policy first mentioned in the PDP is Republic Act No. 11293 or the Philippine Innovation Act. Enacted in April 2019 with its Implementing Rules and Regulations made publicly available in early 2020, the law mandates the fostering and prioritization of innovation as the key driver for economic and social development in the country (NEDA, Department of Science and Technology [DOST], and DTI, 2020). In it, the law established the creation of a National Innovation Council

(NIC) that will supervise the innovation-related efforts of the nation, promulgated in its National Innovation Agenda and Strategy Document (NIASD).

However, the Philippines is still in the process of forming the NIC and NIASD. Therefore, although this study acknowledges their existence, the researcher could not incorporate the law into the analysis. Nonetheless, he recognizes that the Philippine Innovation Act will play a critical role in all upcoming innovation-related developments and ecosystems in the Philippines.

#### **Section 4.4 Harmonized R&D Agenda 2017-2022**

To push for increased R&D in the country, the government set priority areas for development in its *HNRDA 2017-2022* (DOST, 2017). The HNRDA has five priority research themes, and enclosed in these themes are more specific research topics and programs. The research themes guide scientists, engineers, and researchers on R&D projects the government may fund. The policy also lays out the work for public research institutes and public universities. For the private sector, the agenda presents opportunities where they may provide their services and may set expectations on what technologies or innovations may be available for prospective users. Table 4.3 summarizes the five research themes and their topics and programs.

Table 4.3 List of Priority Research Areas and Programs under the HNRDA 2017-2022

National Integrated Basic Research Agenda	Health	Agriculture, Aquatic, and Natural Resources Sector	Industry, Energy, and Emerging Technology	Disaster Risk Reduction and Climate Change Adaptation
<ul style="list-style-type: none"> <li>- Water security</li> <li>- Food and nutrition security</li> <li>- Health sufficiency</li> <li>- Clean energy</li> <li>- Sustainable communities</li> <li>- Inclusive nation building</li> </ul>	<ul style="list-style-type: none"> <li>- Drug discovery and development</li> <li>- Diagnostics</li> <li>- Functional foods</li> <li>- Hospital equipment and biomedical devices</li> <li>- ICT for health</li> <li>- Dengue research</li> <li>- Nutrition and food safety</li> <li>- Disaster risk reduction for health</li> <li>- Climate change adaptation for health</li> <li>- Molecular technologies for health</li> </ul>	<ul style="list-style-type: none"> <li>- Agriculture (crops and livestock)</li> <li>- Fisheries and aquaculture</li> <li>- Forestry</li> <li>- Natural resources and environment</li> <li>- Technology transfer</li> <li>- Socio-economics and policy research</li> </ul>	<ul style="list-style-type: none"> <li>- Food and nutrition security</li> <li>- Countryside development</li> <li>- Competitive industries</li> <li>- Delivery of social services</li> <li>- Intelligent transportation solutions</li> <li>- Renewable energy and energy storage solutions</li> <li>- Human security</li> </ul>	<ul style="list-style-type: none"> <li>- Observation and monitoring networks</li> <li>- Technology development and application for monitoring</li> <li>- Modeling and simulation for improvement of monitoring and forecasting</li> <li>- Hazards, vulnerability, and risk assessment</li> <li>- Warning and risk communication</li> <li>- Technology development and application for disaster risk management</li> <li>- Policy research</li> </ul>

Note. The authors retrieved the information for this list from the HNRDA 2017-2022 (DOST, 2017).

Under the HNRDA's agriculture, aquatic, and natural resources agenda, the DOST-PCAARRD and the DA – Bureau of Agricultural Research [BAR] lead the promotion and coordination of R&D in this field. Particularly for crop-related R&D, the priorities are germplasm evaluation, conservation, utilization and management, varietal improvement and selection, production of good quality seeds and planting materials, cultural management practices, crop production systems, and post-harvest, processing, and product development. R&D in climate change adaptation, disaster risk reduction, technology transfer mechanisms, and socio-economic and policy research supplement the crop-related priorities. Each crop set as a priority also has an R&D roadmap provided in the agenda.

Supporting AFB R&D for the industry or manufacturing side is the DOST's Philippine Council for Industrial, Energy, and Emerging Technology R&D with research priorities on food and nutrition security and developing smart and green packaging technologies. Another critical priority in R&D is countryside development with targets in agro-processing, development of natural products, Halal food production, shop floor R&D, and creation of regional consortiums.

#### **Section 4.5 Inclusive Innovation Industrialization Strategy and Regional and Commodity Roadmaps**

In 2017, the Philippines also adopted an innovation-led industrialization strategy called the Inclusive Innovation Industrialization Strategy or i<sup>3</sup>S (DTI, 2017). Although the i<sup>3</sup>S prioritizes the resurgence of manufacturing through job creation, it still highlights the significant contribution and development of AFB industries, specifically in high-value

crops such as mangoes. Before this strategy, the Philippine government placed innovation policies in a supporting role rather than at the forefront of overall industrial policy (Alabastro, 2006). Through the i<sup>3</sup>S policy, the Philippine government attempts to foster collaboration between various innovation and industry actors – a crucial part of an innovation system found to be lacking by Quimba, Albert, and Llanto (2017) in their assessment of innovation in the Philippines. Moreover, the policy's overall goal is to promote sustained and inclusive economic growth, create jobs, and reduce poverty levels. The priority industries under the i<sup>3</sup>S are as follows:

1. *Auto and auto parts* – auto electronics, CARS Program, Public Utility Vehicle Modernization Program
2. *Electronic manufacturing services* – auto electronics, telecommunications equipment, medical devices, semiconductor manufacturing services, power storage, civil aviation, and aerospace
3. *Aerospace parts and aircraft maintenance, repair, and overhaul*
4. *Chemicals* – petrochemicals, metallic salts, and peroxy salts of inorganic acids, alcohols, and derivatives, oleochemicals, cyclic hydrocarbons
5. *Shipbuilding and ship-repair* – roll-on roll-off, and small- and medium-sized vessels
6. *Manufacturing and design of furniture, garments, and the creative industries*
7. *Iron and steel, tool and die*
8. *Agribusiness* – rubber, mangoes, coconut, banana, coffee, and other high-value crops
9. *Construction* – roads, bridges, ports, airports, and low-cost housing



10. *IT-BPM and e-Commerce* – higher-earning and more complex non-voice BPO services, Knowledge Process Outsourcing of medical, financial, and legal services, software and game development, Engineering Services Outsourcing, shared services
11. *Transport and logistics* – land, water, and air transport, warehousing, support facilities
12. *Tourism*

The i<sup>3</sup>S seeks to develop these industries through a *competition-innovation-productivity* strategy that aims to create a more liberalized market environment that leads to increased competition stimulating innovation and growth. Leading the facilitation and coordination of the industrialization strategy are the DTI and the DTI – Board of Investments (BOI). Currently, the policy espouses a six-point strategy (DTI, 2018):

1. Strengthening government-academe-industry linkages
2. Building human capital for innovation and entrepreneurship
3. Creating a policy environment that accelerates innovation and entrepreneurship
4. Reinforcing the entrepreneurship culture and support programs for MSMEs
5. Increasing and providing funding and financing for innovation and entrepreneurship
6. Growing and developing industry clusters

In line with its first strategy, the government encourages a triple-helix collaboration model between the government, academe, and industry. Through these partnerships, the DTI hopes to create what it calls Regional Inclusive Innovation Centers

(RIICs) as the heart of industrial development for each region of the country (DTI, 2018). These RIICs work similar to industrial clusters (Porter, 1998; Enright, 2003) but exhibit a more open stance in acknowledging potential partners in a RIIC network. Furthermore, DTI envisions these RIICs to work in physical geographic regions and virtual spaces (Aldaba, 2018). Figure 4.9 presents an illustration of a typical RIIC network.

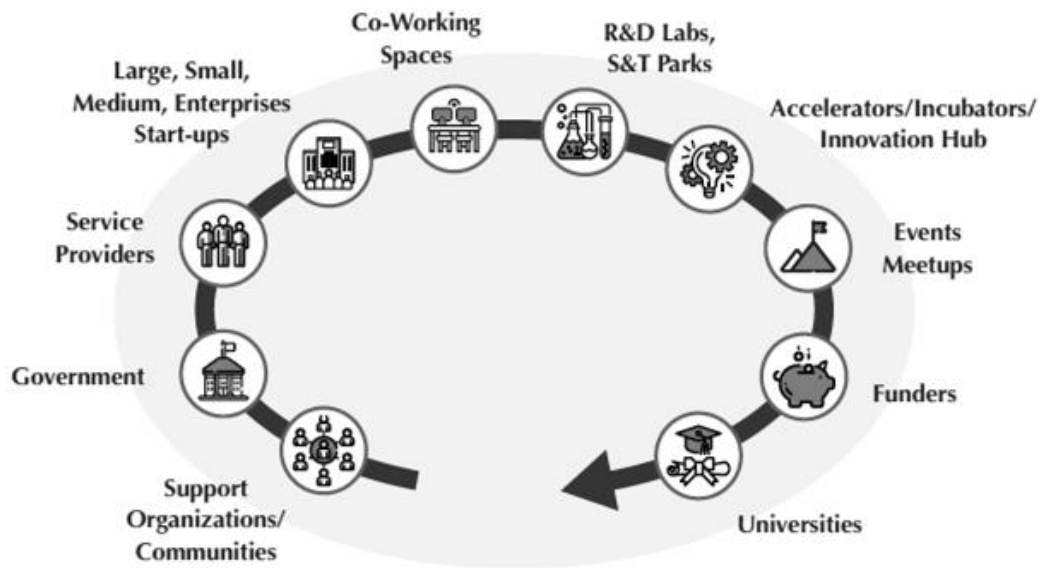


Figure 4.9. The RIIC network proposed by the DTI.

Note. This figure is recolored but directly lifted from DTI (2018).

To start these RIICs, the DTI tasked each region to create a development roadmap of their province and the industries present in their areas. As a result, it is slowly publishing regional roadmaps for industry development through collaboration with multiple stakeholders. To support this effort, the i<sup>3</sup>S recommends potential industries for each region of the Philippines. Moreover, the DA has also prepared sectoral roadmaps for

each target commodity to allow the development of similar products across regions<sup>5</sup>.

Table 4.4 presents a summary of these potential industries.

Table 4.4 Potential Industries per Region Delineated by Sector

Region	Agriculture	Manufacturing	Service
CAR	Coffee	Processed food, aerospace, electronics	Tourism
I	Coffee, cacao, fruits, aquaculture,	Processed food, garments, and textiles	Tourism
II	Fruits, coffee, cacao, other agribusinesses	Processed food, furniture	
III	Bamboo	Furniture, aerospace, processed food, garments, and textiles	
IV-A		Automotive, electronics, chemicals, aerospace, garments, and textiles	IT-BPM
IV-B	Seaweed, rubber, tablea	Coco coir	Tourism
V	Other agribusinesses	Metal casting, coco coir, health care, processed food, garments, and textiles	
VI	Shrimps	Processed food	Tourism
VII	Seaweed/carrageenan, mangoes, abaca, bamboo	Processed food, garments, and textiles, coco coir, furniture, shipbuilding	IT-BPM, tourism

*(Table 4.4 Continued)*

<sup>5</sup> The researcher presents the commodity roadmaps for the rice and mango industries in their respective case chapters.

*(Table 4.4 Continued)*

Region	Agriculture	Manufacturing	Service
VIII	Cacao, fruits, abaca, other agribusinesses	Processed food, copper, garments, and textiles, natural health	
IX	Rubber, cacao, fruits, coconut, coffee, abaca, seaweed, other agribusinesses	Processed food	
X	Coffee, rubber, bamboo, cacao, abaca, coconut, banana, pineapples, lanzones, poultry, other agribusinesses	Coco coir, processed food, aquamarine	Tourism
XI	Seaweed/carrageenan, cacao, tablea, other agribusinesses	Processed food	Tourism
XII	Coffee, rubber, palm oil, cacao, bamboo, other agribusinesses	Processed food, garments, and textiles	Tourism
XIII CARAGA	Palm oil, rubber, other agribusinesses	Processed food	
ARMM	Coffee, rubber, cacao, palm oil, other agribusinesses		

Note. The author adapted and summarized the information from the i<sup>3</sup>S DTI Policy Brief (DTI, 2017).

As the lead agencies for the Philippines' STI infrastructure, culture, and policy, the DOST and DTI signed a Memorandum of Understanding to mutually formulate and implement the innovation plans and strategies of the country (DTI, 2018). An example of this partnership already at work is through the OneSTore.ph that combined relevant and similar programs of the DOST and the DTI (see Box 4.1). This action aligns with the DTI's call for an expanded network of actors working to create the inclusive innovation

culture and entrepreneurial ecosystem vital for the RIICs. The partnership between the two agencies is steadily growing with other government agencies and representatives from industry and the academe. With this expansion, the government agencies are now dividing the work necessary to fulfill the innovation mission. Figure 4.10 presents the delineated work among the different agencies now part of the Memorandum of Understanding with the DOST and the DTI.

**Box 4.1: The case of OneStore.PH**

OneStore.ph is an e-commerce platform of the DOST that caters to MSMEs part of the DOST's Small Enterprise Technology Upgrading Program (SETUP). Through the online platform, MSMEs can showcase and sell their products. In 2018, the DOST and the DTI signed a partnership to merge their programs that target MSMEs and have similar goals. Following this, the DOST started allowing MSME products from the DTI One Town One Product and Go Lokal programs to be sold in the oneStore.ph platform as well. Also, the DOST started setting up science and technology nooks in several DTI *Negosyo* (Business) Centers in the country. They aim to link and offer the DOST services to MSMEs part of the *Negosyo* Centers, who do not know about the DOST services. Before this setup, the two agencies provided separate venues for their partner MSMEs to showcase and sell their products. Now, with a single platform, MSMEs from all over the Philippines hold an online presence through oneStore.ph. As of February 2021, oneStore.ph hosts approximately 1430 products with about 1030 food items and hundreds of handicrafts and other products sourced from all over the Philippines.

Note. Contents of the table are drawn from De Leon (2018) and oneStore.ph (n.d.).

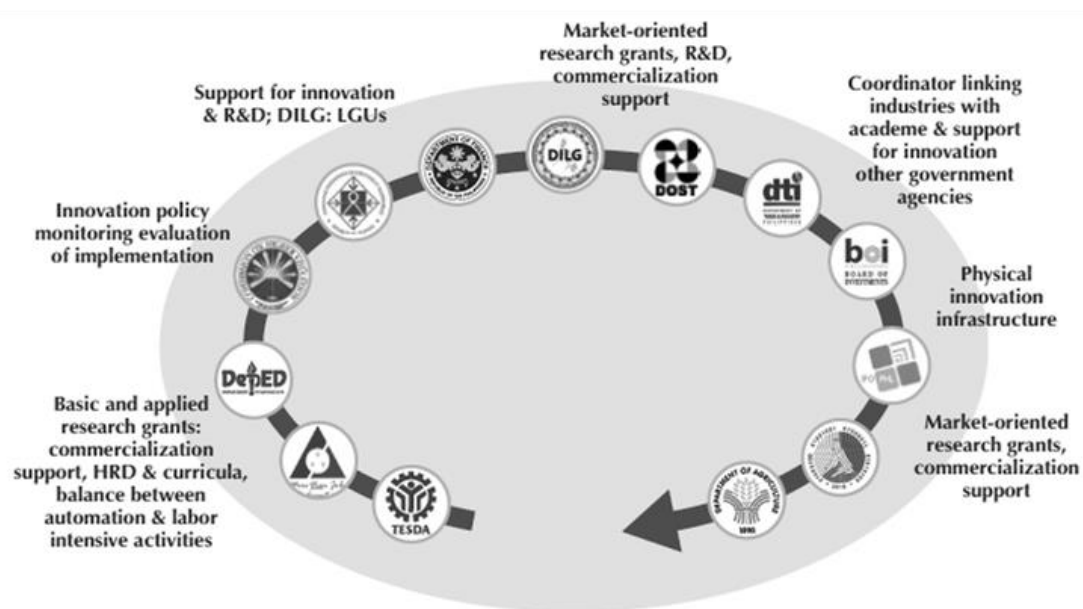


Figure 4.10. The extended network of STI actors of government and their proposed actions.

Note. This figure is recolored but directly lifted from DTI, 2018.

## Section 4.6 Prevailing Agriculture Development Policies

Particularly for the agriculture sector, the DA's work centers around its new policy called One DA: A Holistic Approach to Agriculture & Fisheries Transformation (Dar, 2021). Under this new initiative are its 12 Key Strategies to 'Grow' Agriculture in 2021 and Beyond:

1. Farm clustering (*Bayanihan* Agri Clusters) as an approach to resource management and distribution. The DA will also more effectively introduce social protection and safety-net measures through this strategy
2. Province-led Agriculture and Fisheries Extension Systems target the development of commodities that provinces have a comparative advantage. Provincial governments will espouse co-planning, co-investment, co-implementation, and co-monitoring with stakeholders

3. Creation of Agri-Industrial Business Corridors to serve as the anchor and facilitator in connecting the upstream and downstream value chain activities
4. Infrastructure investments that support agro-industrialization that consider supply, markets, and climate change impact investment location decisions
5. Proactive guidance and partnerships with local government units (LGUs) for post-harvest, processing logistics, and marketing support
6. Promotion and upscaling of digital agriculture
7. Strengthening and application of more climate change adaptation and mitigation measures
8. Mobilization and empowerment of partners to attain scale
9. Global product promotion, trade, and export development
10. Strengthening food safety and regulations
11. Improved procurement transparency and ease of doing business
12. Effective communication through strategic communication support

Supplementing its strategy, the DA announced several follow-up policies and programs. One such program is its response to the COVID-19 pandemic the DA calls the Plant, Plant, Plant Program. The program's main objective is to ensure food sufficiency during the lockdowns or community quarantines during the pandemic (Corpuz, 2020). As a result, the DA was given an additional budget of 31 billion pesos (approximately US\$ 620 million)<sup>6</sup>, of which the DA allocated 8.5 billion Pesos (approximately US\$ 170 million) to its Rice Resiliency Project, aimed at increasing the country's rice self-sufficiency from 87% to 93% by the end of 2020 (DA – Agriculture and Fisheries

---

<sup>6</sup> Converted at the rate of US\$ 1.00 = Php 50.00

Information Division [AFID], 2020). The remaining amount was distributed to the following projects:

1. Additional paddy procurement fund under the National Food Authority (NFA)
2. Expansion of its SURE Aid and recovery project
3. Expansion of its agriculture insurance project
4. Social amelioration for farmers and farm workers
5. Upscaling of its *KADIWA ni Ani at Kita* direct marketing program
6. Integrated livestock and corn resiliency project
7. Expansion of its small ruminants and poultry project
8. Coconut-based diversification project
9. Fisheries resiliency project
10. Revitalized urban agriculture and *gulayan* (vegetable farm) project
11. Corn for food project
12. Strategic communications project

As the pandemic persists through 2021, the DA continues its flagship Plant, Plant, Plant Program and sectoral industrialization efforts. The current draft 2021 overall budget for the DA is set at 85.6 billion Pesos (approximately US\$ 1.712 billion), a 29% increase from the previous year (Ocampo, 2020d). Of the total amount, 75% of the budget will be allocated directly under the Secretary's office to fund a copious number of programs and projects, including its seven priority commodities: rice, corn, high-value crops (which includes mangoes), livestock, fisheries, organic agriculture, and halal food production and accreditation (Ocampo, 2020d).



Aligned with the farm clustering approach, the DA announced its ‘no cluster, no assistance’ approach as its new core strategy in clustering and consolidating agricultural products (DA Communications Group, 2020). The policy seeks to force producers to form cooperatives or associations to ease the distribution of government assistance in the sector, which includes training, farm inputs, and farm equipment and machine technologies (Miraflor, 2020), and covers multiple steps of production, post-harvest, processing, and marketing in the GVC. At present, the policy initially covers cassava and corn products but will eventually be expanded to cover many AFB products (Ocampo, 2020c). In addition, the enforcement of a cluster approach in agriculture may address issues in increasing competitiveness and achieving economies of scale for smallholder farmers in the country, as is the case in other Southeast Asian nations (Gregorio et al., 2020).

#### **Section 4.7 Chapter Summary**

To develop further integration and participation into AFB GVCs, the Philippines is implementing several policies that target the development of its industries on a global, national, regional, and sectoral level. In addition, the Philippine government is also trying to boost its R&D expenditure and output in specific target areas, a portion of which is dedicated to AFB research and countryside development. Table 4.5 summarizes the critical policies, lead agencies, and the system levels that target IS and GVC development.

Table 4.5 List of Key Policies for GVC-IS Interaction and Development

<i>Policy</i>	<i>Lead Agency</i>	<i>Target Level</i>
1. PDP 2017-2022	NEDA	National plan, NIS
2. HNRDA2017-2022	DOST	National plan, RIS, SIS, NIS
3. i <sup>3</sup> S	DTI	GVC, cluster development
4. One DA: A Holistic Approach to Agriculture & Fisheries Transformation and other agriculture policies and programs	DA	RIS, cluster development
5. Regional Roadmaps	DTI, DA, multiple line agencies	RIS, cluster development
6. Commodity Roadmaps	DTI, DA, multiple line agencies	SIS, cluster development

Note. The researcher created this summary list based on the PDP 2017-2022 (NEDA, 2017) and information from the DOST, DA, and DTI webpages.

With these policies and plans in place, the government hopes, with the help of the private sector, to address the perennial problems that limit the development of its AFB sector. Table 4.6 summarizes critical public and private sector organizations in the Philippine AFB sector. Intermediary organizations may also aid in addressing these issues, especially those with limited access to credit, low mechanization and post-harvest facility uptake, agricultural R&D support, and the need for more robust extension services. In addition, through the DA's 'no cluster, no assistance' policy, producers and other chain actors may create cooperatives or associations that may provide innovation intermediary services and create a network for and help individuals and MSMEs innovate.

Succeeding this chapter are the case reports for the rice and mango AFB sectors, respectively. These chapters discuss each case by reporting their respective sector's issues and context, industry development policy, innovation systems, value chains, and how innovation intermediaries in these industries perform roles and build key-capabilities.

Table 4.6 Key Public and Private Sector Organizations in the Philippine AFB Sector

Organization	Type	Scope
1. Department of Agriculture	Public	National and Regional
a. NRP		National and Regional
b. HVCDP		National and Regional
c. ATI		National and Regional
d. Bureau of Plant Industry (BPI)		National and Regional
e. BAR		National
f. Fertilizer and Pesticide Authority (FPA)		National and Regional
g. NFA		National
h. National Seed Industry Council (NSIC)		National and Regional
i. NIA		National
j. Bureau of Agriculture and Fisheries Standards		National and Regional
k. Philippine Crop Insurance Corporation		National and Regional
l. PHILRICE		
m. PHILMECH		
n. Philippine Council for Agriculture and Fisheries and its regional, provincial, and local counterparts		
2. Department of Trade and Industry	Public	National and Regional
a. Center for International Trade Expositions and Missions		International and
b. Cooperative Development Authority (CDA)		National
c. Intellectual Property Office of the Philippines		National
d. Philippine Economic Zone Authority		Clusters
e. Philippine International Trading Corporation (PITC)		National
f. Small Business Corporation		National and Regional
g. Technical Education and Skills Authority		National and Regional

*(Table 4.6 Continued)*

(Table 4.6 Continued)

3. Department of Science and Technology	Public	National and Regional
a. PCAARRD		National
b. Food and Nutrition Research Institute		
c. ITDI		National
d. Technology Application and Promotion Institute		National
d. Technology Application and Promotion Institute		National and Regional
4. Department of Health (DOH)		
a. Food and Drug Administration (FDA)	Public	National
5. State Colleges and Universities	Public	
a. University of the Philippines (UP) System		Regional
b. Other state colleges and universities		Regional
6. Private Colleges and Universities	Private	Local
7. Industry Associations	Private	
a. PHILEXPORT		National
b. PHILFOODEX		National
c. Commodity or product-specific IAs		National, Regional, and Local
8. Farmer/Grower Organizations, Groups, Associations, and Cooperatives	Private	National, Regional, and Local
9. LGUs	Public	Regional and Local
10. Research Institutes	Private	
a. IRRI		International and Local
11. NGOs/NPOs	Private	National, Regional, and Local

Note. The researcher created this list based on organizations mentioned throughout the key policy documents (NEDA, 2017; DOST, 2017; DTI, 2017; DTI, 2018; and Dar, 2021), government agency websites, secondary desk research, and interviews with experts.

## **CHAPTER V**

### **THE CASE OF INNOVATION INTERMEDIARIES IN THE PHILIPPINE RICE**

#### **AFB GVC AND INDUSTRY**

##### **Section 5.1 Introduction**

Chapter V presents the case-study on innovation intermediaries in the Philippine rice AFB industry and its relationship with the GVC. This chapter is divided into six sections. First, Section 5.2 presents the Philippine rice industry's contextual conditions, state of production, and industry issues. Succeeding is Section 5.3, which showcases the Philippine government's policies toward developing the country's rice sector. Next, Section 5.4 shows a mapped GVC-IS figure of the Philippine rice industry. The section then discusses the institutions, laws, practices, value chain segments, processes, technologies, value chain actors, the financial position of key players in milled rice, and the governance structure of the rice value chain in the Philippines. The following Section 5.5 introduces the rice industry intermediary organizations that participated in this study and discusses the roles these organizations perform and how they build their key-capabilities. Finally, the chapter ends with Section 5.6 presents the findings for innovation intermediaries present in the Philippine rice industry GVC-IS.

## Section 5.2 The Philippine rice industry context

Rice is the staple food of the Filipinos (DA, 2018), and it incurs a large portion of the Filipino's food budget, especially for the poor (NEDA, 2017). Economically, rice has contributed roughly 20% of total agricultural GVA, as seen in Figure 5.1. Its contribution grew beyond 20% by 2013 but has remained somewhat erratic in recent years, even exhibiting a decline between 2018 and 2020. Despite rice production only contributing a relatively constant proportion of the agricultural GVA, Figure 5.2 reveals that the value of production of rice has also been increasing at a fairly sharp rate between 2004 to 2014 but started falling from 2014 to 2019, with a slight recovery in 2020. Figure 5.3 shows farm harvest prices regularly fluctuating with a sharp rise in the mid-1990s, and that farm harvest price has had a rising trend since the mid-2000s. However, since peaking in 2014, harvest prices have exhibited a downward trend.

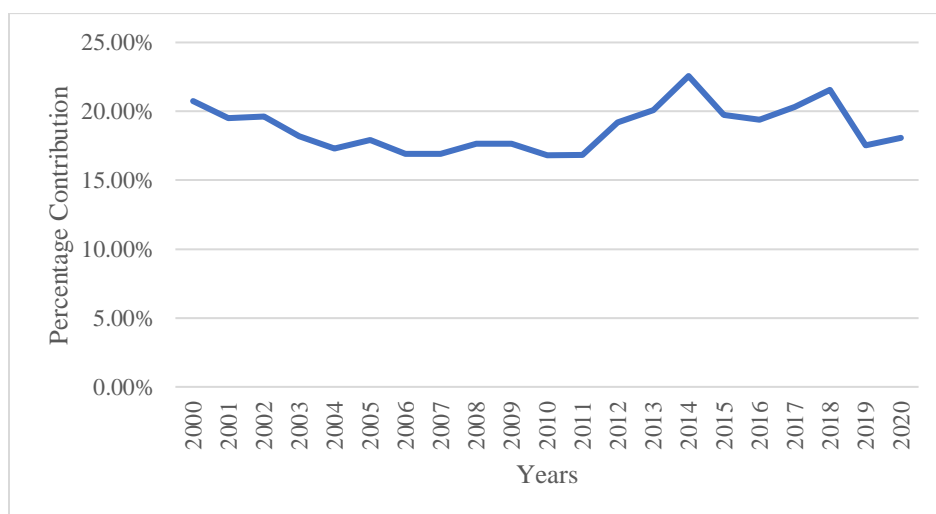


Figure 5.1. Rice paddy contribution to Philippine agricultural GVA, 2000 to 2020.

Note. Percentages derived from data using US\$ 2010, constant price. 2010 = 100. Data source: PSA.

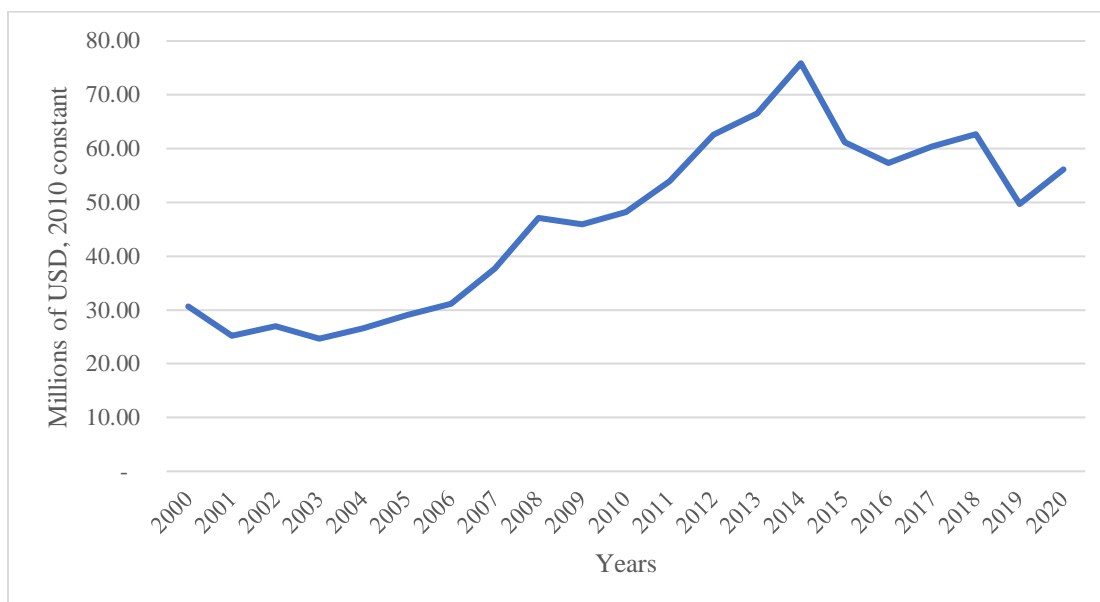


Figure 5.2. Gross value added of the Philippine rice industry, 2000 to 2020.

Note. US\$ 2010 constant, 2010 = 100. Data source: PSA.

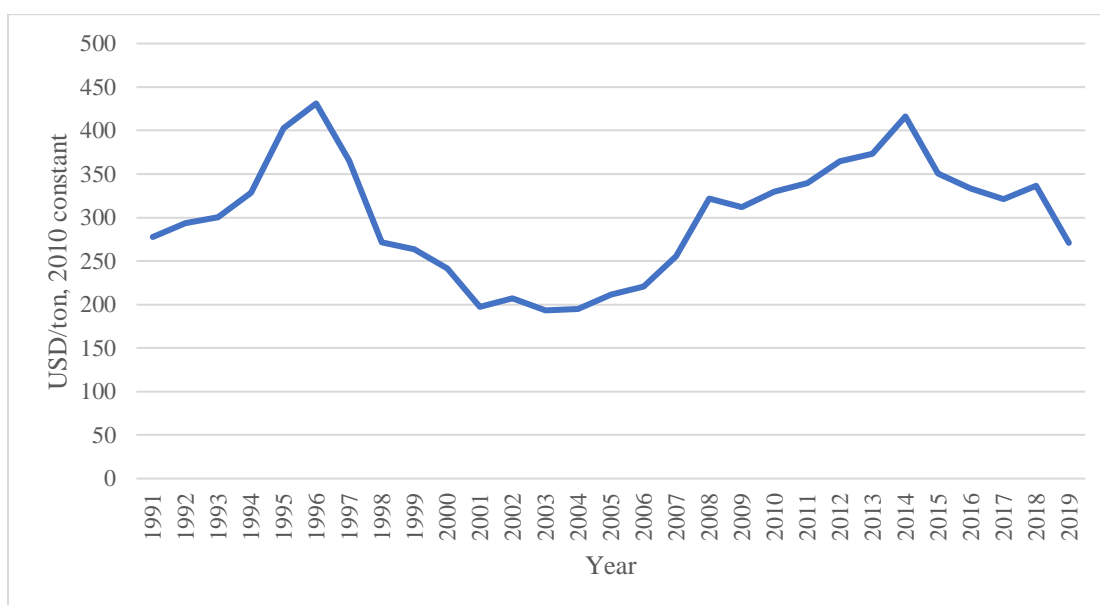


Figure 5.3. Rice farm harvest prices for the Philippines, 1991 to 2019.

Note. US\$ 2010 constant, 2010 = 1. Data source: FAO.

Looking at production capacity, Figure 5.4 presents a sharp increase in the quantity produced while maintaining a steady growth in the area harvested. This sharp increase may be due to the benefits of research and development during the Green Revolution that began in 1966 (Dawe, 2006a). For regional production, Table 5.1 shows that the three major areas of Central Luzon, Western Visayas, and Cagayan Valley contribute approximately 40% of the total rice produced from 1987 and even still in 2020. Often called the *rice bowl of the Philippines*, the Central Luzon region contributes a significant amount among the three regions at about 18% of the total output of the Philippines. Figure 5.5 shows that the region's average rice yields are higher than the country's average.

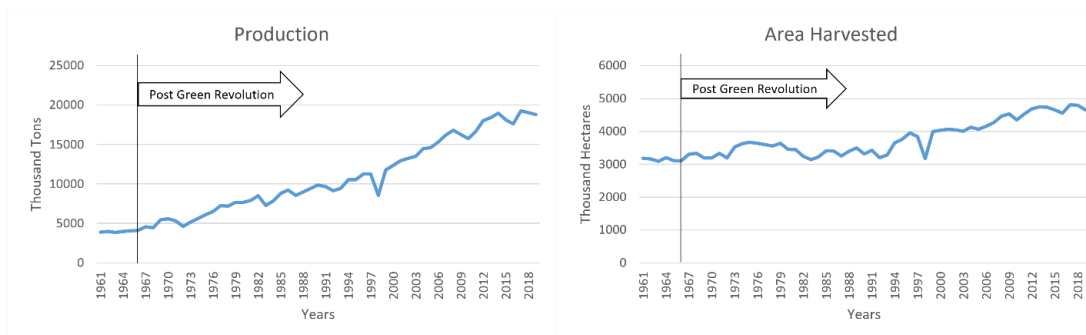


Figure 5.4. Rice production and area harvested in the Philippines, 1961 to 2019.

Note. Data source: FAO.



Table 5.1 Regional Distribution of Volume of Rice Production in the Philippines, 1987 and 2020

	1987		2020	
	Thousand Tons			
CAR	162.466	(1.9%)	376.473	(2.0%)
Ilocos	682.581	(8.0%)	1902.662	(9.9%)
<b>Cagayan Valley</b>	<b>996.606</b>	<b>(11.7%)</b>	<b>2645.777</b>	<b>(13.7%)</b>
<b>Central Luzon</b>	<b>1569.191</b>	<b>(18.4%)</b>	<b>3635.148</b>	<b>(18.8%)</b>
CALABARZON	383.421	(4.5%)	386.920	(2.0%)
MIMAROPA	454.136	(5.3%)	1183.149	(6.1%)
Bicol	581.404	(6.8%)	1294.991	(6.7%)
<b>Western Visayas</b>	<b>1178.375</b>	<b>(13.8%)</b>	<b>2295.580</b>	<b>(11.9%)</b>
Central Visayas	149.835	(1.8%)	260.524	(1.4%)
Eastern Visayas	379.343	(4.4%)	927.095	(4.8%)
Zamboanga	306.577	(3.6%)	645.407	(3.3%)
Northern Minadanao	293.273	(3.4%)	781.825	(4.1%)
Davao	403.233	(4.7%)	466.764	(2.4%)
SOCCSKSARGEN	652.999	(7.6%)	1264.117	(6.6%)
CARAGA	186.314	(2.2%)	503.331	(2.6%)
ARMM	160.098	(1.9%)	725.093	(3.8%)
Philippines	8539.852	(100.0%)	19294.856	(100.0%)

Note. Unit: Thousand tons. Data source: PSA.

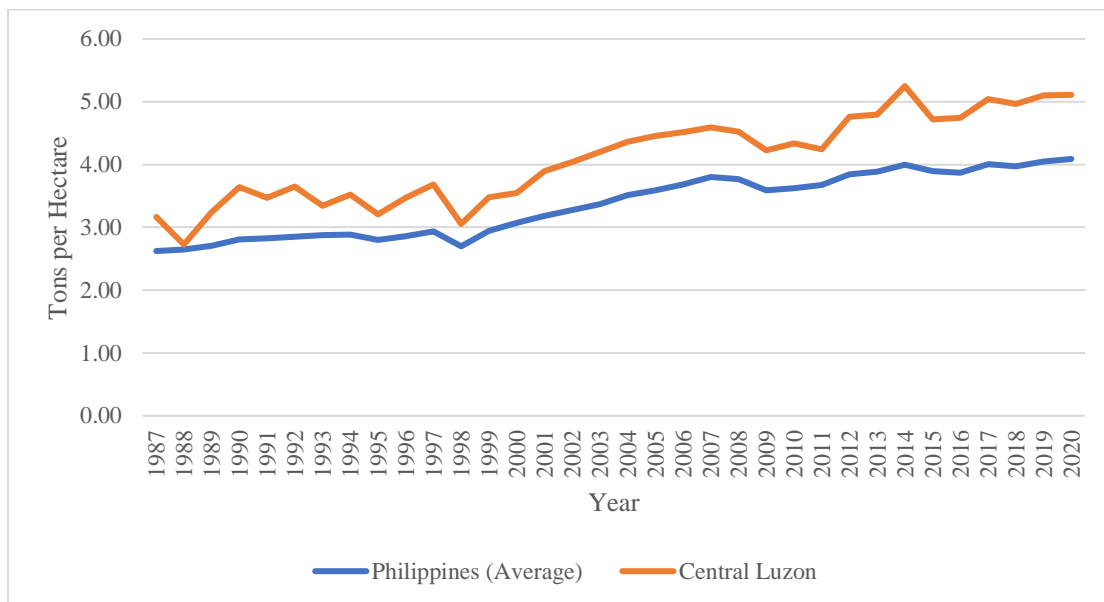


Figure 5.5. Rice yield in the Philippines and Central Luzon, 1987 to 2020.

Note. Data source: PSA.

Despite the production capacity of the Philippines, let alone Central Luzon, the country still sees itself importing rice annually. Figure 5.6 reveals that the imported amount has risen dramatically since the mid-1990s. Though the imported amount fluctuates, supply utilization accounts from the PSA<sup>7</sup> show that rice imports in more recent years have taken a stronger hold, with more than 10% of gross annual supply at 11.94% in 2018, 17.35% in 2019, and 12.67% in 2020. According to the DA (2018), the country continues to import rice as it tries to lessen the gap between supply and demand, especially during the lean months. Stressing the growing reliance on rice imports, the Philippines garnered the world's largest rice importer crown with a record-high 2.9 million tons in 2019 (Ocampo, 2020a).

<sup>7</sup> Please refer to Appendix 9 for PSA's rice supply utilization accounts.

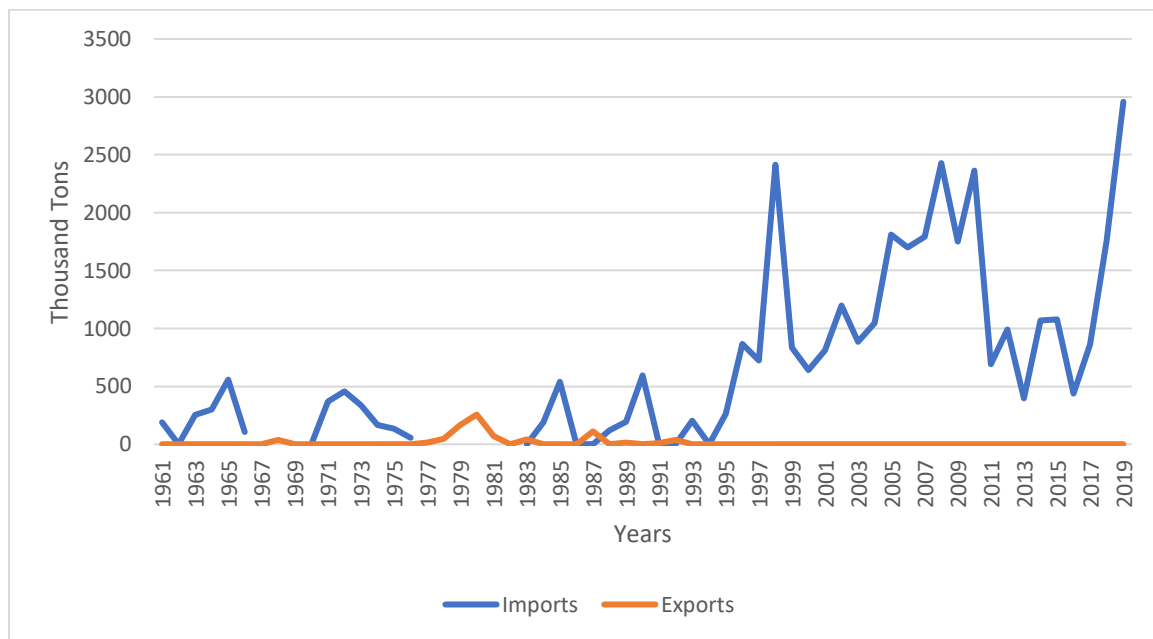


Figure 5.6. Rice trade of the Philippines, 1960 to 2019.

Note. Data source: FAO.

Dawe (2006a) posits that ecological, geographic, and historical phenomena inhibit the Philippines from ceasing to import rice. Dawe lists four reasons. First, he argues that the Philippines inevitably imports rice because it is an island nation. This argument is supported by Hayami (2001), who compares the natural land endowments of Thailand, Indonesia, and the Philippines. The first country, Hayami says, is gifted by the presence of major river deltas that hosts favorable conditions for planting rice. Categorized by Hayami as insular zones, Indonesia and the Philippines will need to rely on irrigation and rainfall to produce rice. Compared to continental countries such as Thailand, the Philippines cannot produce as much rice. As presented in Table 5.2, despite Thailand producing a lower ton of paddy per hectare yield than the Philippines, the sheer difference in the harvested area makes up for this difference. On the other hand, the vastly greater yield of Vietnam may be attributed to its

adoption of rice production technologies – another reason Dawe cites as a limiting factor in Philippine rice production.

Table 5.2 Rice Paddy Production Capacity of the Philippines, Thailand, and Vietnam, 2019

	<b>Philippines</b>	<b>Thailand</b>	<b>Vietnam</b>
Paddy Produced	18,814.83	28,356.87	43,488.50
Harvested Area	4,651.49	9,715.36	7,469.89
Yield	4.04	2.92	5.82

Note. Units: Thousand tons, thousand hectares, and tons per hectare. Data source: FAO.

The second reason Dawe gives is the country's geographical position. Located at the Southeastern edge of Asia and openly facing the Pacific Ocean, the Philippines annually experiences a slew of typhoons that raises the risk and difficulty of rice production. Following this reason is the high labor cost incurred in the rice sector, and Dawe stresses the need to veer away from merely reducing wages and instead ease labor costs through mechanization. As previously mentioned, the final, and as previously mentioned, reason Dawe presents stems from technology adoption. Though the benefits created by the Green Revolution were great, nearly the whole Filipino rice farmer population has adopted the technologies coming from that period. As a result, the sector cannot expect further growth in yield without newer technologies and better high-yielding crop varieties. The same is true for the country's rice post-harvest processes and technologies. The DA (2018) cites PHILRICE and PHILMECH's (2016) study revealing that the Philippines has an average grain loss of 14.29% from post-production processing. The challenge, therefore, is not just in production but in post-production as well.

However, a good sign of development is the rising R&D budget for rice, as shown in Table 5.3. The budget rose significantly between 2016 and 2017 and experienced smaller increases. The significant increase is mainly attributed to the budget for extension support, education, and training services for the sector, which saw a nearly twofold increase between 2016 and 2017. Despite increasing, the budget specifically for new research and development is decreasing. The values represented seem to mirror the published plans of the government for better extension support and technology diffusion, as is presented in the next Section 5.2.

Table 5.3 Estimate of Government R&D Budget for the Philippine Rice Industry (US\$ 2010 constant price)

<b>Item</b>	<b>2016</b>	<b>2017</b>	<b>2018</b>	<b>2019</b>
Extension support, education and training services (ESETS)	153,685.80	314,892.76	300,068.52	369,508.25
R&D	163,377.32	155,863.77	148,064.06	140,524.20
PHILMECH	33,981.82	41,791.15	43,338.87	35,247.26
PHILRICE	75,947.99	77,657.97	108,398.46	86,159.08
PCAARRD	178,302.46	201,972.28	197,190.52	180,471.47
<b>Total</b>	<b>605,295.40</b>	<b>792,177.94</b>	<b>797,060.43</b>	<b>811,910.26</b>

Note. Calculations are converted to US\$ 2010 constant price, 2010 = 100. Data in this table is an estimate of the total R&D budget for the rice industry and is derived from the annual General Appropriations Act budget documents of the Republic of the Philippines (Department of Budget and Management [DBM], 2016, 2017, 2018a, 2018b, 2019, 2020). The budget for ESETS and R&D are items listed under the National Rice Program. More sources of R&D may be allocated in the annual budget documents but not clearly stated as such. PHILMECH and PCAARRD R&D budgets also cater to other agricultural, aquatic, and natural resource industries.

The most pressing issue the industry faces is the passing of the RTL (Republic Act No. 11203). As part of the policy actions listed in the PDP (NEDA, 2017) and the situation factored in the preparation of the Philippine Rice Industry Roadmap 2030 (DA, 2018), this

new law seeks to make the rice industry more competitive as the Philippine government removes quantitative restrictions on imported rice and replaces these limitations with tariffs alone (DA, 2018; Ranada, 2019). This now poses a problem to local rice farmers as the price of rice offered by rice exporting countries such as Thailand and Vietnam is below nearly half the cost per kilogram of that produced in the Philippines, as shown in Table 5.4. Even when imposed with a tariff, imported rice from its Southeast Asian neighbors will still be cheaper as Southeast Asian countries are given a tariff of only 35% under the ASEAN Trade in Goods Agreement of 2012 (DA, 2018; Ranada, 2019).

Table 5.4 Average costs of rice production in the Philippines, Thailand, and Vietnam, crop year 2013-2014 (in Philippines Pesos per kilogram)

	<b>Philippines</b>	<b>Thailand</b>	<b>Vietnam</b>
Seed	0.58	1.12	0.44
Fertilizer	1.94	1.56	1.36
Pesticide	0.36	0.90	0.87
Hired labor	3.76	0.66	0.46
Operator, family, and exchange labor	0.66	0.65	0.81
Animal, machine, fuel, and oil	1.73	1.66	0.81
Irrigation	0.45	0.14	0.08
Land rent	2.11	1.85	1.49
Interest on capital	0.43	0.07	0.08
Others	0.40	0.20	0.13
<b>Total Cost</b>	<b>12.41</b>	<b>8.85</b>	<b>6.53</b>

Note. Data source: Moya et al. (2016).

The imposition of the RTL, however, is not without proper context. Briones and dela Peña (2015) and Briones (2019) aptly summarized why the law was inevitably passed. In 1995, the Philippines agreed with the World Trade Organization (WTO) to open agricultural trade. To show its commitment, the government enacted the Agricultural Tariffication Act

(Republic Act No. 8178), which, like the RTL, forgoes the quantitative restrictions on agricultural products and instead places a tariff ceiling and allows an annual minimum import quantity set at a lower tariff rate. However, a clearly stated product exempted in RA 8178 was rice, as it was still under the purview of the NFA to authorize and allocate the importation of rice.

Nevertheless, the Philippine government conceded a ten-year agreement with the WTO for a more protected set amount of rice at 30,000 tons in 1995 to 224,000 tons in 2004 for the private sector to import, coupled with a higher tariff rate of up to 50%. By 2005, the Philippine government requested an extension on the rice import restrictions based on the sector's inability to compete with foreign producers. The WTO approved the extension until 2012 and further until 2017, when the Philippine government sought another extension in 2012. By 2017, the maximum import amount reached 805,200 tons divided amongst WTO members, already at the 35% tariff rate under the ASEAN Trade in Goods Agreement.

Upon the expiration of the 2017 extension, the government no longer requested another one due to further concessions requested by WTO members and the continuously dropping popularity of the NFA in its ability to manage rice stocks and properly allocate import licenses. With its history and prevailing pressures, the RTL and its Implementing Rules and Regulations came on the 5<sup>th</sup> of March 2019.

Faced with many challenges, the government and industry stakeholders may need to invest much more in agricultural R&D, promote technology adoption, develop overall agriculture extension services, and address longstanding problems facing the rice industry.

Though the increase in R&D and introduction of more and cheaper varieties of rice entering the Philippine market may help the non-farming poor, the inability to adapt and address current and deep-rooted challenges in the rice industry may incur even higher losses to producers. The issue faced by the industry is, thus, domestic-market oriented in that much of the work necessary will require opening opportunities to producers to gainfully compete within their own country in the face of incoming competition from imports.

### **Section 5.3 The government's rice industry development policy**

To address the rice industry's issues, the DA (2018) crafted its Rice Industry Roadmap 2030. The plan, heavily based on previous research on the competitiveness of Philippine rice in Asia conducted by the International Rice Research Institute (IRRI) (Bordey, Moya, Beltran, and Dawe, 2016), outlines the country's plan to reinvigorate the industry. However, unlike in the past, Roadmap 2030 prioritizes achieving rice security rather than supply self-sufficiency. In other words, rice security means achieving "availability, affordability, and accessibility of high-quality and nutritious rice at all times" (p.6). To achieve self-security, the DA hopes to achieve three primary goals: to improve the sector's competitiveness, enhance the resiliency of Filipino rice farmers in their crops to disasters and climate-related risks, and ensure access to safe and nutritious rice. Common with all three objectives is the need to improve and support agricultural R&D and technology adoption<sup>8</sup>. The DA divides its roadmap into three phases, with each phase highlighting one of the goals.

---

<sup>8</sup> For a list of current and available technologies for the Philippine rice industry, see Appendix 10.



Table 5.5 summarizes the targets and planned interventions and support for each of the three phases of the Rice Industry Roadmap 2030.

Table 5.5 The Phases and Goals of the Rice Industry Roadmap 2030

Target	Planned Intervention and Support
<i>Phase 1 – Improved Competitiveness (2017 to 2022)</i> <sup>9</sup>	
1a. Increase average yield to 6 tons/ha in high-yielding provinces, and 5 tons/ha in medium-yielding provinces <sup>10</sup>	<ul style="list-style-type: none"> <li>• Hybrid and inbred seed support</li> <li>• Irrigation development for areas with percentage of irrigated area harvested less than the national average</li> <li>• Extension services support</li> <li>• Yield-enhancing integrated crop management R&amp;D</li> <li>• Credit access facilitation</li> </ul>
1b. Reduce average farm production cost to Php 8/kg in low-cost provinces, and Php 10/kg in medium-cost provinces <sup>11</sup>	<ul style="list-style-type: none"> <li>• Mechanization support, with particular focus on combined harvesters for 2019 to 2020</li> <li>• Promotion of cost-saving package of technologies</li> <li>• Training on farm machinery operation and maintenance</li> <li>• Local farm machinery manufacturing industry development</li> <li>• Development of ICT platform for custom service providers</li> <li>• Rice farming mechanization R&amp;D</li> <li>• Credit access facilitation for custom service providers</li> </ul>
1c. Reduce average post-production losses to 12% in deficient drying capacity provinces	<ul style="list-style-type: none"> <li>• Drying facility upgrading in targeted provinces</li> <li>• Training on drying operation and maintenance</li> <li>• Bulk drying system R&amp;D</li> <li>• Credit access facilitation for custom service providers</li> </ul>

(Table 5.5 Continued)

<sup>9</sup> As of the writing of this dissertation, no references for evaluating the success of Phase 1 are available yet.

<sup>10</sup> The DA classifies high-yielding provinces as those that currently produce greater than 4 ton/ha., while medium-yielding are provinces that product between 3 to 4 tons/ha.

<sup>11</sup> The DA classifies low-cost provinces as those whose current production costs are below Php 12/kg., and medium-cost as those producing between Php 12/kg to Php 17/kg.

(Table 5.5 Continued)

1d. Reduce average marketing cost by Php 1/kg	<ul style="list-style-type: none"><li>• Farm-to-market road improvement</li><li>• Support the development of railway systems</li><li>• Capacity training on business skill improvement</li><li>• Piloting paddy central trading (wholesale market) stations in high-yielding provinces</li></ul>
1e. Assist work transition of rice farmers and workers in low-priority provinces	<ul style="list-style-type: none"><li>• Income support during training</li><li>• Training on farm diversification</li><li>• Training on non-rice agriculture for farmworkers</li></ul>
<i>Phase 2 – Enhanced Resiliency to Disasters and Climate Risks (2023 to 2026)</i>	
2a. Cover at least 60% of rice farms with crop insurance	<ul style="list-style-type: none"><li>• Crop insurance support provision in all target provinces by 2026</li><li>• Earlier crop insurance provision for high-risk provinces between 2019 to 2022</li></ul>
2b. Adoption of climate-resilient technologies by 100% of rice farmers	<ul style="list-style-type: none"><li>• Utilization of climate risk vulnerability maps for adaptation strategies</li><li>• Extension service support on and promotion of localized climate information, dynamic cropping calendars, and climate-resilient technologies</li><li>• Production chain climate-resilient technologies R&amp;D</li></ul>
2c. Provision of seeds to 100% of rice farms affected by calamities for quick-turn-around	<ul style="list-style-type: none"><li>• Increase seed reserves for areas that will be affected by climate change</li></ul>

(Table 5.5 Continued)

*(Table 5.5 Continued)*

---

*Phase 3 – Ensured Access to Safe and Nutritious Rice (2027 to 2030)*

---

3a. Maintain a rice buffer stock of at least 15 days' worth at any given time, and 30 days' worth by July 1 <sup>st</sup> of every year	<ul style="list-style-type: none"><li>• Public procurement and importation, if necessary, of paddy for the rice buffer stock program</li><li>• Distribution of stock in targeted supply-deficit provinces</li><li>• Port decongestion of imported rice near these supply-deficit provinces</li></ul>
3b. Increase availability of value-added rice and rice products	<ul style="list-style-type: none"><li>• Improvement of rice quality and value-adding products and processes R&amp;D</li><li>• Training on value-adding products, processes, technologies, and marketing</li></ul>
3c. Promote responsible rice utilization to reduce rice wastage	<ul style="list-style-type: none"><li>• Holding rice wastage reduction awareness and advocacy campaigns</li></ul>

---

Note. Summarized and adapted from the Philippine Rice Industry Roadmap 2030 (DA, 2018).

Another critical policy lies within the market reforms created by the RTL. To help fend against the might of foreign competition, the passing of the RTL also created the Rice Competitiveness Enhancement Fund (RCEF). For the succeeding six years following the enactment of the RTL, the RCEF will have an annual appropriated amount of 10 billion Pesos (approximately US\$ 200 million) that is distributed under four components for the development of the rice industry (DA, NEDA, and DBM, 2019). These four components are the mechanization program holding 50% of the annual budget, the seed program having 30%, a credit program housing 10%, and an extension service program with the remaining 10%. Each program also has a lead agency managing the funds: PHILMECH for mechanization, PHILRICE for seeds, the Land Bank of the Philippines and Development Bank of the Philippines equally managing credit assistance, and the ATI leading extension services.

To avail of the assistance provided by the RCEF, a rice farmer must be listed under the DA's Registry System for Basic Sectors in Agriculture and located in one of the 57 provinces listed under the RCEF (DA-ATI, n.d.e). Moreover, farmer organizations must be accredited and recognized by the DA and have a membership encompassing at least 20 hectares in adjacent villages under one city or municipality. However, given the DA's recent 'no cluster, no assistance' policy (DA Communications Group, 2020), individual farmers may encounter difficulties in availing of the RCEF benefits once the DA extends this policy to cover the rice industry.

On top of the 10 billion annual allocations under the RCEF, the DA's Plant, Plant, Plant Program allotted an additional 8.5 billion in 2020 for its Rice Resiliency Project to respond to the COVID-19 pandemic (DA-AFID, 2020). Furthermore, for 2021, the DA apportioned an additional 15.5 billion (approximately US\$ 323 million) to improve rice paddy production (Ocampo, 2020d).

#### **Section 5.4 The Philippines' innovation system relationship with and participation in the rice global value chain**

With the rice industry posed towards a domestic market-oriented direction, the industry's primary goal is to be able to compete with the virtually unlimited entry of imported rice. Further integration with the rice GVC means lowering costs, decreasing segment to segment losses, and increasing overall yield (DA, 2018). Doing so requires a deeper understanding of the interaction between the Philippine rice IS and GVC. Figure 5.7 presents this study's attempt to describe this interaction by merging the different vital facets of ISs

and GVCs. The length of the rectangles represents the value chain areas the institutions, laws, and practices may influence and where various value chain actors participate.

One may notice the lack of R&D in Figure 5.7's value chain segments or processes. Moreover, the researcher observed that R&D and diffusion would often go together. Thus, the researcher places R&D and its diffusion as a part of intermediary role performance as PRIs and other organizations that produce R&D almost always exhibit this function.

#### *5.4.1 Institutions, laws, and practices*

The researcher found several institutions, laws, and practices in the Philippine rice industry throughout his field and desk research. These policies, practices, and circumstances affect individuals or span different parts of the value chain and innovation system. Some of these may be relatively new (i.e., RTL and RCEF), while some have been long established (i.e., special labor arrangements). Therefore, it would be difficult to expound on the Philippine rice industry's numerous unlisted institutions, laws, and practices. Instead, the researcher highlights three critical ones frequently mentioned throughout the interviews and desk research. These institutions, laws, and practices are the RTL, chain actor preferences, certified inbred and hybrid seed usage, and the special labor arrangements.

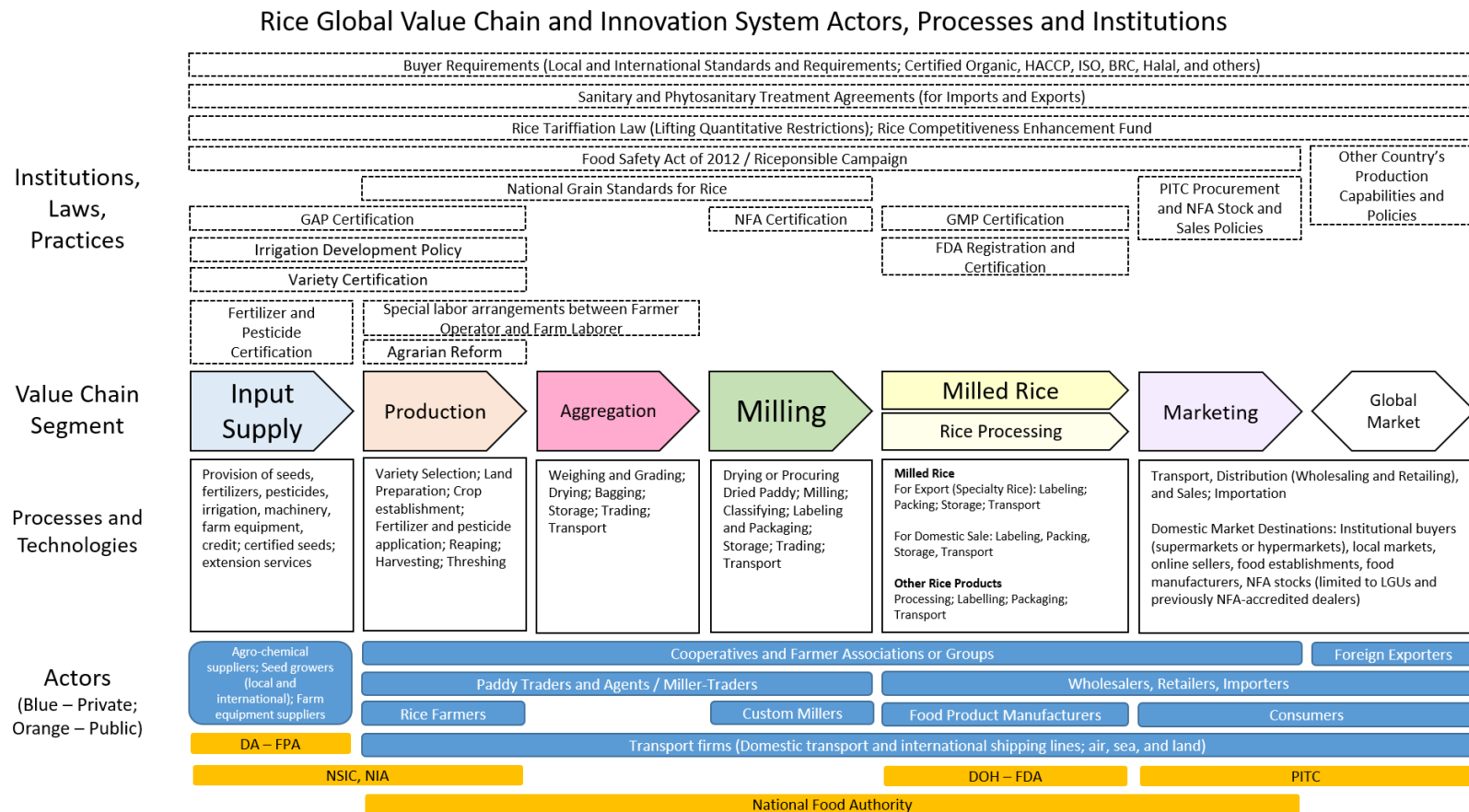


Figure 5.7. The Philippines' innovation system relationship with and participation in the rice global value chain.

Note. The researcher adapted this figure from Senanyake and Premaratne (2016) and Mataia et al. (2019), with additional inputs from his field research.

Of all the institutions, laws, and practices in the Philippine rice industry, the one with the most significant effect is the RTL, coupled with the implementation of the RCEF. As described in the previous sub-section, the RTL was critical in forcing substantial changes in the entire value chain. As a result, paddy prices dropped (Ocampo, 2020b), but overall welfare for end-consumers saw a significant rise due to cheaper rice in the retail markets (Briones, 2020). This is most true for urbanized and large provincial provinces that host most rice consumers, where Mataia et al. (2019) find that most imported rice is brought to these high-demand but non-rice producing areas.

Another significant change brought by the RTL in the structure of the rice industry is the changing of the NFA's role in rice imports. The NFA no longer holds the monopoly on rice importation and contracts for private rice imports. Their central role is to ensure the necessary rice buffer stock and disbursement in lower supply areas. Now, anyone with the financial capability may import rice subject to tariffs.

The opening towards rice importation does not necessarily mean that consumers prefer imported varieties over domestically produced ones. Instead, consumers have their preferences as to what rice they would purchase. Similarly, paddy/rice traders exhibit these consumer preferences in the types of rice that will command higher sales for farmers. Rather than simply following quality standards set by the government, Mataia et al. (2019) find that paddy/rice traders adhere to their own set of quality standards and share these with the farmers they engage. These traders prefer to buy rice that exhibits good eating quality as these demand higher market prices. Thus, they prefer purchasing long-grain varieties and those dried with lower moisture content for paddy. Based on the researcher's observations on rice being marketed online and as also mentioned by

representatives from GRECON, good eating qualities and fragrant varieties are very much present in the imported varieties.

On the other hand, practices by retailers set a balance between consumer preferences and price. According to a representative from GRECON and several retailers interviewed, rice retailers do not necessarily have a particular preference for selling domestic or imported rice but follow the tastes of their consumers. In general, the representative claims that their organization members often classify rice into three different markets: A class, which accounts for 10% to 20%, are high-quality and very fragrant varieties that affluent consumers and restaurants demand; B class covers roughly 30% of the demand are the well-milled rice that caters to the middle class; C grade is regular-milled rice and is the most dominant ranging from 50% to 60% of total demand encompassing the lower-middle to lower economic strata.

However, with the lifting of quantitative restrictions, the GRECON representative also mentioned that they have been selling more imported rice as these are cheaper to procure than domestically produced ones. Nonetheless, the representative counters by stating that they would instead purchase their stocks from local farmers if the prices were at par with imports. Moreover, the rice retailers interviewed add that, although generally cheaper, the imported rice does not necessarily outsell the domestically produced varieties. Instead, they claim that consumer preferences remain the dominant factor when purchasing.

Apart from the RTL and chain actor preferences, an important institution in the industry is certified inbred and hybrid seed variety usage and following grain standards for rice. As pushed forward by the government and according to the experts interviewed,



certified inbred and hybrid seeds allow farmers to gain higher paddy yields than using uncertified seeds per cropping season. The RCEF and the additional funding from the Plant, Plant, Plant Program highlight using high-quality, high-yielding, and environment-appropriate seeds to increase production. According to a PHILRICE representative, farmers could yield an additional 440 kilograms per hectare after using the certified inbred seeds distributed by PHILRICE through the RCEF (Ochave, 2020).

The National Seed Industry Council is the national body that certifies seeds for rice farming. These seeds are produced by breeding institutions such as PHILRICE and UPLB. In addition, accredited seed growers may produce certified seeds for commercial production.

A common and long-established practice in the Philippine rice industry is its high reliance on hired labor for production compared to other countries (Dawe, 2006b). According to Mataia et al. (2016), the reasons behind this are the relatively larger farm size, large rural landless population, and aging of farmers in the country. As a result, farmer Operators or Owners often hire farm laborers for the more labor-intensive portions of rice farming. In the Philippines, though salaried or wage work arrangements are present, more common are the *porsyentuhan* and *hunusan* special labor arrangements (Mataia et al., 2016). Compared to salaried workers, laborers under these special arrangements were paid in kind (i.e., a percentage of the harvest, food, housing arrangements, loans). Workers under a *porsyentuhan* arrangement would receive about 10% of gross harvest at the end of the cropping season (Launio et al., 2015) and are tasked with land preparation, crop establishment, and maintenance, and support the Farmer Operator in overall supervision, harvesting and threshing activities (Mataia et al., 2016). *Hunusan*

arrangements, on the other hand, are done with workers involved in the harvesting and threshing of paddies and are paid a range of 7% to 14% of the gross harvest (Mataia et al., 2016).

#### *5.4.2 Value chain segments, processes, and technologies*

The rice value chain in the Philippines runs through seven segments, with six primary segments and the seventh acting as the representation of the global market's rice trade and production.

1. *Input Supply* – the value chain begins in this segment where the rice farm operators or owners procure or receive the materials necessary to produce rice. These inputs are seeds, fertilizers, pesticides, securing irrigation, renting or sharing farm machinery and equipment, credit, and receiving extension services from public or private organizations. Some of the technologies in this segment are creating high-yielding, high quality, and environment-appropriate seeds (certified inbred or hybrid), farm mechanization (e.g., use of transplanters, combined harvester-threshers), new fertilizers and pesticides, training availability for updated and appropriate farming practices.
2. *Production* – farmers may produce rice in two seasons in the Philippines: wet (high-yielding season) and dry (low-yielding season). The processes involved in this segment are rice seed variety selection, land preparation, crop establishment and maintenance, fertilizer and pesticide application, reaping, harvesting, and threshing. Technologies for this segment are using high-yielding, high quality, and environment-appropriate seeds (certified inbred or hybrid), mechanization of

a farm, use of appropriate fertilizers and pesticides, integrated crop management, and application of training and farming practices.

3. *Aggregation* – according to the experts interviewed, the *aggregation* segment is somewhat unique to the Philippines. Owing to numerous but scattered small farm sizes in the Philippines, there is a need to aggregate paddy produced by farms to achieve scale economies. The value chain segment processes include weighing and grading paddy, drying wet paddy, bagging, storage, trading, and transporting. Consolidation of paddy may be done through a variety of arrangements. Some examples of these arrangements are paddy as payment in kind for loans, contracted procurement before or during the farming season, and group consolidation and procurement by farmer organizations or cooperatives. Technologies for this segment are dryers and drying beds, the creation of better bags and storage materials, and environment-controlled storage facilities, to mention a few.
4. *Milling* – this segment’s primary process is the transformation of dried paddy into milled rice for consumption or further processing. The other processes involved in this segment are classifying, milling proper, labeling and packaging, storage, trading, and transport. Recently, millers-traders have vertically integrated the *aggregation* and *milling* segments to include procuring, weighing, grading, and drying paddy from farmers (Mataia et al. (2019). Technological developments in this segment involve custom milling services and machinery developments.
5. *Milled Rice / Processed Rice Products* – taking into consideration the product differentiation of milled rice and other rice-based products, this study separates both items. It considers them a single segment that co-occurs before the *marketing*

segment. For *milled rice*, the processes include repacking, repackaging, storage, and transport. The field research also showed that small farmer organizations and cooperatives export special milled rice varieties in this segment. However, the quantity is relatively minuscule compared to the regular or well-milled rice varieties. The processes for *processed rice products* include rice-based product processing/production, labeling, packaging, and transport. Examples of rice-based products and by-products are rice flour products (noodles, cakes); liquid rice products (alcohol, vinegar, milk, syrup); convenience foods (puffed rice, crackers, canned and quick-cooking packaged rice); rice starch; rice straw for roofing materials, livestock feed, or fertilizer; the hull or husks for bedding, fuel, incorporated in the creating of concrete blocks, fiberboards, ceramics, or charcoal briquettes; and, some by-products are used in the formulations of soaps, hair products, facial washes, and medicines (Ricepedia.org, n.d.a., n.d.b). According to the PSA's supply utilization accounts, the amount used for processed rice products and by-products is relatively small and, on average, 2.97% of the total gross supply for processing and 4.83% for feeds and waste from 2010 to 2020). Equipment, training, and new rice-based products and by-products contribute to the technologies in this space.

6. *Marketing* – this segment involves the following processes: transport, distribution through wholesaling, and retailing. The primary market destinations of milled rice and rice-based products are institutional buyers (supermarkets or hypermarkets), local markets, online sellers, food establishments, food manufacturers, and NFA buffer stocking and distribution.

7. *Global Market*<sup>12</sup> – processes in this segment have similarities with the *marketing* segment. This segment gains its significance at the beginning of the RTL era. With the entrance of imported rice into the country, the local rice industry is starting to face the pressure of competing with other rice-producing countries that produce and export rice below prevailing local prices. On a separate note, and as mentioned, a small amount of specialty rice is also exported by the Philippines.

#### 5.4.3 Value chain actors

There are numerous actors present in the Philippine rice industry. Figure 5.7 shows the most important of these actors. Actors and organizations placed in blue shapes are private organizations, while those in orange shapes are public organizations. Some actors that are part of those organizations chosen as this case's embedded units of analysis are separated as intermediaries and will be discussed in the proceeding sub-sections. Each actor present in the figure provides an action in the value chain.

1. *Agro-chemical suppliers, seed growers, farm equipment suppliers* – provides the various inputs necessary for rice production. Local or foreign firms may produce these inputs. Farm equipment (i.e., machinery) is also imported from abroad. These actors do not necessarily supply credit to rice farmers.
2. *Rice farmers (Owners/Operators) and farm laborers* – primary producers of rice paddy. Farm owners and operators pertain to those who own the land, while the farm laborers are hired workers who may be paid a salary or have special labor

---

<sup>12</sup> Mataia et al. (2019) note that there are reports of undocumented or smuggled rice in the Philippines. As this phenomenon is difficult to trace and study, the researcher does not include these in his field research and analysis.

arrangements. Rice farms in the Philippines predominantly use hired labor that does approximately 70% of the labor required in production, including transplanting, harvesting, land preparation, weeding, insecticide, and fertilizer application, among other farm work (Dawe, 2006b). According to a rice company interviewed, they have noticed that farm laborers are less likely to adopt newer technology as they do not necessarily have the incentive to do otherwise. A farm owner mirrors this claim when instructing laborers on what to do and newer technologies to try. On the other hand, industry experts interviewed cited that farmers adopt new technologies, especially high-yielding seed varieties, if they see neighboring farmers earning more because of their use. Moreover, several experts and government workers interviewed also find that more farmers are taking the initiative to request and attend training sessions provided by the government. This observation supports Edillon's (2010) finding that more hierarchical (i.e., several are more educated) relationships among farmers exhibit a greater possibility of technology adoption than collegial relationships. Furthermore, Edillon (2010) notes that farmers are more willing to adopt new technologies if they are simultaneously offered packages that mitigate the risks created by adoption.

3. *Cooperatives and Farmer Associations or Organizations* – consolidated groups of individual or clustered farmers that produce rice and other crops. Particularly for rice, these organizations' value chain segment participation varies from solely *producing* and *aggregating* to *producing* to *marketing* their products.
4. *Paddy/Rice Traders and Agents* – their primary role is for the aggregation of paddy. Downstream value chain activity actors have traditionally relied on these

traders and agents to save costs on aggregating paddy themselves. These traders and agents rose to significance because of their ability and maneuverability in gathering paddy from provinces that exhibit varying farmland sizes and distances between farms. These actors are also often rooted in the community they source paddies. Furthermore, they may also provide financial capital in loans to farmers. In recent years, paddy/rice traders have conducted wholesaling and retailing activities directly to retailers and consumers (Mataia et al., 2019).

5. *Miller-Traders* – these actors vertically integrate the *aggregation* and *milling* activities, and, by doing so, earn a larger share in the value chain. They may also do wholesaling and retailing activities.
6. *Custom Millers* – actors that primarily provide milling services that cater to various specifications. They often interact with farmer groups and traders that aggregate and market their products but do not have the capability of milling their rice.
7. *Processed Rice Product and By-Product Manufacturers* – these are actors in the value chain that manufacture processed rice products or other products made from the by-products of paddy production or in milling.
8. *Wholesalers and Retailers* – actors that sell rice to the final consumer. They may be in various markets and sell rice at different price points and quality.
9. *Importers and Exporters* – importers are those individuals, farmer groups, or firms that have the financial capability to import milled rice from other countries. Several farmer organizations export specialty rice from the Philippines. Exporters in this part of the value chain also pertain to the exporting firms from other countries. Importers and exporters of rice need to ensure that the rice they ship to

and from the Philippines adheres to sanitary and phytosanitary requirements set by governments.

*10. Transport Firms* – actors that provide land, air, or sea transportation services to several actors in the value chain.

*11. Consumers* – the final destination of the products in the rice value chain.

*12. DA-FPA* – the government body that tests and certifies fertilizers and pesticides that may be used in rice production.

*13. NSIC* – the government body that certifies the seeds for rice production.

*14. NIA* – government office in charge of irrigation development and maintenance.

*15. DOH-FDA* – a government entity that certifies food products that may be sold in the consumer market.

*16. NFA* – the government agency that certifies milling service providers, maintains a buffer stock of rice for the country and distributes rice to supply insufficient provinces from its buffer stock. Farmers and farmer organizations may also sell their dried paddy to the NFA.

*17. PITC* – a public entity that procures imported rice on behalf of the Philippine government. Rice bought by the PITC is part of the NFA's buffer stock maintained and distributed.

#### *5.4.4 The financial structure of milled rice in the Philippines*

Table 5.6 shows key actors' general financial structure and position, particularly well-milled rice. In terms of cost, farmers and millers contribute the highest percentages to total added cost at 34.70% and 46.82%, respectively. Of the five actors represented, farmers seem to earn the most profit at 5.44 Philippine Pesos per kilogram, or 57.69%, of



the 9.43 Philippine Pesos per kilogram total profit in this chain. Following the farmers are the millers, that capture 1.83 Philippine Pesos or 19.41% of total profit.

Table 5.6 Financial Structure and Position of Key Actors in the Milled Rice AFB Sector, 2015

Key Actor	Cost			Profit			Margin	
	Total unit cost	Added unit cost	% Added cost	Unit price	Unit profit	% Profit	Unit margin	% to price
Farmer	10.87	10.87	34.70%	16.31	5.44	57.69%	16.31	40.03%
Paddy trader	18.87	2.56	8.17%	19.37	0.50	5.30%	3.05	7.49%
Miller	34.03	14.67	46.82%	35.86	1.83	19.41%	16.49	40.48%
Wholesaler	37.92	2.06	6.58%	38.51	0.58	6.15%	2.65	6.50%
Retailer	39.68	1.17	3.73%	40.75	1.08	11.45%	2.24	5.50%
TOTAL		31.33	100.0%		9.43	100.0%	40.74	100.0%

Note. Adapted and modified from Mataia et al. (2019). The researcher made the revised percentage calculations. Prices are in Philippine Peso per kilogram of fresh or dry paddy (farmer to rice miller) or well-milled rice (rice miller to wholesaler).

Mataia et al. (2019) stress that farmers may only earn the most per unit. Farmers are limited to only trading the amount arable by their given land size, averaging about four tons per hectare, assuming they use certified high-yielding seed varieties. Moreover, the profit turnover for farmers is very slow, earning their dues only after every four-month cropping season. Farmers also take on the bulk of the risk associated with weather-related shocks. On the other hand, paddy traders, millers, wholesalers, and retailers trade and work in vastly larger quantities and may experience profit turnover daily. Though their profit margins are seemingly smaller, the sheer quantity of paddy or rice traded makes up for the smaller margins (Mataia et al., 2019).

With the vertical integration of value chain processes, certain actors may effectively lower their costs and capture the gains of others in the chain. Miller-traders who also wholesale their rice and do some retailing effectively gain more. If farmers can consolidate and trade in more significant quantities, these groups may hold a stronger position in pricing and may even capture some amount from wholesaling and retailing.

#### *5.4.5 Governance structure of the Philippine rice industry*

The Philippine rice industry seems to exhibit a market type of governance structure. The industry is predominantly a buyer-driven chain. This is evident and confirmed by the interviews on how price and consumer preferences govern what customers buy and the different varieties available in the market. The power of price is further strengthened by the RTL, where cheaper imported rice can compete with locally produced rice. However, arms-length transactions may be more limited to the downstream portions of the value chain. According to a representative of GRECON, their members classify the varieties of rice they sell to fit the dominant consumer type in their area, with better quality garnering better price (Dela Peña, 2014).

In the production segment of the value chain, certain characteristics of the captive governance structure are in place. These structures may be observed in the relationship between farmers and aggregation actors. A more common scenario of captive chains in the Philippines is the interaction between farmers and loan providers, often paddy traders. In these cases, these loan providers generate a problematic cycle of debt to the farmer, creating a greater deal of reliance on and indebtedness to their financiers. One natural or unforeseen shock may make these loans unpayable. Compared to other captive chains described by Gereffi, Humphrey, and Sturgeon (2005), the loan provider and farmer relationship do not demonstrate any upgrading aid provided by the loan provider. Instead, it seems that just enough credit is allowed to the farmer to ensure that the power held by the loan providers remains.

A different scenario is evidenced by Chen Yi Agventures Inc., one of the Philippines' premiere rice chain integrators. Compared to the loan providers, Chen Yi

Agventures creates contracts with the farmers surrounding their processing facility and provides high-quality farm inputs, low-interest loans, and extension and monitoring services to their contracted farmers. This form of captive relationship grants the farmers opportunities for upgrading, preventing them from entering a debt cycle. However, the longstanding captive chain created by the loan provider (i.e., paddy trader) and farmer relationship hamper the upgrading efforts of Chen Yi Agventures. According to the representative interviewed, the company has had experiences of contracted farmers selling their produce to other traders to whom they still had outstanding loans. Despite the contracts and aid provided by Chen Yi Agventures, the existing and prevailing chain governance structure in their area was still challenging to break.

Before the imposition of the RTL, the NFA held a considerable amount of power in the value chain as they were the only government institution supervising and managing rice importation in the country. Although they are also tasked with maintaining a 15-day national rice buffer stock, the NFA only accounted for roughly 2% of all paddy procurement as the agency held rigid buying requirements (Mataia et al., 2019). Moreover, the NFA controlled cheaper imported rice and kept domestic prices high (Briones and dela Peña, 2015). However, as the years passed, the reputation of the NFA as the country's rice manager dwindled due to several corruption allegations and scandals in its operations (Clapano et al., 2008; Briones and dela Peña, 2015; Elemia, 2018) and consumer belief that rice supplied by the NFA is of poor quality (dela Peña, 2014). With its low public trust and the entrance of the RTL regime, the NFA has now lost all its import regulating and monitoring functions and is left with managing its buffer stock (Briones, 2019).

Prevailing then until now, individual farmers appear at the bottom in terms of relative power in the value chain. Even though price and consumer preferences take a greater hold in the end-market, the existing loan structures give paddy traders enough power to gain a greater footing in the rice AFB value chain. Moreover, the inability of individual farmers to demand economies of scale limits their voice. More recently, the continuous increase in global fertilizer prices continues to eat farmers' already dwindling profit margins, as interviews with farmers and agri-chemical providers revealed.

Nevertheless, upgrading through chain integration activities or innovation by farmer organizations, integrators such as Chen Yi Agventures, or aid provided by intermediaries may change the prevailing governance structures to give all value chain actors a better footing.

#### *5.4.6 The GVC-IS co-evolutionary trajectory of the Philippine rice industry*

Based on Lema, Rabelotti, and Sampath's (2018) possible trajectories and the history and context provided, the early and rapid developments of the Philippine rice industry during the Green Revolution of the 1960s allowed it to hastily move from the *preliminary development* stage towards *expansion and strengthening*. However, as the effects of technologies introduced during that period were maximized, the industry appeared to lead towards an *aborted* trajectory as further innovations to address newer challenges were required. However, the diffusion of these technologies could not be matched (Dawe, 2006a). Exacerbating the domestic industry's lack of innovation and upgrading may also be due to the protection it received from quantitative restrictions set on imported rice. Although the industry has a strong R&D and technology generation base with the presence of PHILRICE and PHILMECH, the absorptive capacity of

producers and disadvantaged players appears to be limited, possibly due to the governance structures prevailing in the industry. The support that innovation intermediaries may provide in addressing innovation system gaps, bridging GVC participation requirements, and improving the absorptive capacities of various industry actors may be necessary for a *gradual* GVC-IS trajectory.

### **Section 5.5 Intermediary organizations in the Philippine rice industry**

For intermediary organizations in the Philippine rice industry, this case study garnered the participation of 11 organizations. These organizations are the NRP, ATI, PHILRICE, DOST-ITDI, PHILMECH, MFA, GRECON, PAKISAMA, LMFRC, Chen Yi Agventures, and AgriCOOPh. Chosen features of these organizations are detailed in Table 5.7.

In terms of their organization type categories, there are two government agencies, three PRIs, three industry associations, one NGO, one social media group, and one private firm. Five organizations represent the public sector, and six belong to the private sector. All these groups provide a wide range of services to their intermediation partners, consistent with the four roles of intermediaries.

Table 5.7 The Participating Intermediary Organizations in the Philippine Rice Industry

	<i>Year Established</i>	<i>Number of Employees and/or Members</i>	<i>Type</i>	<i>Ownership</i>	<i>Geographic Scope</i>	<i>Value Chain Segment</i>
ATI	1987	173 employees	Government Agency	Public	National with Regional Counterparts	Input Supply, Production, Milling, Milled and Product Processing, Marketing
NRP	1986 (IRRI, 2017)	20 employees	Government Agency	Public	National	Input Supply, Production, Milling, Milled and Product Processing
DOST-ITDI	1987	334 (2017)	PRI	Public	National	Milled and Product Processing, Marketing
PHILMECH	1978 as National Institute for Research and Extension; 2009 as PHILMECH	186 employees (2019)	PRI	Public	National	Input Supply, Production, Milling, Milled and Product Processing, Marketing
PHILRICE	1985	265 permanent employees; 21 co-terminus positions (2018)	PRI	Public	National with Regional Counterparts	Input Supply, Production, Milling, Milled and Product Processing

(Table 5.7 Continued)

*(Table 5.7 Continued)*

	<i>Year Established</i>	<i>Number of Employees and/or Members</i>	<i>Type</i>	<i>Ownership</i>	<i>Geographic Scope</i>	<i>Value Chain Segment</i>
GRECON	1980	about 20,000 members	Industry Association	Private	National with Regional Counterparts	Aggregation, Milling, Milled and Product Processing, Marketing, Global Trade
PAKISAMA	1986	25 employees; about 74,000 members	Industry Association	Private	National	Input Supply, Production, Marketing
MFA	2016	26 individual members	Industry Association	Private	Local	Input Supply, Production, Marketing
LMFRC	2016	1 administrator; 27,093 members as of March 2021	Social Media Group	Private	National with International Reach	Input Supply, Production, Milling, Milled and Product Processing
Chen Yi Agventures	2015	100 permanent employees; 250 during harvest season	Private Firm	Private	Local with National Sales	Input Supply, Production, Aggregation, Milling, Milled Rice, Marketing
AgriCOOPh	2017	13 staff split between two offices	NGO	Private	National with International Opportunities and Funding	Input Supply, Production, Aggregation, Milling, Milled and Product Processing, Marketing

*Note.* The author gathered the information for this table based on interviews and secondary desk research from publicly available sources. Moreover, the researcher assigned the organization type and value chain segment involvement based on the interviews and his understanding of the programs and services provided by the participating organizations.

Regarding their value chain segment participation, the participating organizations provide ample support in all aspects of the rice value chain. The minimum an organization is present in is at least two value chain segments. In contrast, the most participation an organization has is in six parts of the value chain. And, none of the participating organizations is present in the entire value chain. However, missing only the Global Market segment, Chen Yi Agventures may soon participate in this segment. Figure 5.8 provides a visual summary of the rice value chain segments that the participating intermediary organizations support.

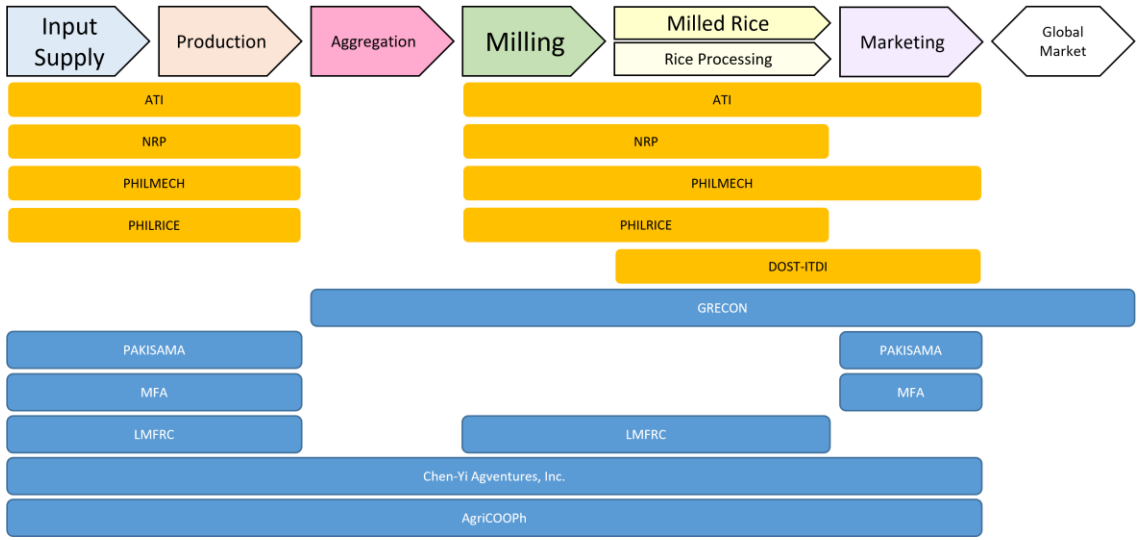


Figure 5.8. Value chain segment support and participation of intermediary organizations in the Philippine rice industry

Note. The placement of organizations in the figure is based on the study's findings. Organizations in orange boxes are from the public sector, and those in blue are from the private sector.

Succeeding this brief overview of the participating organizations will be the findings on how the roles and key-capabilities of these organizations compare to one



another as their organization type and segment participation vary. Moreover, a nuanced discussion on how the industry exhibits a more domestic-market orientation follows.

#### *5.5.1 Differences in role performance and key-capability building by organization type*

The roles performed by the rice industry intermediaries are presented in Table 5.8. All participating rice intermediaries claim to perform all the mentioned roles. Although they perform these roles, they do not necessarily focus on all of them. Of the four roles, the researcher finds that brokerage and resource provision are the roles most emphasized by the participating organizations. Although these two roles appear to be most performed, specific organization types exhibit certain specializations.

Table 5.8 Innovation Intermediary Roles Emphasized by Organization Type in the Rice Industry

	Brokerage	Consultancy	Mediation	Resource Provision
ATI	**	**	***	***
NRP	***	*	***	***
PHILMECH	***	**	*	**
PHILRICE	***	**	**	***
DOST-ITDI	***	**	**	**
GRECON	***	*	***	**
PAKISAMA	***	**	***	**
MFA	***	**	*	**
LMFRC	**	***	*	**
Chen Yi Agventures	***	***	***	***
AgriCOOPh	***	**	***	**

Note. Criteria for judging emphasis are based on focused roles during interviews and an FGD with respective organization representatives and triangulated through other data sources.

The GAs, ATI, and NRP emphasized their mediating and resource provision roles. Of the two roles, mediation is not surprising as government agencies have often been known as network orchestrators (Van Lente et al., 2003). In the case of ATI and NRP, they monitor and facilitate the progress of national rice industry programs with their provincial and municipal counterparts, where ATI focuses on extension work and NRP on the national rice network. Moreover, they support the agriculture-related programs of other government organizations like PHILRICE and PHILMECH. They also support linkages between farmers and private sector service providers by establishing farm schools and technology demonstrations.

As resource providers, the organizations' central offices manage and oversee the use of financial resources for national projects of their local counterparts. Apart from financial resources, ATI also provides technical advisories, information-education campaign materials, online training, actual and farm demonstrations, and radio programs. NRP, on the other hand, provides farm inputs, machinery, and other rice production materials needed by value chain actors, especially rice farmers. Resources may be training, farm inputs, farm machinery, or the setting up of facilities.

These two GAs also perform brokerage, but these actions often overlap with their resource provision role. In the case of ATI, although they broker training programs, the provision of these often uses their owned resources. To make their programs widely available, they invest in multiple platforms for learning by establishing learning sites, setting up mini-libraries in municipalities, hosting local radio programs, and launching their e-extension website and programs. ATI can broker new technologies and practices to its partners by providing these resources. The NRP, too, performs brokerage in its

setting up of rice processing facilities around the country. Moreover, they have promoted intersectoral upgrading by brokering the technical knowledge of mushroom farming using rice waste as the primary composting agent.

More significant in brokering are the PRIs. These institutions conduct R&D and broker the technologies they generate to rice farmers, machinery manufacturers, and product processors. Moreover, these organizations do not only provide hard technologies. They also offer training on farm management techniques, science-related topics like bioprocessing, use and maintenance of machinery, and business management. The three organizations are also quite active in conducting and joining technology roadshows and campaigns to promote their technologies. At times, PHILMECH and DOST-ITDI would also sponsor their adopters to serve as success story examples during these demonstrations.

A surprising role the PRIs perform is resource provision. In the literature (Van Lente et al., 2003; Intarakumnerd and Goto, 2018), PRIs often take more technology generation and brokering roles and do not necessarily provide resources at little to no cost. However, as their public mandates demand them, the organizations often provide several resources to their technology adopters. For example, under the RCEF, PHILRICE and PHILMECH provide rice seeds and farm machinery to qualified and registered farm groups. PHILMECH and DOST-ITDI even support market matching and merchandising, such as using grain drying facilities by PHILMECH or packaging machinery to create market samples by DOST-ITDI. The three PRIs also conduct various socio-economic research that benefits the industry overall.

Although the PRIs do a lot in brokering and resource providing, the same may not be said regarding their mediating role. They do have research collaboration work with other PRIs, universities, foundations, and other private sector organizations. All three institutions are firm in their stance that managing these collaborations remains doable because of strict adherence to memorandums of agreements or understanding between the parties involved. Doing so allows collaborators to manage expectations and tasks. Moreover, by abiding and delivering what is required, PRIs can build on their reliability, possibly leading to more collaborations in the future. Finally, the three PRIs are also network orchestrators as public sector organizations. They coordinate with local counterparts in diffusing information and resources that they can provide. As a research organization, PHILRICE also heads the coordination of the National Rice R&D Network.

Like the GAs, the PRIs also have overlapping roles, where their consultancy role shines. For example, PHILRICE provides consultancy as they broker technologies to their partners. They developed a smartphone application and a Text Center that farmers may use to receive advice or information. In addition, as these organizations have multiple divisions that specialize in various rice-related projects, the expert advice they may provide is quite broad. They can provide various experts for secondment work to public or private organizations, which may be viewed as part of their resource provision role.

Nonetheless, the PRIs practice the consultancy role by providing expert advice. For example, these would be advising on rice technologies, Good Agricultural Practices (GAP), Good Manufacturing Practices (GMP), and machinery use and maintenance. In addition, given their broad human resource base, the three PRIs can offer business development and financial management coaching and mentor their technology adopters.

For the industry associations brokering is an essential and common role. GRECON and PAKISAMA broker financing and market opportunities for their members. GRECON connects its members to funnel rice supplies to supply deficient areas and links retailers to member-millers, wholesalers, and importers. During the pandemic, PAKISAMA created market opportunities for its indigenous people members to sell their produce in Metro Manila. Moreover, MFA and PAKISAMA have brokered the receipt of farm inputs, machinery, and training from the government to its members. As a result, MFA received several farm machinery members shared amongst themselves. Recently, PAKISAMA has partnered with PHILMECH to broker farm machinery for its rice farmer organization members under the provisions of the RCEF.

For consultancy, the IAs mostly share market information and technical knowledge between members, such as what MFA farmer members do during their meetings or how PAKISAMA members share new developments during their annual conference. However, the consultation role of IAs, particularly that of PAKISAMA's and GRECON's, becomes interesting in their participation in government consultations and when approached by other organizations for advocacy and policy concerns. The performance of this consultancy service mixes with their work as a mediator where the two organizations act as representatives for their constituents during public consultations, organize members into location-aggregate groups, catalyze their network of members and associates to gather resources, and hold political stances. An interesting yet undiscussed finding in previous innovation intermediary literature is the lobbying role that innovation intermediaries may take. Through the actions above, PAKISAMA and GRECON perform lobbying and policy work. GRECON even ran for a congressional party-list position in the past. Currently, it is placed as part of the mediation role as lobbying allows

intermediaries to act as representatives on behalf of their constituents and others in the industry. Further research will be necessary to learn whether lobbying is a unique role.

As resource providers, the IAs provide somewhat specialized types of resources depending on their primary purposes. PAKISAMA, with its heavy advocacy-based platforms and programs, can offer community development projects from donor partners, legal assistance, training on community development and organizing, and policy research. GRECON, formed as a rice retailer network, utilizes its system and knowledge resources to move rice stocks between provinces, especially those struck by disasters. Both IAs also assist members and non-members during calls for aid and disaster relief distribution. On the other hand, as a localized community association, MFA focuses on the needs and welfare of its members. The association uses its funds to pay for their communal use machinery's gas and operator expenses. As a small association, they can even give each member birthday and Christmas gifts. Although most of the resources indicated may not be upgrading or innovation-related, the mention of these by the intermediary representatives may show how their work as intermediaries also covers non-technological resources that affect their partners' well-being and innovation capacity.

As a social media group, LMFRC acts as an innovation-enabler primarily by performing a consultancy role. However, one limitation to SMGs performing intermediary roles is their reliance on its being an online platform as the basis for their services. Nonetheless, it works as a strength as well. As an online group, thousands of people may join, but not all members are active. LMRFC's primary purpose is for rice farmers to learn about farm machinery and assist each other in troubleshooting their machines. The platform enables consultancy by having its members post inquiries and

receive advice from anyone in the group. A significant caveat to this is the reliability of answers given and the decision of advice to take. Although the group administrator interviewed mentioned that most members answering are experienced in farm machinery acquisition and maintenance, there may still be a sense of unreliability, as observed by the researcher seeing a variety of answers to the same question.

Another aspect of the consultancy role that blends with resource provision is the opportunity for silent or inactive members to learn from what others post. For example, members looking to invest in rice farm machinery may silently learn by reading and observing the pictures, videos, and text posted in the group. Again, as an online platform, LMFRC performs as a resource provider by using its space for sharing experiences and knowledge.

In the same way, the group allows some brokerage to occur between members by allowing its platform to work as a marketplace for new and used farm equipment and parts and the trading of rice. To an extent, this act of brokerage coincides with the mediation role. However, both are performed in a limited capacity as the group does not meddle between trades or sales. The administrator nor other group members may not be held accountable for failed transactions. Moreover, the researcher has observed debates within posts, and no resolutions are made when these occur. As the administrator mentioned, all members are entitled to their opinion, and all they ask is that they respect the opinions of others.

Compared to the other private sector intermediaries, Chen Yi Agventures emphasized performing the four roles extensively. Owing to its value chain control, Chen Yi Agventures appears to blend the four roles as it provides its services to its partner

farmers. Although a firm aimed at profits, Chen Yi Agventures began and continues to run its business to alleviate the challenges that rice farmers face. They begin their engagements with farmers by mediating meetings with them to enlist in the company's partnership program. Second, Chen Yi Agventures practices brokerage, consultancy, and resource provision roles in their program. They offer farmers the rental use of high-tech and advanced farm machinery and other rice-farming equipment at a low cost for brokerage. They offer land preparation services for their partners too.

Most importantly, Chen Yi Agventures assures a market for its partners by purchasing directly from them. Coupled with brokering is the company's resource provision, where they provide farmers with high-yielding seeds and zero to low-interest loans for imported fertilizer. Furthermore, although indirectly, Chen Yi Agventures uses its resources to conduct the remaining processes in the value chain, from aggregation to milling to packaging and marketing their rice. Finally, to perform its consultancy role, the firm hired and trained agriculturists and field technicians that continuously support and monitor the progress of their rice farmer partners. These technicians would visit each farmer and provide advice to better their potential yield or address various production issues. Through this setup, Chen Yi Agventures performs intermediary roles and provides upgrading and innovation opportunities for its partner farmers.

Finally, for AgriCOOPh, the organization performs the four roles but not in the same capacities. Nonetheless, interviews with its representatives reveal that the NGO provides services that allow them to perform multiple roles. Although they do not provide hard technologies, AgriCOOPh focuses on offering innovations and process upgrading to its member cooperatives through its training programs.



Of the four roles, the NGO performs brokerage and mediation more. The two primary items that AgriCOOPh brokers and mediates are training programs and market matchmaking. For its training programs, AgriCOOPh focuses on providing cooperative-related topics on management, governance, and development. Moreover, they broker training and financing opportunities for their members by linking them to international organizations. On the other hand, matchmaking services are brokered and mediated by AgriCOOPh, usually between its members or between members and a buyer (e.g., food product processors for government procurement). However, during the COVID-19 pandemic, AgriCOOPh offered its matchmaking services to non-member organizations by acting as an intermediary between non-member farmers and member cooperatives or non-members. Since this organization is relatively young, they continuously experiment with products they can broker. In addition to mediating training and matchmaking, AgriCOOPh acts somewhat similarly to IAs. The NGO stands as a representative for its members during negotiations for possible entrepreneurial collaborations or projects.

AgriCOOPh offers advice on cooperative management, governance, and development as a consultant. Apart from these, the organization conducts an initial assessment of its member cooperative and tailor fits an organizational development proposal to each. In addition, AgriCOOPH offers value chain analyses, market research, or business feasibility studies and consultancy for their member cooperatives.

The NGO performs these mostly in tandem with either brokerage or mediation for its resource provision roles. A major resource AgriCOOPh provides its members is information on development and financing opportunities it receives from its vast network of development partners and practitioners. Aside from information, AgriCOOPh also has

a bridge financing program where the organization may aid a cooperative in covering initial payments to supply or product purchases, which may be paid later with low interest.

To reiterate, brokerage followed by resource provision appears to be what rice industry intermediaries focus on the most. Therefore, it is not surprising that these two roles attempt to directly address the industry's most pressing issues, such as production capability improvement and better uptake of modern technologies (i.e., farm machinery). When comparing public and private organizations further, mediation is somewhat mixed depending on an organization's mandate, a more targeted constituency, and a large constituency size. Although several intermediaries may exhibit substantial memberships, like LMFRC, whose membership is in the tens of thousands, the direction for mediation may not be present.

For consultancy, the private sector may be more suited to this role. However, the consultancy performed by the private sector intermediaries may not necessarily be technology-based. Instead, most of the advice provided revolves around market information and knowledge sharing. Often, the consultancy provided by the intermediaries overlaps with their resource provision roles, taking information and knowledge as the resource being provided. However, between the two general organization types, public sector intermediaries seem to find these overlaps in information sharing more in line with resource providers, as this service is part of their government mandate.

Similarly, the private sector intermediaries see parts of information sharing as part of their being resource providers, but the knowledge shared is general information. For

the private intermediaries, advice and knowledge that caters to the specific needs of their partners are what they seem to consider as part of consultancy.

For the key-capability development of the participating innovation intermediaries, internal communication and knowledge-building capabilities, as expressed in Table 5.9, appear to be the most emphasized and built. Nonetheless, one may notice that most organizations build all key-capabilities almost evenly, with some giving less priority to others. However, a lack of emphasis does not mean that the organization does not possess the key-capability. Instead, it may mean that the intermediaries prioritized or needed building other key-capabilities more throughout their intermediation.

For the GAs, internal communication capabilities were the most emphasized and built. Owing to their role as network orchestrators, a good set of these capabilities is truly necessary. The ATI and NRP build and practice this capability through annual consultations with the private sector and unceasing communication with their provincial and municipal counterparts. As the offices that provide the national directives, these GAs need to build this key-capability to communicate policies well. ATI and NRP have delineated tasks much more effectively by building this capability. When asked about the critique that many agriculture-related organizations experience mandate overlaps, the representatives mentioned how they have overcome these by properly delineating work between the different organizations and from national and local levels. The national office still heads the public extension network for ATI, but their focus will only be on training trainers and farmer leaders. These trainers and leaders will be tasked to download what they have learned to individual farmers. The NRP, on the other hand, remains on the monitoring side of all government rice industry programs and projects. But, aside from

these, the NRP representative mentioned that their local counterparts provide the resource support necessary for provinces that are not prioritized by large-scale programs such as the RCEF.

Table 5.9 Innovation Intermediary Key-Capabilities Emphasized by Organization Type in the Rice Industry

	External Networking	Internal Communication	Knowledge- Building	Management
ATI	**	***	***	**
NRP	**	***	**	**
PHILMECH	***	**	***	**
PHILRICE	***	**	***	**
DOST-ITDI	***	**	***	**
GRECON	**	***	***	**
PAKISAMA	***	**	**	***
MFA	*	**	***	*
LMFRC	*	**	**	***
Chen Yi Agventures	***	**	***	***
AgriCOOPh	***	***	**	**

Note. Criteria for judging emphasis are based on focused key-capabilities during interviews and an FGD with respective organization representatives and triangulated through other data sources.

Following their internal communication capabilities is their emphasis on knowledge-building capabilities. The base of their knowledge comes from their staff, who are very well-versed in the rice industry or trained in agricultural extension. For the NRP, they may request for the secondment of experts from other agencies or institutions, if necessary, to further enhance the expertise they require. On the other hand, ATI would hire persons with agricultural and extension work backgrounds. When necessary, they will also offer technical and technology-specific training for staff that requires these. According to the NRP representative, one vital knowledge-building and internal

communication capability for their field staff is the art of being sociable to acquire the data and time necessary from local government and their beneficiaries.

Moreover, these two organizations learn about issues and needs of the rice industry through their consultations with the private sector. The application of the knowledge they gained is shown in the creation and implementation of new policies, information sharing between the different DA offices, extension modules, and the hosting of the e-extension website and knowledge centers. In executing these, ATI and NRP always make it a point to improve their programs through post-project evaluations and data monitoring continuously.

Again, these two organizations practice this capability for external networking primarily through their consultations with the private sector. According to the representatives, as they are known government agencies, the two organizations are usually approached first by interested stakeholders and partners. The constant and renewed exchange between the ATI, NRP, and the private sector is essential in widening the implementation of government programs like the RCEF. In addition to networking, in more recent years, ATI has been extending its network reach by having a more active social media presence. They constantly update their social media pages, upload new content to their video streaming channel, and improve their e-extension website. Through these efforts, more farmers and interested persons interact with the ATI.

Regarding their management capabilities, two facets of these were highlighted. First, as they are primarily network orchestrators, the management capabilities mostly brought up were managing the assigned networks. In doing so, they employ a variety of evaluations and progress monitoring tools to ensure that they hit their targets and perform

better each year. They also employ different contingency measures, such as how ATI sets aside a budget for unforeseen projects that suddenly become necessary, like increased food safety and handling due to fears stemming from COVID-19. The organizations' second management facet was the significance of human resources. However, the discussion revolved more around the issue of their staff under job order or contractual arrangements. There is the fear of the lack of job security, benefits, and loss of talent because of it. Coupled with this issue is the importance of supportive leadership or management. Because of the nature of government, leadership changes may also cause sudden changes in staffing and directions. These, according to a representative, may induce staff anxieties and frustration.

One other aspect of management for NRP that may be a cause of concern would be the impermanence of its office. As they are considered a banner program of the DA, from time to time, their office gets shuffled between different divisions under their mother agency. From a management perspective and given the significance of rice to the country, it may be best that the program earns a sense of permanency in the future.

Like the GAs, the PRIs also have knowledge-building as their top emphasized capability. As R&D institutes, it is not surprising that they claim this as the most important capability. Similarly, the knowledge bases of the PRIs are built on the expertise of their scientists and researchers that cover robust and expansive fields, industries, and technologies. Building this capability further are the multitude of advanced degrees their staff obtained domestically and from foreign universities. The three PRIs also practice staff mentoring to train and ensure knowledge transfer to their younger staff. In addition,

their staff is also proactive in participating in academic conferences, product and technology expos, and career development opportunities.

Even when applying and diffusing their wealth of knowledge, the PRIs continue to develop their knowledge. They remain open to feedback from their constituency or adopters to deepen and revise their knowledge in the field. Moreover, before they diffuse appropriate technologies, they first conduct participatory needs and opportunities assessments and technology and business feasibility studies to make sure they understand the needs of their clients. Also, like the GAs, the PRIs learn about needs and issues through consultations with stakeholders. The PHILRICE representative also highlighted the importance of conducting field visits by their staff to learn genuinely. In addition to these, the PRIs conduct science-based research and social research to aid in deploying their technologies.

Compared to the GAs, the PRIs focus on external networking more than internal communication. According to the representatives interviewed, credibility and reputation matter greatly for them as PRIs. Being designated as the institutes for industrial technology, rice-focused research, and farm mechanization helps create the foundation for external networking. Using that as a base, the DOST-ITDI and PHILMECH have found numerous interested adopters when they host or join product or technology showcases, expos, and roadshows. All three PRIs also invite or visit potential adopters to their networking activities. They also join stakeholder meetings to interact with and learn about the needs of their stakeholders.

As part of their nature, the scientists of these organizations participate in local and international research conferences and build networks as they pursue advanced degrees.

Several of their researchers have also begun being active on social media and received invitations for R&D collaborations with international, private, and other public organizations. Aside from the individual efforts of their staff, ITDI, PHILRICE, and PHILMECH also publish and promote their R&D results and developed technologies on multiple media platforms. Through these platforms, interested adopters or farmers may also contact the institutes. One unique platform that PHILRICE has is its Text Center, which farmers may contact for various rice production-related inquiries.

Coinciding with their external networking are their internal communication capabilities. Once the PRIs and their researchers have created collaborative relationships, they try to make sure that they uphold their research reputation to foster more opportunities with their collaborators. They maintain this by sharing research outputs with relevant offices and organizations through multiple media platforms. Furthermore, when collaborating, DOST-ITDI ensures that they provide their R&D partners first offer rights of the technologies they co-developed. Moreover, DOST-ITDI and PHILMECH build and sustain their reputation by continuously supporting their technology adopters by sponsoring them during technology expos, inviting them to share their stories, assisting in sales when possible, and documenting their success stories and posting these online. As mentioned by the DOST-ITDI representative, it is vital that they, as PRIs, are open to sharing all details of their research results and technologies with their adopters to generate and sustain their trust in the institution.

Another facet of their internal communication is communicating within their organization. By this, the PRIs mean the significance of maintaining a good relationship with their staff, especially the scientists and researchers that generate a gamut of



intellectual properties. Moreover, as large institutions with close to 200 to over 300 staff, their internal communication capabilities will need to cover the institution itself. Taking PHILRICE as an example, the institute manages ten branch stations. Each station generates research and technology outputs that must be communicated well within its network. PHILRICE practices a variety of methods to build communication capabilities. One such way is by allowing their staff to work in different branch stations, building the trust and relationship required to maintain a communication ecosystem. For DOST-ITDI, the representative mentioned that they foster community within their ranks by also asking their scientists to accompany their staff when doing technology promotion or do it themselves. Having the scientists undergo such a task lets them realize the importance of science communication to the public and appreciate the dual work of technology generation and promotion that the institute cultivates. Finally, several representatives highlighted another significant staff communication capability: the practice of intellectual property inventor acknowledgment and sharing of royalties to the inventors and staff involved in generating the technologies.

Building the internal communication capabilities of the PRIs with their employees also entails using several facets of their management capabilities. One such facet is the availability of human resource development programs or offices within the institutions. Through each program, the PRIs identify and plan for staff training and opportunities for further studies. In addition, when there are available scholarship offers, the PRIs make sure that they share these with eligible employees and may require postgraduate degrees for career advancement. Finally, by ensuring the professional development of their staff,

the PRIs have been successful in making their employees stay in their institutes for more extended periods.

Moreover, quite interestingly mentioned by these three PRIs is how they try to inculcate a more socially oriented or societal perspective towards their work. The PRI representatives cited the existence of and sustaining the passion and open-mindedness of their employees, who unceasingly strive to develop industries that have many persons in need. In particular, the PHILRICE representative mentioned the need for social immersion to have their staff understand for whom they do the work. Furthermore, as some funding takes a while to arrive, the representatives recalled how several scientists would use their money to advance some payments not to delay their R&D projects. Of course, these advanced payments will be reimbursed, but the mere fact of doing such actions presents the commitment their employees have to their mission.

However, like the GAs, one human resource risk they possess is the presence of many contractual employees. As permanent positions are challenging to attain because of budgetary and policy restraints, several representatives stated that they at times lose out on people with great potential. As a result, these talents often transfer to more secure jobs offered by private companies.

Regarding their management capabilities in conducting R&D, the PRIs have an annual budget from general appropriations for their daily operations and several projects. These are further supplemented by grants from government research councils or external funding agencies as they prioritize topics listed in the PDP and HRNDA. However, although they generate hard technologies, they are not allowed to mass-produce their

inventions as part of the public sector. Instead, they need to find manufacturers for these, at least in the case of hard technologies.

All three institutes have their own intellectual property rights offices and enterprise or business development sections to support their technology diffusion further. These offices manage the available and deployable technologies and aid potential adopters in understanding how these may be integrated and help further their respective businesses. Finally, to add to their reputation and management prowess, the facilities of the three PRIs all possess the pertinent ISO certifications.

Moving towards the private sector intermediaries' key-capabilities and starting with the IAs, the researcher finds minimal similarities between how they emphasized their key-capabilities. Nevertheless, one common trend between the three is an emphasis on their knowledge-building capabilities. A similarity the three IAs share is how they compose their knowledge bases. All three organizations highlighted how their members have a wealth of knowledge that allows them to build and develop the services they provide. GRECON comprises rice retailers, importers, traders, and millers, who can broker and mediate rice stocks. PAKISAMA's members are farmers, fisherfolk, indigenous peoples, rural women, and youth groups that understand and can communicate the needs of their sectors. To address their needs and support the development of their sectors, PAKISAMA responded by hiring professionals in agriculture, agri-business, community organizing, law, and lobbying. Farmers from their locality make up MFA. The MFA farmers share their experiences of transacting with traders and bands to request aid from the local government. By having their bases as the source of knowledge, the members of the three organizations can learn and build upon each other's knowledge.

Another key-capability that shares some commonalities between the three IAs is internal communication. IAs must have a well-established communication system to deliver information and opportunities to members as member-focused organizations. A conventional method for communication all three organizations employ is meetings. As larger organizations, GRECON and PAKISAMA have national leaders or board members that meet regularly, and both have general member meetings annually for GRECON and every three years for PAKISAMA. MFA had monthly meetings, too. However, they decided to meet once every three months instead because of the pandemic. During meetings, the organizations discuss or report services and issues to the members.

As much older organizations, GRECON and PAKISAMA have built their internal communication capabilities much more than MFA. Although much looser than PAKISAMA, GRECON's national presence created a chain of communication for members that begins at the municipal GRECON level and works up to the national team. In the same way, GRECON manages its services and the organization using the same national-regional-municipal setup. Unlike GRECON, PAKISAMA has a physical office that houses its national secretariat in charge of providing the services of the federation. PAKISAMA also sustains its relationships with other NGOs and agriculture, fishery, and forestry confederations and networks through the national secretariat. According to the PAKISAMA representative, their regional area managers' communication skills are crucial as these staff directly interact with the members. In addition, the persons that face the farmer and fisher organizations must be well-versed in community organizing and community development tools and skills. On the other hand, MFA, which is much

younger and smaller, communicates more informally. As the members are all part of the same community, they may visit one another to inquire or relay information.

Of the three IAs, PAKISAMA appears to be the most active in building and applying its external networking capabilities. PAKISAMA has had more international experience than the other two organizations, with international organizations inviting them to consultation workshops and conferences. On their own accord, PAKISAMA co-hosts an annual conference where they have participants share new knowledge and best practices in the agriculture, fishery, and forestry sectors. PAKISAMA actively organizes communities and meets with other advocacy and NGO groups to grow its membership base and support. They also take the initiative in submitting project and program proposals to donor agencies to fund the services they provide.

Nevertheless, GRECON and MFA also build their key-capabilities. Like PAKISAMA, the other two organizations also initiate discussions for partnerships and resources from the government. In the case of MFA, they build their network with the local government to request farm machinery. GRECON, on the other hand, extends itself to the government to raise their concerns as rice wholesalers and retailers. Moreover, when it was still allowed, GRECON was a major partner of the NFA in distributing and selling government-procured rice. As PAKISAMA and GRECON are well-known, these two organizations also have partnerships with more extensive regional and national networks.

As a note on MFA, according to the representative interviewed, their group is not as interested in expanding its network. As a young association, they would like to maximize the support they can receive from each member first before moving towards

network expansion. Although, they may need to practice their networking soon since their membership has been shrinking due to several farmers selling their lands, as stated by the representative.

One apparent similarity that the three IAs share in their management capabilities is a formal organizational structure with elected officials. However, comparing the three, PAKISAMA has a more concrete structure by having an office from where they manage the organization. Following them is MFA, which uses the current elected president's house as their base of operations for meetings and storing their shared farm equipment and machinery. Finally, GRECON, although lacking a physical office, owes much of its success to its multi-level management system. This system efficiently relays information up and down the line, especially when they need to transfer rice stocks from one municipality to another.

Another difference in their management styles is evident in how they conduct their activities. PAKISAMA is professionally managed, with staff trained to deliver various programs and services. Conversely, GRECON's and MFA's activities are more member-driven and require members to plan and implement their programs.

A management-related issue that all three IAs face is financial limitations. Although they require membership fees and annual dues, the amount required of members is not that substantial, with PAKISAMA charging Php 1,000.00 (US\$ 20.00) as a one-time membership fee and Php 2,000.00 (US\$ 40.00) as an annual per member organization, GRECON charging Php 100.00 (US\$ 2.00) as an annual fee. MFA annually requires Php 1000.00 (US\$ 20.00) per hectare of land a member owns. For MFA, the amount may be enough, but for the other two organizations, much more is required.

PAKISAMA, for the longest time, has been grant-dependent and is currently exploring ways to be more financially sustainable. For GRECON, its members try to subsidize their activities if needed.

Based on the experiences of the three IAs, it seems that their key-capabilities hinge on an organization's geographic scope, programmed services, and purpose. Taking the IAs alone, these findings coincide with those of Sutthijakra and Intarakumnerd (2015), in that key-capability building is informed more by an intermediary's roles than anything else. Nonetheless, comparisons with other intermediaries may reveal how roles are affected by variations in organization type.

Like the IAs, LMRFC as a social media group also highlighted its knowledge-building capabilities as one formed by its members. With many of its members as farmers, machinery suppliers, and input suppliers, they are knowledgeable about their segments of the value chain and the intricacies of their craft. Similarly, the group administrator knows equipment importation, trade, and new and old rice equipment and machinery. Because of their backgrounds, the group members can freely share and apply their knowledge, expertise, and experiences to others. The knowledge shared between members does not only revolve around machinery and equipment but also around market information like input and buying prices. There would be posts about industry issues, such as the RTL, that members would post and discuss. However, little control is given to what members may say. Moreover, no concrete resolution is made when debates occur. Although the group may have a vast wealth of knowledge, different opinions, beliefs, and understanding often float to the surface.

The knowledge of its members is shared through posts in the group or private messages. On the group's main wall, members would freely post inquiries, equipment demonstration videos, items for trade or sale, and opportunities to learn (e.g., seminars and training) related to rice farming. The free-to-post nature of the group acts as the foundation for the group's internal communication capabilities. Similarly, the group is quite open to its opinions, and it is just as open to interested would-be members. As it is an online platform, its external networking capability is quite broad, albeit the administrator is not actively promoting the group online. Even though the group is not marketed, its membership has increased steadily. Although, a great majority of its thousands of members are not necessarily active in posting or commenting.

An interesting sub-group of members that join LMFRC are Overseas Filipino Workers (OFWs). According to the group administrator, these OFWs have relatives in the Philippines engaged in farming. Moreover, the OFWs are more open to adopting newer mechanized technologies than the generation ahead of them; thus, the interest of this group in joining the group. Moreover, as these workers earn better income from abroad, they are at least more capable and comfortable investing in farm equipment, especially those that may ease the burden of their parents or that they may use if they choose to return.

With the freedom to post and its growing number of members, the management capabilities of the administrator need to be built quite well. One person manages LMFRC, and he does all the filtering and approval of posts. No fees are required to join or sustain membership in the group, and having no source of sustainable income means that the administrator renders his service to the group free of charge. When asked why he does



the service without payment, he stated that because he is quite serious about promoting farm mechanization and modern farming technologies, he manages the group despite the difficulty and time required to continue operating it. Truly, scrutiny and time are needed when sifting through relevant and irrelevant posts and people there to cause trouble. From time to time, the administrator deletes posts that have been around for quite some time or those entirely irrelevant to rice farming (e.g., posts about clothes for sale). It would likely help if the administrator had some group moderators to support the group's management. However, that may take more personal management and coordination capabilities for the administrator to build and apply. As of now, he claims that he accepts the current setup despite the time required.

Chen Yi Agventures acknowledges and highlights the significance of all four key-capabilities. Moreover, they seem to blend the key-capabilities more than the other intermediaries. At the base of the mix are their knowledge-building capabilities. Although the owners of Chen Yi Agventures knew little to nothing about rice production when they began their enterprise, the knowledge and skills from their previous lines of work served tremendously to help develop their rice-based knowledge. Upon arriving in Leyte, they conducted surveys and interviews with local farmers to learn the industry's most pressing and structural issues. However, Chen Yi Agventures did not stop there. They employed their international network to discover even more about the available technologies that may address Philippine rice production. They visited PHILRICE, IRRI, and other rice-producing companies in Southeast Asia, China, and Japan. They decided to build a state-of-the-art rice processing center in Leyte that serves as the base of their rice and development operations at the end of their search.

Regarding their staff, Chen Yi Agventures hires trained professionals to serve in the plant's operations and visit their partner farms. In the beginning, the Japanese company they partnered with agreed to provide nine in-house Japanese engineers for the first two years of operation to develop the facility further and train the staff. The representative mentioned that plant workers need to be certified engineers to be hired. For those visiting the farmers and operating the machines, these people need to be trained agriculturists and technicians. Chen Yi Agventures assures itself that the most suitable persons may apply the knowledge and expertise they require.

In managing its operations, Chen Yi Agventures, as a private firm, established itself as a full value chain business that attempts to put a sense of control from input supply to its marketing. They developed the Renucci Rice Partnership Program for farmers on the production side. They supply rice seeds, fertilizers, and access to farm machinery at little to no cost or interest. In the mid to downstream portions of the value chain, everything is precision and data controlled from the processing center they founded. To ensure that these live up to global standards, they established their entire company, ensuring that they always uphold GMP and International Organization for Standardization (ISO) certifications and standards. They have over a hundred employees that may balloon to 250 during the harvest season. By mixing their capabilities, Chen Yi Agventures has employed its rice scientific knowledge-building capabilities to develop their rice. In implementing their full value chain system, Chen Yi Agventures, under their Dalisay Rice brand, won the third best rice in the world in 2019.

In their management style, they also employ their internal communication capability. Being able to control their entire value chain, the chain of information and

communication is much more efficient and goes through a set process. Despite the control, Chen Yi Agventures still experiences issues with its communication with its partner farmers. Although they belong to the partnership program, the company does not force the farmers to purchase fertilizers they provide, use the machinery they offer access to, and even sell the paddy to Chen Yi Agventures. Rather than force learning on the farmers, Chen Yi Agventures wants them to realize the gains of working with the company independently. It may create small gaps in communication with their main suppliers but choosing to do so upholds the principles for which the company stands. Nonetheless, Chen Yi Agventures attempts to communicate better with the farmers by fielding technicians and agriculturists to provide advice.

As mentioned earlier, Chen Yi Agventures exercised its external networking capabilities during the company's foundation. As a result, they have established good relationships with several rice-related organizations, such as PHILRICE, which supplies their rice seeds. Another facet of their external networking capabilities is their awards and commendations. Learning about and having these accolades may create a sense of trust and value for potential customers and possibly additional trust and value for existing ones. Finally, the company is currently exploring the possibility of venturing out and exporting its Dalisay Rice. However, as they produce their rice at a higher price point, they will still need to drive costs down further to compete with lower-cost but better-quality foreign-produced rice.

For AgriCOOPh, the NGO appears to have emphasized the external networking and internal communication capabilities more than the other two key-capabilities. Compared to the rest of the innovation intermediaries, the interview and FGD with

members of AgriCOOPh suggest that communication appears to be the most important facet of their work that they hold in high regard. Owing to their more recent establishment, AgriCOOPh directs its efforts to establish its reputation to work sustainably in the future.

Moreover, similar to Chen Yi Agventures, AgriCOOPh appears to meld its key-capability application. This is most evident when they harness their management capabilities to expand and sustain their networks. AgriCOOPh's CEO, a former congressman, has a long and diverse set of experiences working in the agriculture, fisheries, and forestry sectors. Because of these experiences, he has a vast network that the NGO taps to gain funding, consultancy, projects, opportunities for development, training opportunities, and more. Adding to the CEO's network are the networks of AgriCOOPh's staff, who also have backgrounds working in the same sectors. During the height of the pandemic, many of their contacts approached them for partnerships and support – effectively expanding their network further. Their staff can also tap their networks for cooperatives that may avail or need their services and asks that they subscribe to the AgriCOOPh membership. In addition, the previously established network of AgriCOOPh's workforce is not limited to the Philippines. During its foundation, many international and local agriculture, fisheries, forestry, and NGO organizations supported their cause and partnered with AgriCOOPh in delivering the needs of cooperatives. A manifestation of their partnerships is their joint projects and proposals. Finally, AgriCOOPh further expands its network through its very active use of social media. Early on, the chief executive officer (CEO) realized the potential of having a staff member assigned to manage its communication and network and requested funding.

AgriCOOPh's knowledge management officer currently operates the NGO's social media page, keeps it updated, and responds quickly to inquiries.

Within its current network, especially with its member cooperatives, AgriCOOPh continuously works on its internal communication capabilities to sustain and grow its relationships. As it was being established, the founding members of AgriCOOPh conducted several consultations with a varying group of stakeholders to ensure that the services they would provide were ones that cooperatives needed. Upon its establishment, one of the first things AgriCOOPh does with a cooperative is to conduct profiling and present a development proposal to the cooperative and communicate their plans together. While conducting its programs, AgriCOOPh ensures that it sends other organizations' invitations to its members. They also follow up constantly with those that have pending inquiries and projects.

Moreover, to build the relationship with the cooperatives, AgriCOOPh supports their programs by participating or attending them. The network created by AgriCOOPh also encourages larger member cooperatives to mentor smaller members, which the NGO facilitates. Finally, AgriCOOPh shares its successes, evaluations, and plans during its annual General Assembly, which for 2021 was livestreamed via its social media page.

Like many intermediaries and most people globally, the pandemic affected AgriCOOPh's projects and programs. They experienced communication difficulties as most of their partner cooperatives are outside Metro Manila. Nevertheless, the NGO was steadfast and quick in its shift towards online platforms and teaching the use of these to its member cooperatives. During the FGD, a person mentioned how they were on the cusp of beginning multiple projects and programs before the pandemic hit. Although it did

cause some delay, the NGO was able to manage and incorporate process innovations in its work.

AgriCOOPh's staff act as the foundation of the knowledge that forms their services for its knowledge-building capabilities. With backgrounds working in the agriculture, fisheries, and forestry sector, cooperative development, agricultural management, development communications, and work experiences from like organizations, AgriCOOPh offers a wide range of programs that include cooperative management and governance, business development, and business matchmaking. In addition, the staff develops their skills further by attending training provided by AgriCOOPh's partner NGOs and international organizations. Moreover, the NGO continues to build its knowledge-building capabilities by conducting assessments at every step of its development programs or projects with its stakeholders and members. The evaluations are needed to see if they fit the needs or opportunities and address the weaknesses found during the profiling.

Throughout the discussion of its other key-capabilities are facets of its management capabilities. However, a critical facet of the NGO's management capability that allows the extensive blending of capabilities has yet to be mentioned. Even as AgriCOOPh was being formed, the initiators set up the organization to make it a professionally managed NGO. Being managed in such a way, AgriCOOPh seeks to operate itself more as a business despite being listed as a non-profit federation. It still relies on funding and support from donors but is slowly moving towards a more service fee-based business model. AgriCOOPh hopes to sustainably fund its entire operations by requiring commissions and fees for its services. As of the interview and FGD, the NGO

is partnered with 30 cooperatives with a combined membership of approximately 500,000 individuals. With further growth, AgriCOOPh may soon realize the potential of its business model. Operating the NGO in such a way provides AgriCOOPh and its member cooperatives a fresh perspective on how to work in the NGO sector may be done sustainably.

To summarize how organization types affect the key-capability building of innovation intermediaries, it is first worth reiterating that almost all intermediaries emphasize their key-capabilities relatively equally. This may mean that they treat all these capabilities as critical to their operations. Nonetheless, when comparing the key-capabilities, knowledge-building is the most emphasized and followed by internal communication. These are not as surprising as knowledge-building capabilities seem to act as the foundation of an intermediaries' programs and services and effectively its role performance. On the other hand, internal communication capabilities demonstrate how the organizations share information and sustain relationships within their network. The greater emphasis on these two key-capabilities seems to match the discussion on role performance that discussed how many intermediaries provide knowledge and information resources.

A shared aspect of the key-capabilities that the intermediaries often highlighted was their human resources. Not counting the more volunteer-based intermediaries, all other intermediaries emphasized the need for the appropriate skills to ensure competently handled tasks. Several intermediaries cited specific professionals like lawyers, engineers, community organizers, business consultants, agricultural technicians, and scientists in particular fields as critical employees. Moreover, these intermediaries recognize the need

to personally and professionally develop their staff. For the public organizations, the staff development programs allow their staff to pursue further studies and technical or management training. A specific program allows the public sector intermediaries to track which staff need or are eligible for these opportunities.

#### *5.5.2 Differences in role performance and key-capability building by value chain segment support*

Based on the interview data gathered, the researcher plotted the roles of each intermediary across the different segments of the Philippine rice value chain. Table 5.10 presents plotted role performance of the participating intermediary organizations in the rice industry.



Table 5.10 Roles Performed by Participating Intermediaries in the Rice Value Chain

	Input Supply	Production	Aggregation	Milling	Milled Rice / Rice Processing	Marketing	Global Market / Import
ATI	B, C, RP	C, RP		C, RP	B, C, RP	M	
NRP	B, C, M, RP	C, M		B, C, M, RP	B, M, RP		
PHILMECH	B, C, M, RP	C		B, C, M, RP	B, C, M, RP	M	
PHILRICE	B, C, M, RP	C, RP		B, C, M, RP	B, C, M, RP		
DOST-ITDI					B, C, M, RP	C, M	
GRECON			C, M	B, C, M	B, C, M	B, C, M, RP	B, C, M
PAKISAMA	B, C, M	C, RP				B, C, M	
MFA	B, C, M, RP	C				C	
LMFRC	C, M, RP	C, M		C, M	C, M		
Chen-Yi Agventures	B, C, M, RP	C, RP	B, C, RP	B, C, RP	B, C, RP	B, RP	
AgriCOOPh	B, C, M	C, M	C	C, M	C, M	B, C, M, RP	

Note. B stands for brokerage, C for consultancy, M for mediation, and RP for resource provision. The researcher based the assignment of roles in the value chain on the actions and services done by the organizations vis-à-vis the processes involved in each segment of the value chain. The data for this table is drawn from the interviews and an FGD with respective organization representatives and triangulated through other data sources.

As presented in the table, many intermediaries concentrate their role performance in the input supply, production, milling, and milled rice/rice processing segments of the rice value chain. Much fewer are active in the marketing segment, vastly fewer are present in aggregation, and only one interacted with the global market or the importation segment. One reason for the concentration of intermediaries in the four highly mentioned segments may address industrial issues on high production costs, low uptake of technology, and the lack of scale economies. One may also notice that the public sector intermediaries appear to perform more roles in these segments than their private sector counterparts. This is likely because of the public sector mandates of these organizations. Looking specifically at the PRIs, some may question that they perform all four roles – in varying degrees – across the value chain. Since they are mandated to diffuse their technologies actively, the PRIs are pushed into being the providers or purveyors of technologies apart from being the technology generators. Recalling the processes involved in input supply, production, milling, and milled rice/rice processing, much more technology-based or skills-based processes are involved in these segments, thus, requiring the more active presence of intermediaries that offer hard and soft technologies.

Tackling each segment, we start with Input Supply, where many intermediaries participate. As this segment involves acquiring the necessary materials required for rice farming, it is not surprising to find many intermediaries providing as much support to farmers or cooperatives that operate in this segment. Expectedly, intermediaries perform brokerage and resource provision extensively in this chain segment. In addition, however, all the intermediaries perform consultation and mediation roles despite the need to receive materials and technologies. One reason for this may be the need for value chain players to learn of inputs necessary, technologies available, skills improvement opportunities, or

financing prospects. Additionally, with the recent push for farm consolidation or clustering, several intermediaries may be mediating the establishment of loose farmer groups or the formalization of organizations.

When comparing public and private sector intermediaries, the findings suggest that public sector intermediaries have more in common in terms of their roles compared to those in the private sector. Barring DOST-ITDI, which is not present in this segment, the public sector intermediaries are consistent in their performance of brokerage, consultancy, resource provision, and mediation for three of the four. As mentioned in the preceding sub-section, the performance of multiple roles is likely due to their government mandates. However, the need for the public sector to do multiple roles may not be because of the lack of effort from the private sector. Instead, it may be due to the scale of intermediation required. Coming from an interview with the PAKISAMA representative, he realized the limits of what their organization can do. Using the RCEF Mechanization Program as an example, he cited how minute adding their 21 member cooperatives as recipients was when he saw the colossal scale of farm organizations that PHILMECH required. This is not to say that the private sector has no role in this value chain segment. For example, two crucial roles they may perform here are brokering and mediating their partners with government programs or learning and sharing key market and technology information and opportunities. Nonetheless, suppose a private sector intermediary has the capability of providing the hard and soft technologies or inputs needed. In that case, they can most certainly provide these, as in the experiences of Chen Yi Agventures and MFA for farm machinery.

In the Production segment of the value chain, the same intermediaries from the previous segment perform intermediary roles. However, the researcher finds that brokerage appears to have been lost in this segment. The main reason for this is the absence of the need to broker materials and inputs. At this point of the value chain, rice farmers begin the planting process and must have already acquired the necessary items. Nonetheless, several intermediaries still perform resource provision. These come in the form of information-education materials for ATI and PAKISAMA, the hosting of the Text Center and use of smartphone applications for PHILRICE, and the provision of agricultural technicians for Chen Yi Agventures.

The most significant support provided by all the present intermediaries in the production segment is consultancy. The researcher finds that the intermediaries perform consultancy the most. This is unsurprising as value chain actors and intermediaries report the need for consultation on diseases, pests, and the processes by rice farmers during this segment. To gather advice, farmers would use the resources provided by several intermediaries or seek staff from the staff of intermediaries to the farmers are connected or are members.

Several intermediaries, NRP, LMFRC, and AgriCOOPh, also perform mediation roles in this portion of the value chain. Apart from providing opportunities for rice farmers to meet, the mediation performed by these intermediaries also helps connect value chain actors from the production segment (i.e., farmers) with the aggregation or milling segment (i.e., rice paddy buyers). Although the trading process comes in the following segment, connecting farmers to buyers, in the context of a value chain, is a mediating role

that may also involve or turn into successful brokerage if an intermediary's role is necessitated for the fruition of a transaction.

When comparing the private and public sectors, the interviews suggest that private intermediaries may be better suited to support the individual needs of rice farmers and cooperatives in the production segment. Nonetheless, the public sector intermediaries have a role to play. With an aim toward scale, the public intermediaries may support farmers' consultancy and resource needs by providing common-use technologies or materials such as smartphone applications or educational materials. An issue with the public sector intermediaries raised several times in interviews was that, although they provide consultancy services and advice for free, there is an air of skepticism around government workers as many farmers believe that they only know about farming theoretically rather than practically. However, the interviews suggest greater trust between farmers than farmers toward non-farmers when believing what is best for rice production. Most definitely, the knowledge and experience of the public intermediaries are not only based on books and research. However, until such a notion is wholly changed, private sector intermediaries may step in to fill the individualized issues farmers may face. Nevertheless, understanding this reality, many public sector intermediaries are moving towards empowering farmer leaders to be their voices to other farmers. An example of this effort is the establishment of farm schools by ATI, where trained farmers provide training and learning opportunities for others while being guided and supported by other public sector intermediaries.

In the Aggregation segment of the value chain, the researcher finds only three intermediaries that are directly performing roles. These three organizations are GRECON,

Chen Yi Agventures, and AgriCOOPh. Common between the three is the performance of consultancy roles. However, the way each organization provides consultancy varies significantly. For GRECON, as an industry association catering to rice retailers, the consultancy they provide here primarily advises where to find rice supplies and where member traders<sup>13</sup> may sell their rice. The information-sharing system they have in place is always coupled with the mediating actions that GRECON members and officers perform to connect for these transactions and supply transfers. Chen Yi Agventures, on the other hand, performs consultancy more to dissuade farmers from selling their produce to paddy traders seemingly. Instead, the consultancy they provide advises farmers on how much more they may earn and develop if they supply their rice to the company. As a value chain integrator, Chen Yi Agventures supports its advice by brokering and providing equipment and machinery that makes the consolidation and transport of paddies more efficient. The consultation provided by AgriCOOPh differs in that the NGO provides advice for cooperatives and its consolidation operations, rather than advice on where to sell produce, as one might think. With a whole value chain approach to their development programs, it is not surprising that AgriCOOPh also tries to tackle issues related to aggregation and counter them by providing their member cooperatives involved in the rice industry methods to manage the consolidation of their produce more efficiently.

Based on the experiences of these three intermediaries, the findings suggest that intermediaries in the rice industry may not necessarily be in favor of the current

---

<sup>13</sup> Although GRECON has paddy trader members, there are not many of them within the organization. According to the representatives interviewed, most of these traders are also likely engaged in wholesaling or retailing rice themselves, which is why they joined the association.

aggregation system. However, that does not mean that the system is faulty. Recall that in the previous segment, a few intermediaries also aided in connecting farmers to potential buyers. But these instances mainly were mediation, and the intermediaries did not have a solid hand in brokering transactions between individuals or groups of farmers with buyers (i.e., paddy traders). In AgriCOOPh's case, the mediation, and eventual brokerage, were performed between member cooperatives and not between cooperatives and a single firm or individual trader. The presence of Chen Yi Agventures and AgriCOOPh in the aggregation segment is not surprising. These two organizations always highlighted the whole chain approach of their operations, thus necessitating the need to tackle innovation or upgrading issues in aggregation. GRECON is present because of the nature of the association's members. As an organization that caters to the primary market, the organization needs to aid its members in ensuring an ample supply of rice. One way of doing so is by interacting with traders with the most extensive presence in the aggregation segment. Conversely, the lack of other intermediaries, especially public sector intermediaries, may indicate the absence of technological innovation or upgrading needs for actors that the intermediaries may provide.

Similar to the first two segments, the Milling segment exhibits the presence of many more intermediaries. Intermediaries that support the milling segment do not perform as many roles as input supply. However, like all segments preceding it, the most commonly performed is consultancy, followed by mediation, resource provision, and brokerage.

For consultancy, many of its instances revolve around the request for information on better milling machinery, standards, and the process for those getting into milling,

machinery maintenance, and market information. The researcher finds no striking differences in consultancy provided by the intermediaries. However, when it comes to mediation, several variances may be found. For GRECON and AgriCOOPh, mediation may involve more market mediation than something overtly technological. These two intermediaries make market innovation possible for their constituents. However, a slight difference for them is their partner choice. As mentioned several times, AgriCOOPh links cooperatives or groups, while GRECON may connect individual value chain actors. For LMFRFC, mediation may involve connecting farmers to millers, millers to equipment providers, or would-be millers to machine manufacturers. The public sector intermediaries do similar linkage possibilities. Although they also provide opportunities for market innovation, the introduction to milling machines and parts manufacturers may be meaningful connections millers would need.

Except for Chen Yi Agventures, the intermediaries in the milling segment may perform brokerage roles after mediating between parties, especially transactions between farmers and millers or millers or would-be millers to equipment manufacturers. Similarly, GRECON brokers trade between its members (e.g., millers to wholesalers or retailers, traders to millers). Another form of brokerage that occurs follows or coincides with resource provision. An example of this is the establishment of rice processing facilities by the NRP in areas that do not have many milling services available. These processing facilities are publicly financed and may be awarded to specific farmer groups or managed by the local government. Other intermediaries, such as the PRIs, may provide custom milling or small portable milling machines for smaller farmer groups.



As discussed previously, resource provision coincides with the brokerage role, especially when providing hard technologies. For example, in the case of Chen Yi Agventures, they invested and used their milling machines to process the rice they purchased from their partner farmers, effectively but inadvertently brokering the access to the milling segment of the chain to their partners. Conversely, resource provision on its own may be possible, as in the case of ATI, which provides milling information materials and training resources to learn about milling.

In the shared segments of Milled Rice / Processed Rice Products, many intermediaries participate in one or both product types, with a majority present in milled rice. Like the input supply segment, the public sector intermediaries return to their performance in many roles. These intermediaries reinstitute brokering and resource provision as their primary roles by providing facilities necessary for the packing, storage, and trade of milled rice and diffusing technologies that create new rice-based products and use rice by-products. Excellent examples of the latter are interchain upgrading by NRP in its use of rice husks for mushroom farming and PHILRICE's help setting up biofuel power plants that use rice hulls as fuel. Like other segments, brokerage and resource provision by the GAs and the PRIs work almost in sync as they diffuse and provide the necessary technologies and markets for their adopters.

Moreover, public sector intermediaries may provide knowledge and training on better packaging and storage, like ATI and PHILRICE. Similarly, mediation and consultancy for these intermediaries work the same manner as they did in the previous segments. The public sector intermediaries would mediate by connecting their constituents to possible sources of technologies and financing that the intermediaries may

be unable to provide. They may also support looking for possible buyers or markets for adopters and stakeholders. One form of support that DOST-ITDI and PHILMECH provide in this regard is sponsoring their adopters in technology or product fairs. For consultancy, like before, the intermediaries would provide advice on appropriate technologies or packaging used by their clients or market advice and information.

Comparing the roles done by the private, the researcher finds less brokerage and resource provision done. Moreover, the present private sector intermediaries do not appear to be as active in processed rice products in the shared segment. The researcher could not find private sector intermediaries directly providing intermediary services for rice processing companies or groups. Nonetheless, this is not to say that these intermediaries may not exist. For example, organizations that support various food processing companies or private rice product processing firms that perform intermediary roles for their partners may be a part of the list of possible intermediaries.

Understanding that the participating private sector intermediaries focus on the milled rice portion of the segment, the researcher finds that the intermediaries extend their role performance from milling to the milled rice segment. Unsurprisingly, this occurs as the processes involved in this segment are reported to be activities redone from the milling segment. First, GRECON continues the brokering and mediation of rice trades between its members and areas with their presence. Second, LMRFC remains a platform for trades and sales of milled rice from millers or actors that repack milled rice. Third, AgriCOOPh persists in its consultancy and mediation of possible trades between members and non-members.

The milled rice portion of this segment requires less hard technologies, apart possibly from better packaging material. On the other hand, processed rice products and by-product use will require more hard and soft technologies and knowledge to operate properly. Nonetheless, the potential for intermediation and technology development is there. Many processed rice products require specialized skills and machinery that intermediaries may focus on brokering or providing. Furthermore, rice by-products are also increasing in value. As reported by one milling company interviewed, rice husks that used to be thrown away now have value when the technology for how these may be used as biomass fuel was developed. According to that milling company, they use the technology to lower their costs by producing their energy through small biomass power plants, with many other millers around them following suit. This segment has much potential for intermediation. With the lack of private sector intermediaries, the public sector appears to be leading the charge, at least when it comes to the processed portions. In particular, PRIs may have a more significant role in this sphere.

In the Marketing segment of the value chain, one may notice that private sector intermediaries perform more than the public sector intermediaries present in the study. Nonetheless, the ones present – ATI, PHILMECH, and DOST-ITDI – still perform mediation. However, the actions related to mediation are mostly in connecting or providing avenues for possible transactions. The intermediaries may not be actively pursuing that these successfully transpire. In the case of DOST-ITDI, it also provides some business consultancy to support its adopters.

The existence of the NFA may explain the lack of presence by the other public sector intermediaries. The NFA still holds the mandate and authority to purchase rice

directly from farmers and manage the nation's entire buffer stock for public procurement of milled rice. Although the RTL removed several of its powers, the organization remains a powerful institution in this value chain segment. Several interviews and secondary sources claim that the process of selling to the NFA is still mired by several obstacles farmers must face.

Conversely, private intermediaries are more active in supporting the marketing of their partners' milled rice. Apart from market consultancy and linkage, GRECON, PAKISAMA, MFA, and AgriCOOPh aid in brokering transactions for their members. Moreover, GRECON performs resource provision roles in transporting rice to calamity-struck areas. On the other hand, although Chen Yi Agventures shows brokering and resource provision, its performance is primarily more indirectly felt by its partner farmers. Instead, it is the brokering and use of resources to market its rice products.

Nonetheless, doing so is an important facet for the company to continue its work in developing the lives of its partner farmers. Based on these findings, IAs may be the most appropriate type of organization that may support its members and partners in the marketing segment of the value chain. In addition, an NGO that provides market matchmaking services like AgriCOOPh may also be a good model for other NGOs with stakeholders that require aid in this segment.

The researcher finds only one participating intermediary present in the Global Market segment: GRECON. As primarily a retailers' association, it is not surprising that they are present here since one of the organization's purposes is to help its members source rice stocks. GRECON may perform brokerage, consultancy, and mediation between its members that import rice and those requiring stocks. The group may advise

who imports and where members may purchase, and officers may connect and ensure transactions between their members. Although GRECON has a presence in the global market segment, the representative mentioned that many members prefer to source their stocks domestically to support the local farmers.

The lack of presence by other intermediaries in this segment suggests that the participating intermediaries may be all focused on truly developing the local rice industry to combat the growing influx of imported rice. Nonetheless, intermediaries not in this study may also have roles in this segment. An example of these may be cooperatives that export specialty rice, as one of the industry experts mentioned. Unfortunately, those that do export do so in very minute volumes, and they may not necessarily affect the larger picture of the industry.

The researcher finds that several roles are performed more in specific segments than others, affecting intermediary role performance by participation in the value chain. The leading cause for this may be the requirements that each segment's processes entail. For example, brokerage and resource provision roles are performed mainly in the input supply, milling, and milled rice/rice processing portions. These three segments require more technologies, equipment, facilities, and training. Thus, it is not surprising that intermediaries perform brokerage alongside resource provisions in these segments, especially the public sector intermediaries. When other intermediaries perform brokerage in other sections, like in aggregation or marketing, these are more to broker sales or markets for their partners.

However, consultancy is performed most by intermediaries and is present throughout the value chain. Intermediaries provide advice on available production

techniques, training opportunities, and technologies in the technologically heavy segments. Moreover, many too provide advice on input sourcing and market information. Like PRIs and AgriCOOPh, several also provide business development consultancy, especially for the value-added product processing and marketing.

On the other hand, mediation roles in the value chain involve creating relationships between suppliers and buyers. It may also involve mediating between prospective technology adopters or buyers with financing organizations. Moreover, the researcher finds that market mediation links actors between segments, such as Production to Aggregation, Aggregation to Milling, or other segments to Marketing. Again, when performing mediation, intermediaries do not necessarily ensure that these transactions bear fruit. Their main task in providing such a service is creating connections and fostering the rice industry's network.

Finally, one important lesson we learn from laying out intermediary roles in the value chain is the absence of some services that intermediaries provide that may help in upgrading or innovation. Activities such as R&D, community organizing, organizational development training, and lobbying may not be immediately evident. These activities may not always directly add value to a product, but these activities certainly affect the institutional environment or innovation ecosystem surrounding the farmers and MSMEs. For example, the performance of R&D creates opportunities for technological innovation and lowers production costs. Community organizing will aid in addressing the scale economies problem. Coupling that with organizational management improvements, farmer organizations and cooperatives may become more efficient, well-managed, and profitable. These developments may have been mentioned in earlier discussions but are

more indirect in their impact on the value chain processes. Finally, lobbying affects the institutional environment with the intermediaries pushing for specific laws and policies to support the industry, especially the value chain actors that gain the least.

For intermediary key-capabilities and the effect the rice value chain has on them, it appears rather difficult to argue that specific key-capabilities are more present or developed in specific segments of a chain. Nonetheless, the researcher finds that value chain segment participation may influence key-capabilities in their entirety, and this argument may be more clearly seen in the knowledge-building capabilities of intermediaries. Focusing on their partners or stakeholders, intermediaries learn the current state of their partners in the segments their partners participate in and discover the hindrances to participation, innovation, and upgrading. However, it is not enough to learn about the needs of their partners alone, especially given how the local and global rice industry is structured. Understanding the production process and how the next steps ensue will be essential in addressing hindrances faced by their partners. To do so, intermediaries need to learn and understand the structure of the entire rice value chain and the intricacies of each segment. For example, suppose rice farmers face input problems in the production segment. These must be addressed in the input supply segment, which requires the intermediaries to perform the roles presented earlier. However, the knowledge-building capabilities of intermediaries are not solely for learning. It also involves applying their knowledge. By understanding the value chain and their partners, intermediaries may assess which roles they need to perform. It may be possible that the intermediary service required need not return to the previous segment but entail consultancy in the current process the farmers or value chain actors are conducting. Another application of

knowledge-building capabilities would be applying the knowledge to link or mediate between value chain segments.

Like their knowledge-building capabilities, the management capabilities of intermediaries are similarly affected by value chain participation. The way intermediaries manage and implement their programs varies with the roles that they need to perform in specific value chain segments. Protocols and processes set may vary depending on which segment requires specific roles. In the case of public sector intermediaries, for them to perform resource provision roles, they will need to abide by the procurement process set by the government. Part of their management capabilities is their ability to abide and maneuver through the requirements set in the procurement law.

Coupled with their knowledge-building capabilities, intermediaries apply their management capabilities too. The intermediaries may implement programs and services that target specific value chain segments. Returning to the case of the public sector intermediaries, with PRIs of note, the researcher finds that several PRIs specialize in specific value chain segments. For example, PHILRICE primarily targets the input supply and production segments, creating various hard and soft technologies. PHILMECH creates farm machinery that supports production and milling. On the other hand, DOST-ITDI focuses on creating technologies for the milled rice/rice product processing segment.

A similar pattern may be gleaned from the private sector intermediaries as well. GRECON emphasizes its management structure in the milling to global market segments but only in so far as rice trading is concerned. MFA focuses on the needs of their members in farm machinery and having a community, thus focusing their management capabilities on shared maintenance of farm machinery and gift-giving. LMFRC as a platform



manages its group bound by the limits of the social media platform and does not meddle or operate beyond the confines of their group's page. From the experiences of the private sector intermediaries, a determining factor for their management capabilities may lie in their purpose or mission more than in the value chain segments they support.

Several other intermediaries also present a different pattern of management capability application. In the case of the following organizations, they focus on whole value chain approaches wherein they do not necessarily specialize in a specific segment but build and implement their management capabilities with the entire rice value chain in mind. For ATI, it provides a whole gamut of training and educational materials that cover the entire or specific parts of the value chain. Chen Yi Agventures, on the other hand, built its entire business model and management by taking control of most of the value chain segments. For the production aspect, where it supports farmers, Chen Yi provides inputs and deploys several field technicians to produce some form of standardization. In addition, they manage their operations by ensuring that their business is built on a similar data-driven and data-centered management approach.

Similarly, AgriCOOPh took a chain-encompassing approach in the training services they provide. Instead of implementing specific production process training, AgriCOOPh employs its management capabilities to create organizational and business development proposals to build cooperatives into better businesses. According to AgriCOOPh representatives, these development programs espouse a more chain-encompassing approach. In the experiences of these three organizations, the rice value chain may not necessarily have a direct effect on how the organizations choose to build their management capabilities. Instead, the intermediaries employ their management

capabilities to fit or incorporate the entire value chain. Their experiences push further the argument that other factors determine how intermediaries build their key-capabilities.

Similarly, the participating intermediaries' external networking and internal communication capabilities do not appear to be as affected by the value chain segment they participate in instead of the mandates and roles the intermediaries have and perform. Nonetheless, suppose one were to visualize how intermediaries employ these two key-capabilities in the rice value chain. In that case, one may find them utilized for the diffusion and provision of technologies and resources, mediation of trades, and connection of actors in different segments. The use and building of external networking and internal communication capabilities seem to go beyond the value chain. The networks created and sustained may cut across or not involve the entire value chain. Again, the purpose or mandate of the organization appears to matter more. Still, several organizations that focus on certain parts of a value chain may create networks related to the segments they participate in, while others may sustain networks that focus on areas outside the value chain. For example, within the sphere of the public sector intermediaries, we find DOST-ITDI present in fewer segments than the rest. DOST-ITDI's network comprises more food product processors or MSMEs looking into food manufacturing. They may or may not partner with rice farmers, but farmers interested in rice-product processing may most definitely be in their network range. Pooling the PRIs together, the researcher finds that their network creation and sustainment focus are on R&D collaborations with other research institutes or universities. Although they are mandated to broker and provide technologies and resources, their goal is to widen their research network, hoping to invent or adopt better technologies for the rice industry. The focus on

networks for R&D is an example of how external networking and internal communication capabilities go beyond the value chain.

Similarly, in the pool of private sector intermediaries, we find GRECON focused on aggregating global market segments. The network created by GRECON houses value chain actors involved in rice trades. There may not be too many actors involved in the input supply or production segments unless these actors also retail rice. Although PAKISAMA and AgriCOOPh have networks and programs that directly connect to specific segments and processes in the value chain, they are also constantly looking for opportunities to provide their members and stakeholders with community-related or organizational development projects are outside of the rice value chain. In the case of Chen Yi Agventures, while it encompasses the entire rice value chain, the network it created mainly was built during its establishment. The network it sustains is its partner farmers and markets. Compared to the other intermediaries, Chen Yi Agventures built its external networking capabilities as it improved its rice value chain. By winning 2019's third-best rice, the company discreetly expanded its network by garnering the interest of several more end markets. Soon, Chen Yi Agventures will employ its external networking capabilities and tap its internal network to market its rice outside of the country.

Given these findings on intermediary key-capabilities and their relationship with the rice value chain, it seems more plausible to argue that value chain segment support and participation do not directly build intermediary key-capabilities. Nonetheless, this does not mean that no relationship exists. Instead, the researcher argues that participation and support in the value chain inform intermediaries on how to employ their key-capabilities. Coming from the discussion, the intermediaries appear to first learn about

each segment's value chain and the intricacies through their knowledge-building capabilities. From that point, intermediaries may build the other three key-capabilities depending on their mission as organizations and the roles required by their stakeholders or partners. Of the other three capabilities, management capabilities are the most flexible. They may be built on the most, varying whether intermediaries decide to concentrate on specific segments or take a whole-value chain approach to their programs and services. Again, their external networking and internal communication capabilities appear to depend on the organization and the roles they perform. However, the researcher finds that these two key-capabilities more often go beyond the confines of the value chain to include other aspects of the intermediaries' work, such as networking for R&D collaboration or communicating development assistance opportunities from partners to their members or constituents. Supporting and adding to Sutthijakra and Intarakumnerd's (2015) claim that key-capabilities are built depending on what roles intermediaries perform, the researcher adds that organizational purpose or mandate also informs key-capabilities, especially in the context of value chain participation and support.

### *5.5.3 Role performance and key-capability building as a domestic-market oriented industry*

Building on the previous sub-sections, the researcher shows how intermediaries in domestic market-oriented or focused industries may prioritize role performance and key-capability building. Table 5.11 summarizes the findings for roles, services, and possible requirements for effective innovation intermediation following Intarakumnerd and Chaoroenporn's (2013a) work. Table 5.12 presents the key-capabilities that may help better intermediary role performance in domestic market-oriented industries.

Table 5.11 The Roles Performed by Innovation Intermediaries in the Philippine Rice Industry, a Domestic Market-Oriented Industry

	Roles	Intermediary Services	Requirements to Work Properly	Requirements for Industry
Public	<ul style="list-style-type: none"> <li>• <b>Broker</b></li> <li>• <b>Consultant</b></li> <li>• Mediator</li> <li>• <b>Resource Provider</b></li> </ul>	<ul style="list-style-type: none"> <li>• Standards and certification monitoring, promotion, and acquisition support</li> <li>• Technology generation (for PRIs)</li> <li>• Facility, inputs, and machinery funding</li> <li>• Industrial and support policies</li> <li>• Technology adoption advice and training</li> <li>• Extension service provision</li> <li>• Network orchestration (for GAs)</li> <li>• Clustering promotion and development</li> <li>• Price mediation</li> </ul>	<ul style="list-style-type: none"> <li>• Consistent public funding</li> <li>• Clear government mandate</li> </ul>	<ul style="list-style-type: none"> <li>• Professionalized organization management and development</li> <li>• Extension services shift towards clustered organization development</li> <li>• Recipients of machinery need to manage these properly</li> <li>• Willingness to invest</li> </ul>
	<ul style="list-style-type: none"> <li>• Broker</li> <li>• <b>Consultant</b></li> <li>• <b>Mediator</b></li> </ul>	<ul style="list-style-type: none"> <li>• Standards and technology promotion and acquisition</li> <li>• Technology diffusion and advice</li> <li>• Extension service provision</li> <li>• Market network linkage</li> <li>• Demand articulation and sourcing</li> <li>• Financial management support</li> <li>• Organizational development support</li> </ul>	<ul style="list-style-type: none"> <li>• Professional organizational management</li> <li>• A consistent source of funding</li> <li>• Adequate human resources</li> </ul>	

*Note.* The researcher based the format of this table on Intarakumnerd and Chaoroenporn's (2013a) delineation of roles performed by public and private sector intermediaries. Italicized and the bolded text indicate suggested focus for intermediaries. The data for this table is drawn from the interviews and an FGD with respective organization representatives and triangulated through other data sources.

Table 5.12 The Key-Capabilities Built for Innovation Intermediaries in the Philippine Rice Industry as a Domestic Market-Oriented Industry

	Public	Private
External Networking	<ul style="list-style-type: none"> <li>• Open avenues for industrial consultation and contact</li> <li>• Adopt and continue using new lines of communication (social media, video streaming platforms, online platforms, R&amp;D online groups)</li> </ul>	<ul style="list-style-type: none"> <li>• Openness for collaboration and membership</li> <li>• Maximize membership in national and global networks</li> <li>• Confidence to introduce themselves</li> <li>• Adopt and continue using new lines of communication (social media, video streaming platforms, online platform)</li> </ul>
Internal Communication	<ul style="list-style-type: none"> <li>• Harmonize policies, plans, and directives with regional/local counterparts, other agencies, and industry</li> <li>• Continue relationship with technology adopters</li> <li>• Build communication skills of staff</li> </ul>	<ul style="list-style-type: none"> <li>• Encourage replication, mentoring, and demonstration between members</li> <li>• Build communication skills of staff</li> <li>• Communicate services and purpose of the organization</li> </ul>
Knowledge-Building	<ul style="list-style-type: none"> <li>• Experts come from various fields</li> <li>• Creation and sharing of technology banks and libraries</li> <li>• Learn and communicate end-market demands</li> <li>• Learn from national and global networks, and share knowledge</li> </ul>	
Management	<ul style="list-style-type: none"> <li>• Clear mandates and a sustainable budget</li> <li>• Human resource development and management are vital</li> <li>• Encourage employment permanency</li> <li>• Passion for service of the country</li> </ul>	<ul style="list-style-type: none"> <li>• Professionalize organizational management</li> <li>• Create a sustainable business model, veer away from being grant-reliant</li> <li>• Scale services to current capabilities/delivery capacity</li> </ul>

Note. The data for this table is drawn from the interviews and an FGD with respective organization representatives and triangulated through other data sources.

Discussing intermediary role performance first, the researcher finds that public and private sector intermediaries better fit specific roles to heighten intermediation in the Philippine rice industry. Like Intarakumnerd and Chaoroenporn's (2013a) original findings, public sector intermediaries are well suited for consultancy and resource provision roles. However, a primary difference the researcher finds is the abundance of brokerage that the public sector intermediaries perform. They broker technologies and processes that allow interchain upgrading, build training facilities for trainers and host online platforms. Quite often, these brokerage functions are tied to the resource provision roles of these intermediaries.

Compared to consultancy, resource provision has been highlighted more significantly. Given a budget and mandated to deliver various resources, public sector intermediaries perform resource provision roles much more than their private sector counterparts. These resources may take the form of technology generation for PRIs, and the provision of facilities, production inputs, and machinery. With a broader range of stakeholders, GAs and PRIs may cater to numerous value chain actors scattered throughout the country. As mentioned several times, intermediaries' brokerage and resource provision roles in the rice industry are often coordinated, especially in the public sector. Many of the items provided or brokered originate from their institutes or other related government agencies.

Nonetheless, public sector intermediaries broker collaborations and development opportunities for private sector actors and other organizations. A caveat, however, of the brokerage-resource provision work that public sector intermediaries may focus on is the difficulty in monitoring the proper use, maintenance, or management of the resources

they provided or technologies they brokered. Due to the sheer scale of targets these GAs and PRIs need to provide for, it is not surprising that they encounter challenges in monitoring the proper utilization of these items. This is one aspect of intermediation that private sector intermediaries may need to support to ensure that resource and technology recipients employ these efficiently and effectively.

For their consultancy role, the public sector intermediaries support the promotion and setting of industry standards, expert advice on various value chain processes, and assistance in business development. These services may be provided through their extension programs or by inquiring with the organizations and their local counterparts. These organizations also provide advice on viable technologies that may aid in the production of various actors.

Although part of the original's findings, mediation may not be as emphasized for the rice industry. Nonetheless, this does not mean that these intermediaries do not need to perform this role. Based on the data, the mediation performance of public sector intermediaries appears to focus on network orchestration for GAs and R&D collaboration for the PRIs. Though there were several reported accounts of mediating between buyers and producers or organizations and financial institutions, these are not as commonly performed.

For private sector intermediaries, the researcher finds that, at least for the Philippine rice industry, these intermediaries seem to be more suited for consultancy and mediation roles. Intarakumnerd and Chaoroenporn (2013a) initially found that the private intermediaries in their study are well suited for brokerage. In the Philippine rice industry, however, there is a lack of a private intermediary that encompasses most of the value



chain actors or holds a massive membership like the Thai Auto-Parts Manufacturing Association in the mentioned study. Although several organizations like PAKISAMA, GRECON, and LMFRC see combined memberships in the tens of thousands and AgriCOOPh in the hundreds of thousands, these organizations may not necessarily only cover the rice industry, as in the cases of PAKISAMA and AgriCOOPh. Nonetheless, this does not mean that these organizations should not perform brokerage functions. On the contrary, they are still encouraged to do so, especially as they broker government support programs and development opportunities for their members or stakeholders.

Brokerage roles may also be performed through mediation. Private sector intermediaries appear to be better suited for mediation as they have a deeper connection to possible markets, as in the cases of AgriCOOPh, GRECON, PAKISAMA, LMFRC, and Chen Yi Agventures. They can mediate possible partnerships between their constituents and others and may also broker transactions between them. Apart from market mediation between members and value chain actors, intermediaries may mediate trades and partnerships between members, as in the experience of GRECON and AgriCOOPh. Moreover, the private sector intermediaries can perform mediation within their memberships and with their other types of partners for development-related programs or funding opportunities. Examples of these come from the experiences of PAKISAMA and AgriCOOPh.

The mediation performed by private sector intermediaries has several differences from their public sector counterparts. Compared to GAs and PRIs, private sector organizations perform more direct market mediations and are more member-focused. In contrast, public sector organizations mediate to the extent that their mandates allow them.

Although they provide some market mediation, the primary mediation is linked to their organization type: network orchestration for GAs and R&D collaborations for PRIs.

Regarding consultancy, this role may be a better fit for the private sector intermediaries in the rice industry as these intermediaries can provide more individually specific technical and expert advice, and not necessarily only for rice production-related issues (e.g., legal advice, organizational development advice). Most private sector intermediaries also promote the knowledge of and adherence to industry standards. Another form of consultancy that private sector intermediaries may provide is not for their stakeholders but for technology generators or the public sector. By being closer to the value chain actors, the private sector intermediaries may be better for demand articulation. Compared to Intarakumnerd and Chaoroenporn's (2013a) study on the Thai automotive sector, because of the rice industry's numerous intermediaries, information and advice may be more freely shared between value chain actors and a variety of intermediaries. Value chain actors are given more leeway in choosing whom they may request advice from, and their options are not necessarily limited to private sector intermediaries. However, as the interviews revealed, many value chain actors trust the advice of like actors (i.e., farmer to farmer). Although the private sector intermediaries may also provide non-value chain actor extension workers, most advice providers come from the same job.

The previous discussion has mentioned several specific services that either public or private intermediaries may provide for the rice industry. Of all these services, one typical service both intermediary types may share are standards, certifications, and technology promotion and acquisition. Although formal standards and certifications

become highly relevant once the industry can fully compete with foreign-produced rice, training producers and having processors adhere to global standards and certifications will hasten the process and allow these actors to develop. Both intermediary types will need to work together in this endeavor. It requires awareness building, incorporation of new habits, and convincing numerous value chain actors that the benefits of standards, certifications, and technology adoption outweigh the costs in the long run. Another similar service both may provide is agricultural extension programs. Although not all types of intermediaries may provide extension workers, those who can deploy workers may help monitor production and advice for specific issues faced by value chain actors.

In terms of specific focus, there are several services that each general type of intermediary may do. First, public intermediaries may focus on technology generation, investing in communal processing facilities (e.g., milling stations or product processing machinery), and providing farm inputs. While private sector intermediaries may focus on diffusing available technologies and building their knowledge on which technologies are most adaptable. When possible, it would help that both provide available technology advice and training. Both types may also have their roles in creating a more sustainable innovation ecosystem for the rice industry. Finally, private sector intermediaries may provide the demands and needs of the industry and take a more direct hand in clustering producers together, as PAKISAMA has done.

Moreover, sharing the demands and needs of the industry may also take the form of lobbying for certain policies or laws. The public sector intermediaries may support these calls for policy changes and provide the necessary data or research to encourage favorable industrial development policies. One such policy that will be vital is the creation

of farm clusters. Although there are initiatives from the government to push for farm clustering, these must also be supported by organizational development programs to ensure that the organizations or clusters created are established to be sustainable. These programs may be specialized training offered by private sector intermediaries like AgriCOOPh.

Following Intarakumnerd and Chaoroenporn (2013a), the researcher also provides several requirements for the intermediaries to operate properly. Like them, this study finds that public sector intermediaries need clear government mandates. This prevents overlapping work between different public institutions. Being specific with target actors will be most helpful. An example of good mandate and work delineation may be seen through the RCEF implementation. Each institution is given tasks according to specialized mandates, like PHILRICE for seeds, ATI for extension work, and PHILMECH for seeds mechanization. Another requirement is consistent funding, not only for public intermediaries but also for private sector organizations. Public sector intermediaries need to maintain a sustainable budget annually, while private sector intermediaries require more work to guarantee sustainable funding sources. As several IAs and the NGO mentioned, they can no longer be granted dependent organizations but must evolve into organizations that can earn enough to sustain operations.

Another important requirement for the private sector is to have enough human resources to run the organization. Coming from the experiences of several organizations, the lack of dedicated staff and working on a purely voluntary basis may hamper the development and deployment of programs. But this is not to say that working voluntarily for intermediaries will not work. In the case of GRECON, they can operate and

communicate effectively, even if they have no dedicated staff. Related too is the need for the private sector to be professionally managed. Comparing the private sector organizations with dedicated management staff and those that do not, the researcher finds that those do more with professionals in their offices. Moreover, these organizations can provide development assistance and opportunities for their constituents.

Nonetheless, there are requirements for the value chain actors in the industry too. For example, the researcher finds that clustering and group creation need to professionalize their operations for the rice industry. Moreover, recipients of resources, especially high-cost farm machinery, will need to learn to properly manage and maintain these items. Finally, the industry needs to raise its willingness to invest in innovation and upgrading, including funding R&D and adopting new technologies and techniques.

Furthermore, the government must balance protecting and allowing its rice industry a healthy dose of foreign competition for the industry to achieve these requirements. Studies show that too much protection likely leads to poorer developments for an industry (Fujita, 1998). In the case of the rice industry, the protection granted towards the controlled and limited importation of rice from 1995 to 2017 may have led to an overly protective environment that was not suitable for innovation in the industry. Although rice-related technologies continue to be generated and provided, these primarily originate from the public sector. We find possible over-dependence on government support by many in the industry. Exacerbating the dependence was the artificially high domestic rice prices created by the allegedly corrupt management of imported rice during that period by the NFA (Clapano et al., 2008; Briones and dela Peña, 2015; Elemia, 2018). The slow or lacking uptake towards modernization may have also added to the difficulty

for the local rice industry to cope with the global food crisis of 2008, where domestic prices soared even higher amid the fears of rice shortage in the country (Manzano and Prado, 2014). Relating these to innovation intermediation, overprotection of the industry may hamper role performance as the private sector may be unable to see the imminent or long-term value of the investment in innovation and upgrading as they experience little to no challengers that perform better than they do. Moreover, the case of the rice industry shows how mismanaged policy implementation may create an environment unfit for innovation, let alone innovation intermediation.

These requirements, especially those for the intermediaries, may be addressed by building their key-capabilities. As a domestic market-oriented industry, the researcher finds several ways intermediaries build their key-capabilities for more effective intermediation. First, public sector intermediaries need to keep their networks available and easily contactable for the industry to approach them. This includes having multiple types of communication lines available and the availability of staff assigned to respond to possible inquiries and partnerships promptly. Moreover, more public sector intermediaries may emulate the adoption and evolving use of newer lines of communication like the participating intermediaries.

ATI, PHILRICE, PHILMECH, and DOST-ITDI have been heavily present on social media and other online platforms to promote and diffuse information about new technologies, training availability, opportunities for consultation, and much more. Although NRP's institutionalization may not be very stable, it may still harness the network that these newer platforms present to orchestrate the industry further. Private sector intermediaries may follow the same method of adopting social media platforms,

video streaming websites, and having a dedicated page for their organization. The researcher finds that those who have done so, like AgriCOOPh, PAKISAMA, LMFRC, and Chen Yi Agventures, show networks beyond the Philippines and have more opportunities for other development-related projects. Another external networking capability that private sector intermediaries may need to build is their confidence in introducing themselves to relevant public and private agencies.

Building their confidence may allow the intermediaries to learn and receive opportunities that others may offer. Given the scale at which the government needs to provide resources, it may be impossible for them to take the responsibility of knowing all groups, especially smaller IAs or farmer organizations. Thus, private sector intermediaries may make their presence known to advance intermediation for their members. In general, widening avenues for communication for both types of intermediaries will have positive effects. Organizations that have been consistent in innovating their communication lines have gained more opportunities for organizational collaboration, funding support, and additional users, members, or customers.

Moreover, building one's external networking capabilities may also create opportunities for inclusion in global networks. Although the rice industry is domestic-market oriented, learning and receiving support from foreign entities may aid in hastening the addressing of industrial issues. The PRIs join research networks and councils worldwide to learn new technologies and studies that may be adaptable to the country. Chen Yi Agventures' experience also explains how adopting foreign technologies helps generate globally competitive rice.

Building communication lines and staff skills will also help develop their internal communication capabilities. More than these, the two types of intermediaries may focus on building certain characteristics to make their internal communication more effective. For example, the public sector must harmonize its policies, plans, and directives with its regional and local counterparts to ensure a smooth understanding and passing of resources between the national offices and local implementers. Moreover, being clear on these will allow for more transparent interactions and relationships with other government agencies and industry actors, especially for the GAs need to develop their internal communication capabilities to orchestrate the rice network better. For the PRIs, it will be helpful to have a continued relationship with their technology adopters. Coming from the experience of the three PRIs, the excellent relationship with adopters led to several more adopters following suit after seeing the positive effects PRI-generated technologies gave them. Documenting and sharing adopter stories through their social media pages or events helps develop these relationships further.

A similar strategy may be done by private sector intermediaries too. In particular, IAs may showcase several of their members' success stories to encourage replication, mentoring, and demonstration between members. While public sector intermediaries focus on technology generation and provision of resources, private sector intermediaries can build their ability to inform and communicate these developments to foster diffusion and adoption in their circles. Moreover, documenting and sharing their experiences with other intermediaries may encourage replication of best practices and technology adoption mechanisms across membership bases. Another integral part of internal communication capabilities that private sector organizations may need to prioritize is clarifying their organization's purpose and the extent of their services to their members and their current



network. Although the mentioned point may be more associated with management capabilities, these must be clarified and communicated well to prevent the reported establishment of unsustainable groups. Likewise, having a clear understanding of their services and relationship with members may help ease the implementation of their projects and build their management capabilities. Building these two key-capabilities will aid in the funding requests from financial organizations, and material or technological support from the government as these institutions look for well-managed organizations. This is especially important now that the DA is expanding its ‘no cluster, no assistance’ policy.

The researcher finds that knowledge-building capabilities are necessary for all intermediaries in the rice industry, regardless of type. Although different organizations may focus on specific types of knowledge – technical, managerial, research, or others – the intermediaries in the rice industry show several similarities that all types of organizations may choose to practice. First, the intermediaries in this study highlight the significance of having a pool of experts or professionals specializing in various fields. Having persons from different academic and technical fields may widen the range of services that target different aspects and depths of the value chain, and several intermediaries that have community organizers, lawyers, social workers, and others also provide projects or programs that target human and community development outside of the value chain.

Second, intermediaries in the rice industry may collate their knowledge into a technology bank or library that they may share with their constituents. By having these readily available, intermediaries may be able to perform roles indirectly or remotely.

Taking ATI and the PRIs as examples, the researcher finds the different technologies available, training modules one may take, or solutions to frequently faced problems. Knowing what to house in such a bank or library requires intermediaries to learn about the needs of different value chain actors, most notably farmers. Both types of intermediaries report that being part of and dialoguing with industry is a significant source of their knowledge. For most private intermediaries, especially IAs, many add that being built as a collective of value chain actors (e.g., farmers, retailers) provides a tremendous advantage in collective knowledge stemming from their life experiences.

Third, leveraging their national and global networks, intermediaries in the rice industry may learn about the latest developments and best practices from others and attempt to apply such in the local context of their intermediary partners. Chen Yi Agventures and AgriCOOPh are good examples of these. While planning for their facility, the owners of Chen Yi Agventures tapped their global networks to learn of the best equipment and practices that rice farmers and millers from other countries employ. Through this effort, the company built its facility and managed its operations successfully. Similarly, AgriCOOPh maximizes its international network of agriculture, fishery, and forestry organizations to access training and mentoring opportunities and experiences for its member cooperatives. AgriCOOPh also mediates opportunities for project funding and disaster relief financing through this network. Although the examples provided appear to exercise the two networking capabilities, knowledge-building remains a vital resource in their experiences. These organizations need to learn about the possibilities for their stakeholders.

Finally, end-market demand communication is a piece of knowledge that the researcher finds not applied or shared enough. While interviewing various upstream and downstream value chain actors, the researcher noticed how the market pricing mechanism is not as well understood across actors in the value chain. Rice farmers believe that they are getting too little per sack, and millers believe that higher paddy costs will only deplete their already small margins. There may be a need for intermediaries to include sharing the pricing mechanism of each actor. Moreover, intermediaries may build and share their knowledge on how customer demand for rice is shaped. The researcher learned that customers do not always purchase rice with the lowest cost. The argument on imported rice being the cheapest option is not necessarily true. According to retailers interviewed, although cheaper than most premium varieties, imported rice lies in the middle of an average retailer's available stock in terms of price. Taste, smell, texture, and other factors play a role in the decision-making of rice consumers. By sharing demand mechanisms with their partners like rice farmers, value chain actors may be more convinced to innovate or upgrade to meet these demands. By understanding how the cost and profit structure work, intermediaries and their partners in the rice industry may find solutions to earning more.

Several points mark differences between public and private sector organizations' management capabilities for intermediaries in the rice industry. The first is the public sector's clearer mandates and annual budgets. Compared to their private sector counterparts, GAs and PRIs have mandates based on laws or policies that create their offices and institutions. For example, the implementation of the RCEF is managed by different institutions, each specializing in one aspect of developing the rice industry. Clear in the RCEF is delineating roles and responsibilities between each organization. Although

minor alterations in terms of services may be made, noticeable changes and overlaps between organizations need significant changes in laws and leadership.

On the other hand, private sector intermediaries may be more flexible. These organizations may have set projects and programs but are also open to other possibilities. For example, PAKISAMA and AgriCOOPh may entertain other NGOs by offering additional assistance to their member organizations. LMFRC, although supposedly focused on farm machinery, allows inquiring about production practices, sharing possible training information, or discussions on current industry issues.

Regarding budgets, public sector intermediaries manage their annual budgets and need to justify these annually. The process is quite tedious and takes over a year to accomplish. Because of such a process, public sector organizations need to build their foresight on the needs of their constituents. Although challenging, the intermediaries are assured of budgets that they may use to perform their roles. Conversely, private sector intermediaries rely on membership fees, grants, or business models that keep their operations afloat. The experiences of PAKISAMA and AgriCOOPh show that organizations are trying to move towards a more sustainable business model, veering away from being grant-reliant. The challenge for the private sector intermediaries is the ability to manage their limited funds. By creating sustainable business models like that of Chen Yi Agventures', private sector intermediaries may be able to perform more too. However, having very limited to no funding is also difficult to climb. In the experience of LMFRC, a desire to help and be of service emanates from the group creator. However, a question remains on how long that may last, especially since they receive no compensation for the time-consuming work of managing the group.

The succeeding management capability aspect the researcher finds essential to discuss is human resource development capability. From the rice industry representatives interviewed, those from the public sector heavily emphasized the significance of their human resource development and management programs. These programs track their staff's professional and personal growth to ensure that they bring out their potential. These programs signal personal growth opportunities, even in public service. However, limitations in current laws create potential losses of skilled workers. Several representatives mentioned the limited number of permanent positions available that lead to qualified workers taking contractual or consultancy work that, although pays well, does not guarantee job security. In addition, some intermediaries have lost out on promising staff due to better offers by private sector firms. Thus, the government may need to encourage the creation of more permanent staff posts, especially in innovation intermediaries that need human resources.

An aspect of managing human resources mentioned profusely, especially by the PRIs, is the passion for serving the country. According to the representatives, one critical reason staff remain in their organizations is their passion for serving the Filipino people. By understanding this, the public sector intermediaries offer their staff opportunities to see the results of their work. As representatives from three PRIs explained, government scientists can claim the rights for their new inventions just as easily. However, they do not do this because of their desire to serve and the care provided by their organization. Adding to Intarakumnerd and Chaoroenporn (2013) and Go (2019), building management capabilities for public sector intermediaries in the rice industry considers human resource development apart from how an organization implements, monitors, and evaluates its programs and projects.

For the private sector, human resource development is also vital to the success of its operations. However, the intermediaries interviewed emphasized an organization's operations as critical for management capabilities. Included in Tables 5.11 and 5.12 is the mention of the professionalization of intermediaries as critical to performing intermediation better. As stated several times, professionalization may involve having a dedicated manager oversee an organization's operations and having a dedicated finance officer supervise funds. When comparing private sector intermediaries, those with dedicated directors, managers, program officers, and others appear to offer more services and have established networks outside the country. Although those without offices their organizations successfully, those with dedicated staff can expand much quicker. Regardless, a critical management capability for success is learning how to scale services given their current delivery capability, balanced with the other three key-capabilities.

## **Section 5.6 Chapter Conclusions**

The Philippine rice industry has been mired by several perennial issues that the country is on its way to addressing. Among its issues are the need to develop production capabilities, lower production costs, boost uptake of modern farming technologies and practices, and manage clusters for scale economies. These especially need addressing in the upstream portion of the Philippine rice value chain. Exacerbating these matters is the recent imposition of the RTL that removes the quantitative restrictions on cheaper produced, imported rice. To tackle these issues, the country may emphasize the role performance of intermediary organizations that provide intermediary services. This chapter discussed several intermediaries present in the Philippine rice industry and showed how these organizations performed intermediary roles and built the necessary

key-capabilities. In addition, the researcher assessed the variations of role performance and key-capability building of rice industry intermediaries by organization type, value chain segment support, and as a predominantly domestic market-oriented industry.

Regarding the role performance of intermediaries in the rice industry, Table 5.13 summarizes the findings compared with the general assessments of Intarakumnerd and Chaoroenporn (2013a). In terms of consistencies, the researcher finds many similar services and actions done by the intermediaries that coincide with previous studies. However, several significant differences are also observed. Chief among these is the heightened brokerage roles performed by public sector intermediaries. In performing brokerage, the researcher also finds that it often overlaps with other roles. Specifically, their brokerage regularly goes in tandem with resource provision performance. Although Partners (2007) and previous studies that cite their work (Intarakumnerd and Chaoroenporn, 2013a; Sutthijakra and Intarakumnerd, 2015, Go, 2019) find the possibility of dual role performance, this study adds evidence to the tight interrelatedness of certain intermediary services, possibly showing that intermediary roles are becoming more intertwined than before. In the case of the public sector intermediaries, the intertwining roles may be due to how the law and policies mandate the role performance of these organizations.

Table 5.13 Summary Comparison of Philippine Rice Industry Intermediaries' Role Performance

Intarakumnerd and Chaoroenporn's (2013a)			
	Original findings:	Consistencies in services and actions:	Variations in this study:
Public	<ul style="list-style-type: none"> <li>• Consultants</li> <li>• Mediators</li> <li>• Resource Providers</li> </ul>	<ul style="list-style-type: none"> <li>• Network orchestration (M)</li> <li>• Standards and certification setting, promotion, and training (B/C)</li> <li>• Provision of training and farm inputs (RP)</li> <li>• Value chain and market linkage (M)</li> </ul>	<ul style="list-style-type: none"> <li>• Significant brokerage role</li> <li>• Brokerage often overlaps with resource provision</li> <li>• PRIs doing resource provision</li> </ul>
Private	<ul style="list-style-type: none"> <li>• Brokers</li> <li>• Mediators</li> </ul>	<ul style="list-style-type: none"> <li>• Network catalyzation and linkage (B/M)</li> <li>• Knowledge sharing (B/C/M)</li> <li>• Brokering and introduction of technologies (hard and soft) (B)</li> </ul>	<ul style="list-style-type: none"> <li>• Significant consultancy</li> <li>• Firm doing a lot of intermediary roles</li> <li>• Competition for R&amp;D not present</li> <li>• SMG consultancy may be questionable</li> <li>• Strong political participation and push</li> </ul>

Note. The contents of this table are summarized based on the findings presented in this chapter. B stands for brokerage, C for consultancy, M for mediation, and RP for resource provision.

Another departure from Intarakumnerd and Chaoroenporn's (2013a) study is the significant consultancy roles private sector intermediaries perform in the rice industry. Although rice industry actors still approach the public institutions for advice, many interviewees report that most industry actors, especially farmers, have a higher trust when consulting with actors with similar experiences. Even government representatives have noticed such a trend. As a result, they have been transitioning towards gaining the support of industry champions and farmer leaders to serve as voices for innovation on the ground. However, a caveat for consultancy has been observed in the SMG of the private sector



intermediaries. The consultancy method has its pros and cons due to its open nature. On the one hand, members are given the opportunity for discussion and many options. But, conversely, it may be quite difficult for members to ascertain which advice to follow.

One variation from the previous study is the lack of competition for R&D, which Intarakumnerd and Chaoroenporn (2013a) claim to be a requirement for private sector intermediaries. The lack of finding this in this study may be more due to the absence of private R&D institutes in this specific study. Nonetheless, competition in R&D does exist, especially in seed production. Many multinational input supply companies compete with PRIs in the hybrid rice seed market. In this study, the one with the closest experience with R&D competition was Chen Yi Agventures. The representative recalled how they previously conducted R&D for seeds but eventually moved towards partnering with PHILRICE for these inputs.

A further interesting finding the rice industry case makes is the strong political participation and push of several intermediaries. Currently, these organizations' lobbying or policy role performance is placed under the mediation role because of the representative nature of lobbying. However, one may argue that these actions serve a separate role, especially since lobbying targets the innovation or institutional ecosystem of the industry and value chain rather than direct interaction with intermediary partners or stakeholders.

Looking at the rice value chain, the researcher observes that intermediaries provide broader role performances in the input supply, milling, and milled rice/rice processing segments. These segments' value chain actors require more knowledge, technologies, and resources that intermediaries may provide through various roles.

Although the segments mentioned above see many intermediaries, other segments are still important and may require some intermediation. For example, very few participating intermediaries participate in the aggregation segment. With this segment bridging the upstream and downstream portions of the rice value chain, mediation and brokerage may be necessary for this segment that more intermediaries may focus on moving forward.

Another important finding from the value chain is the absence of several vital intermediary services not evident from observing the value chain. Since value chain analysis focuses on the production processes, one may overlook the roles that may indirectly affect these. Some of these services may be mediation in community organizing, facets of business consultancy, or R&D. Specifically for the rice industry, a simple value chain analysis may not show that farm clusters and farmer organizations may need to develop their organizational and management capabilities, which intermediaries may provide through brokerage, consultancy, or resource provision (e.g., secondment of managerial staff, creation of management programs, or training).

The organizations have also reinforced, changed, or added new roles and services throughout their lifetimes. Based on the discussions above, we also found four factors that may affect the role performance of intermediaries in the rice industry. These four are policy changes, the mandate or missions of each organization, the needs of their partners, and crisis events. The first and last are external to the intermediary, while the second and third are internal factors. These factors affect the organization type and support an intermediary provides in the value chain. For example, PRIs in the rice industry has turned into resource providers because of policy changes. Another instance is the greater reliance and distribution of imported rice by GRECON members to retailers and consumers

following the opening of rice importation, and related to that, GRECON also lost its role as a broker of NFA or government-stocked rice as the NFA can no longer distribute rice during times of non-crisis. Finally, an instance of role shifts caused by a large crisis is the COVID-19 pandemic, which saw additional and widening product matchmaking services provided by AgriCOOPh and PAKISAMA to cover non-members and newer members' markets.

As a summary of intermediary key-capabilities, the researcher provides Table 5.14 to compare the key-capabilities that public and private sector intermediaries may focus on in the rice industry. Coming from the organization type discussion, this study finds that each organization focuses on different key-capabilities. Different organizations communicate within their network, and several have built unique lines throughout their history. In addition, each manages its operations and implementation differently. Nonetheless, intermediaries may similarly build capabilities too. For example, looking at knowledge-building, the intermediaries highlighted the knowledge of staff and members as the foundation of this capability. One critical takeaway is that this study reinforces the idea that key-capability building is based on an intermediary's role performance, as Sutthijakra and Intarakumnerd (2015) posited. But, in addition, the researcher finds key-capability building hinges on an organization's purpose or mission, too, especially in a value chain context.

Table 5.14 Summary Comparison of Philippine Rice Industry Intermediaries' Key-Capabilities

	Public	Private
External Networking	<ul style="list-style-type: none"> <li>• Fostering relationships and keeping a good reputation to expand and sustain network</li> <li>• Mandates and 'known for' or assigned tag provides credibility</li> <li>• Growing social media presence</li> </ul>	<ul style="list-style-type: none"> <li>• Importance of larger network to establish network, political voice, and achieving scale</li> <li>• To grow membership and gain more provisions for members</li> <li>• Growing social media presence</li> </ul>
Internal Communication	<ul style="list-style-type: none"> <li>• GA: harmonization of policies and monitoring of progress</li> <li>• PRI: fostering relationships with adopters, scientists, and collaborators</li> </ul>	<ul style="list-style-type: none"> <li>• IA and NGO: consistency in communication; innovating communication lines</li> <li>• Firm: monitored flow of communication</li> <li>• SMG: challenge in controlling communication; very free</li> </ul>
Knowledge-Building	<ul style="list-style-type: none"> <li>• Built on the specialization or particularization of staff and members</li> <li>• Process of knowledge generation or adaption, storage, sharing, and application</li> </ul>	<ul style="list-style-type: none"> <li>• Built on the specialization or particularization of staff and members</li> <li>• Process of knowledge generation or adaption, storage, sharing, and application</li> </ul>
Management	<ul style="list-style-type: none"> <li>• Restrictions on HR side are limiting and will lead to higher training costs</li> <li>• Changes in leadership may change policies</li> </ul>	<ul style="list-style-type: none"> <li>• Management staff vs. member-led activities</li> <li>• Importance of securing investment/capital and funding</li> </ul>
Underlying / Motivational	<ul style="list-style-type: none"> <li>• Passion for service</li> <li>• Service-oriented perspective with work</li> <li>• Supportive leadership</li> </ul>	<ul style="list-style-type: none"> <li>• Perspective towards intermediation role is critical</li> <li>• Needs sustainability strategies</li> </ul>

Note. The contents of this table summarize the findings from this chapter. HR stands for human resources.

Moreover, the researcher finds that one organization's key-capability building strategies or focus may not necessarily be inapplicable for others to attempt. For example, looking at external networking, public sector intermediaries appear to focus on building

a good reputation to foster relationships and expand their network. Moreover, they may leverage their institution's assigned tag or 'known for' status as a base for reputation. However, for private sector intermediaries, the researcher emphasizes the need to focus on the larger networks they are members of to establish their voice and purpose in the industry. Doing so provides them with the reputation and the possibility of an additional membership. However, either organization type may employ the other's external networking strategy. For example, one common strategy proposed is to maximize social media platforms for external networking and internal communication.

Nevertheless, key-capability building differences between the intermediaries exist, and one of the more significant differences is that of public sector intermediaries emphasizing human resource development. In contrast, private sector intermediaries highlighted the significance of a well-operated organization. Although previous research on intermediary key-capabilities (Sutthijakra and Intarakumnerd, 2015; Go, 2019) consider human resource development across the four key-capabilities, the interviews with the participating intermediaries seem to regard human resource development as an important capability, separate from the other key-capabilities. For example, the knowledge, professional licenses, and fields of staff expertise act as a foundation for knowledge-building. However, knowing, harnessing, and developing the potential of personnel may be mixed with management capabilities. Therefore, there may be merit in separating operational management or implementation from human resource development.

Although key-capabilities are primarily built as informed by their role performance (Sutthijakra and Intarakumnerd, 2015), we also find several other factors

that may affect their capability-building process based on the experiences discussed throughout this chapter. First among these are policy changes that inform intermediaries of boundaries or new frontiers available for their partners. For example, the institution of the RCEF affected the management capabilities of ATI, PHILRICE, and PHILMECH by needing the institutes to create an office in charge of RCEF implementation alone. This entailed the need to shuffle their human resources to find the most appropriate candidates to lead and implement the large-scale government program. The second factor that may affect key-capability building is leadership and changes in management. As mentioned by several intermediaries, leadership and management styles may affect the motivation and current work of intermediaries, especially when these persons change. New leaders can also widen networks as they bring new contacts with them as they begin. Another factor mentioned by several private sector intermediaries is funding or financing. By having sustainable sources of funds, intermediaries were found to invest more in developing their key-capabilities, like with the experiences of PAKISAMA, AgriCOOPh, Chen Yi Agventures, and the public sector intermediaries. Finally, another factor that greatly affected the external networking and internal communication capabilities of the rice industry intermediaries is the COVID-19 pandemic. With most used to face-to-face contact, the shift towards online means to transact, train, and provide intermediation was a struggle initially as not many of the intermediary partners had the capability of having a constant online presence. With the restrictions placed, intermediaries learned how to use new methods of communication and taught their partners to use these too. New service delivery modes were conceived or used more like the e-extension portal of ATI and the growth of membership in LMFRC. Still, the pandemic had its adverse effects on the capability-building process of intermediaries. In the case of MFA, the association

changed meeting schedules from once a month to once every three months. For many, operational management slowed considerably due to the need to work from home.

In conclusion, the researcher finds that intermediary organizations in the Philippine rice industry have a vital role in pushing for innovation and upgrading in the face of many industry issues. A mix of public and private sector intermediaries have specific and common intermediary roles to perform to boost innovation. The insights coming from this chapter may be applied by other intermediaries present in the rice industry. One considerable policy implication for the rice industry that may be immediately applied would be the inclusion of more explicit descriptions of intermediary services in the RCEF. An expansion may also come in the form of incorporating private sector intermediaries in the RCEF implementation. By explaining how these organizations, like those in this chapter, may aid in the intermediation of hard and soft technologies available through the RCEF, a more unified intermediary ecosystem may arise for the Philippine rice industry.

## **CHAPTER VI**

### **THE CASE OF INNOVATION INTERMEDIARIES IN THE PHILIPPINE**

#### **MANGO AFB GVC AND INDUSTRY**

##### **Section 6.1 Introduction**

Chapter VI reports the case-study on innovation intermediaries in the Philippine mango AFB industry and its relationship with the GVC. This chapter is divided into six sections. Section 6.2 presents the background and contextual conditions surrounding the Philippine mango industry. Next, the section describes the current state of mango production in the country, its dwindling position in the global trade of mangoes, and the issues that the industry needs to address. Following this is Section 6.3, which presents the Philippine Mango Industry Roadmap 2017-2022. Succeeding is Section 6.4 that presents a mapped GVC-IS figure of the Philippine mango industry. The section proceeds to discuss the significant institutions, laws, practices, value chain segments, processes, technologies, value chain actors, the financial position of key players in the fresh mango trade, and the governance structure of the Philippines' mango value chain. The role performance and key-capability building of intermediaries participating in this study are presented and discussed in Section 6.5. Closing this chapter is Section 6.6, which summarizes and conclusions drawn from this case study on innovation intermediaries in the Philippine mango industry GVC-IS.



## **Section 6.2 The Philippine mango industry context**

The mango is considered the third most important fruit in the Philippines, following bananas and pineapples, and it is also known as the country's national fruit beloved by Filipinos (DA-HVCDP, 2018). Three well-established mango varieties available in the country are the Carabao, Pico, and Indian mangoes, with the Carabao variety as the most abundant and solely exported fresh (DA-HVCDP, 2018). The world market even considers the Philippine Carabao mango of exceptionally high quality and is treasured as one of the finest and sweetest available (Fernandez-Stark, Couto, and Gereffi, 2017).

Given its significance in the country, it is surprising that the mango industry's contribution to agricultural GDP has dropped since 2000 and recently hovers around 2%, as Figure 6.1 reveals. However, this decline is unexpected since the gross value added of mangoes has been growing in recent years, albeit somewhat erratically, as Figure 6.2 shows. A similar trend can be seen in its export value in Figure 6.3, which shows export values continuing to rise, although the increase is very erratic.

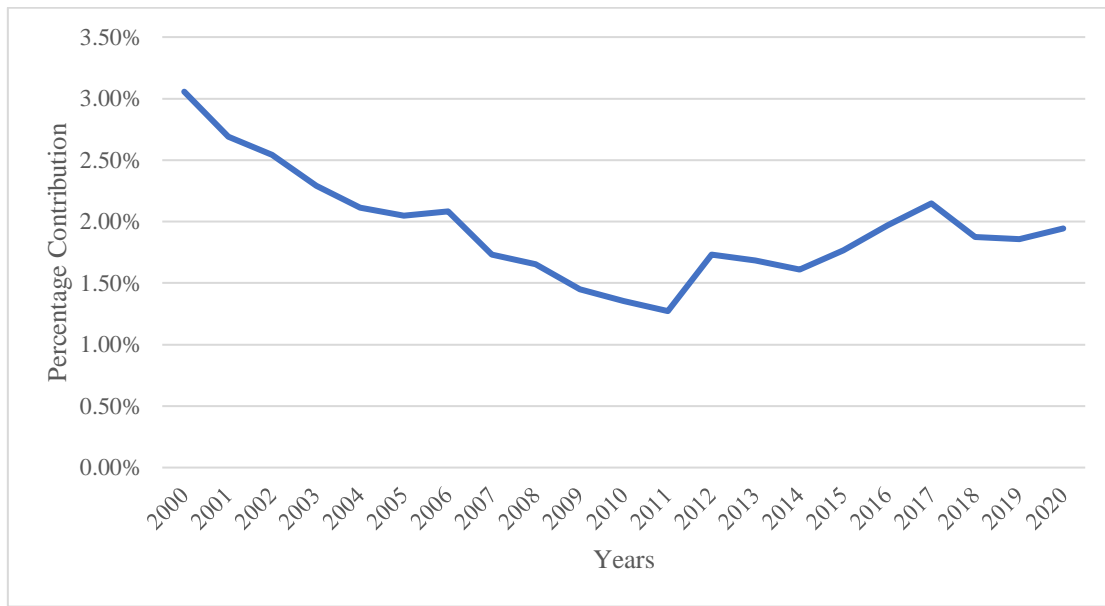


Figure 6.1. Mango contribution to Philippine agricultural GVA, 2000 to 2020.

Note. Percentages derived from data using US\$ 2010, constant price. 2010 = 100. Data source: PSA.

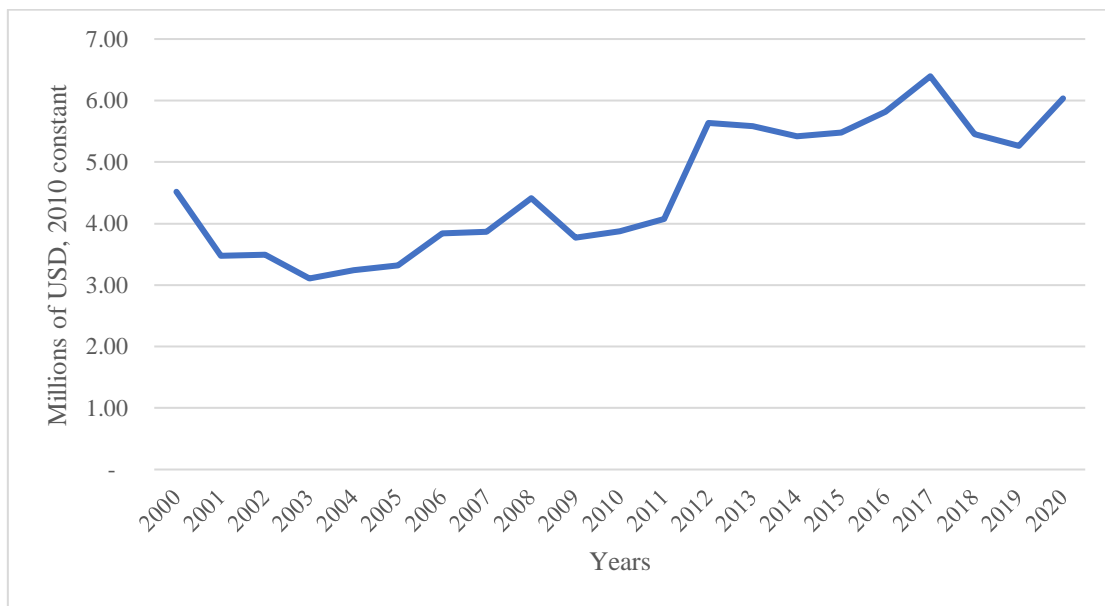


Figure 6.2. Gross value added of the Philippine mango industry, 2000 to 2020.

Note. US\$ 2010 constant, 2010 = 100. Data source: PSA.

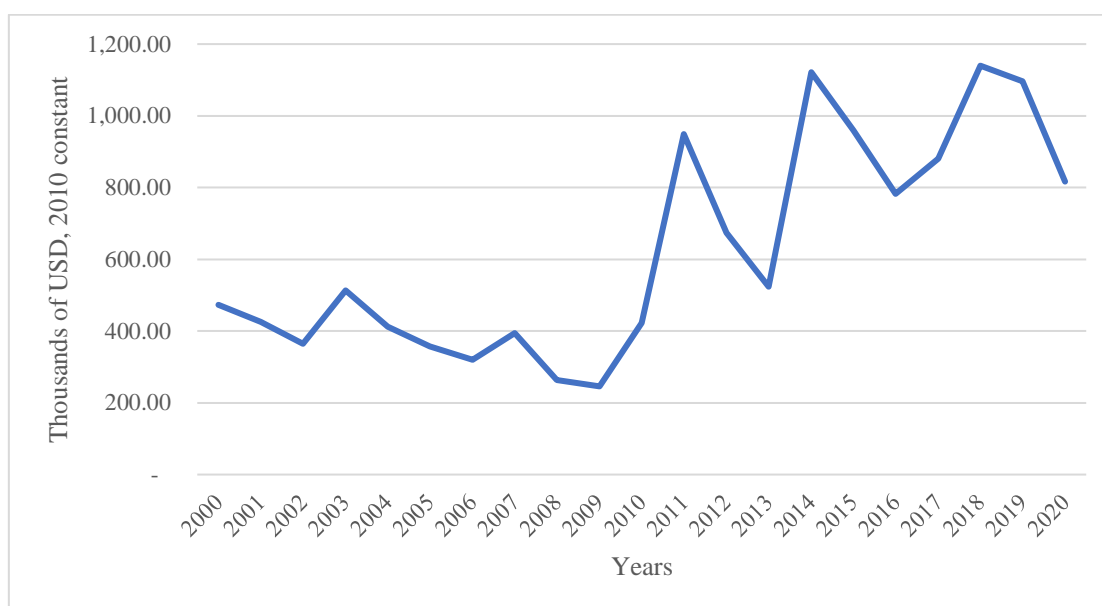


Figure 6.3. Export value of Philippine mangoes, 2000 to 2020.

Note. US\$ 2010 constant, 2010 = 100. Conversions from the original data in PHP to the US\$ 2010 constant were made by the researcher. Data source: PSA.

Despite the seeming appreciation of its value, the increase does not appear to reflect the Philippines' standing in mango world trade. Figure 6.4 shows the top ten mango exporting countries in the world. As of 2019, the Philippines is no longer a part of the top ten mango exporting countries by value and is now 11<sup>th</sup> globally. By contrast, in 2000, the Philippines was second in the world. Since then, the Philippines has lost its place to other countries yearly. A similar story is seen in the quantity exported, as presented in Figure 6.5. The Philippines also ranks 11<sup>th</sup> and has, through the years, slowly lost export quantity. Although, in 2019, the country seemed to have caught up to its earlier state. The catch-up may be due to the 2,000-ton oversupply of mangoes caused by the El Niño dry spell (BBC News, 2019).

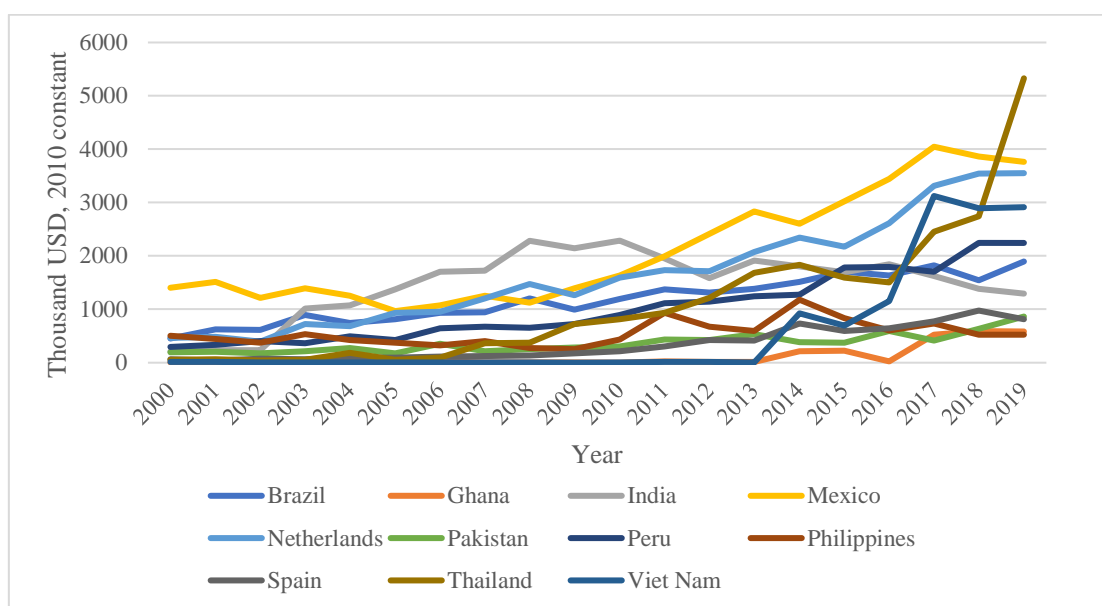


Figure 6.4. Top ten mango exporting countries and the Philippines by export value, 2000 to 2019.

Note. USD 2010 constant, 2010 = 100. The FAO considers mangoes, mangosteens, and guavas under one category. The list is generated based on the 2019 top ten countries by export value plus the Philippines. Several of these countries are re-exporters. Data source: FAO.

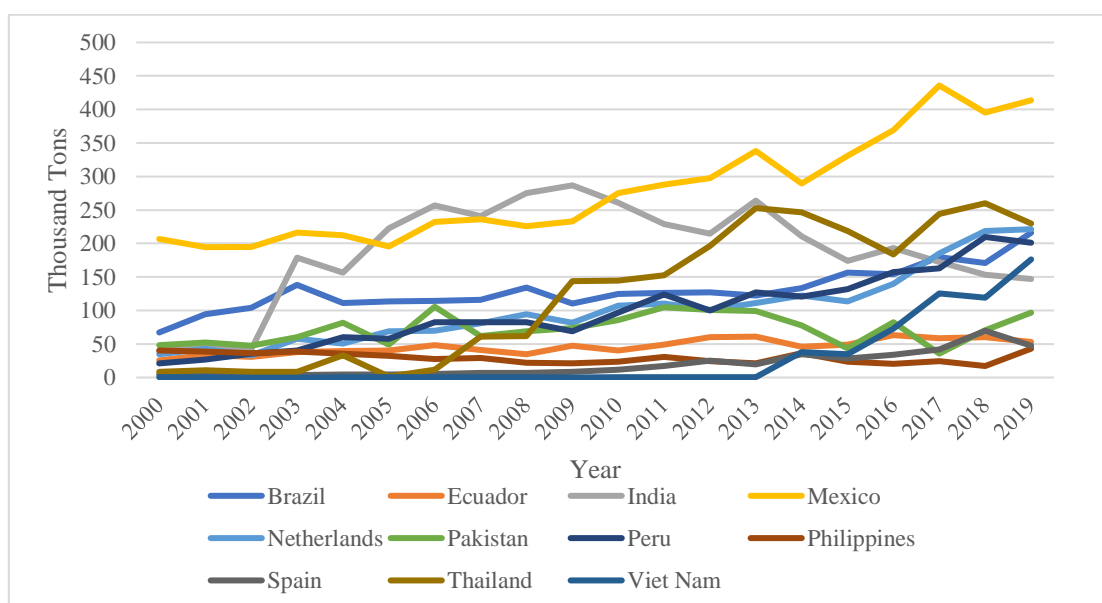


Figure 6.5. Top ten mango exporting countries and the Philippines by quantity exported, 2000 to 2019.

Note. The FAO considers mangoes, mangosteens, and guavas under one category. The list is generated based on the 2019 top ten countries by export quantity plus the Philippines. Several of these countries are re-exporters. Data source: FAO

A possible explanation of why the Philippines is falling in the global mango trade may be its lower yield than the top producing countries globally. Currently, the Philippines is 15<sup>th</sup> in the world in mango production. However, the Philippines still has a long way to go to improve its production capabilities compared to the top ten producing countries. As seen in Table 6.1, the Philippines can yield 3.87 tons per hectare, a far cry from how much other countries can produce. Even though the Philippines has a greater harvest area than Bangladesh, Brazil, China, Egypt, and Malawi, its yield capability is a third or even smaller than the countries mentioned.

Table 6.1 Top Mango Producing Countries in the World and the Philippines, 2019

	<b>Mango Produced</b>	<b>Area Harvested</b>	<b>Yield</b>
Bangladesh	1,456.33	134.35	10.84
Brazil	1,998.56	89.46	22.34
China, mainland	2,415.00	180.00	13.42
Egypt	1,473.54	135.52	10.87
India	25,631.00	2,572.00	9.97
Indonesia	3,294.82	250.61	13.15
Malawi	2,083.47	69.49	29.98
Mexico	2,396.68	215.98	11.10
Pakistan	2,270.23	214.80	10.57
Philippines	753.99	194.92	3.87
Thailand	1,628.19	209.04	7.79

Note. Units: Thousand tons, thousand hectares, and tons per hectare. Data source: FAO

As presented in Figure 6.6, the lower yield is reflected in the decreasing, albeit fluctuating, annual quantity produced in the Philippines despite the steady growth in mango trees over time. Some possible reasons behind the lower yield could be environment-related factors (Briones, 2013), tree ages and grower capabilities (Sarmiento et al., 2012), improper application of flower-inducing spray (Pablico, 2001), limited or inappropriate adoption of production and post-harvest techniques and technologies (e.g., tree rehabilitation, hot water treatment, fruit bagging, cold chain management) (DA

Philippine Rural Development Program [DA-PRDP], 2017; Fernandez-Stark, Couto, and Gereffi, 2017), or pest infestation (DA-HVCDP, 2018). Box 6.1 discusses the major mango pests and diseases in the Philippines.

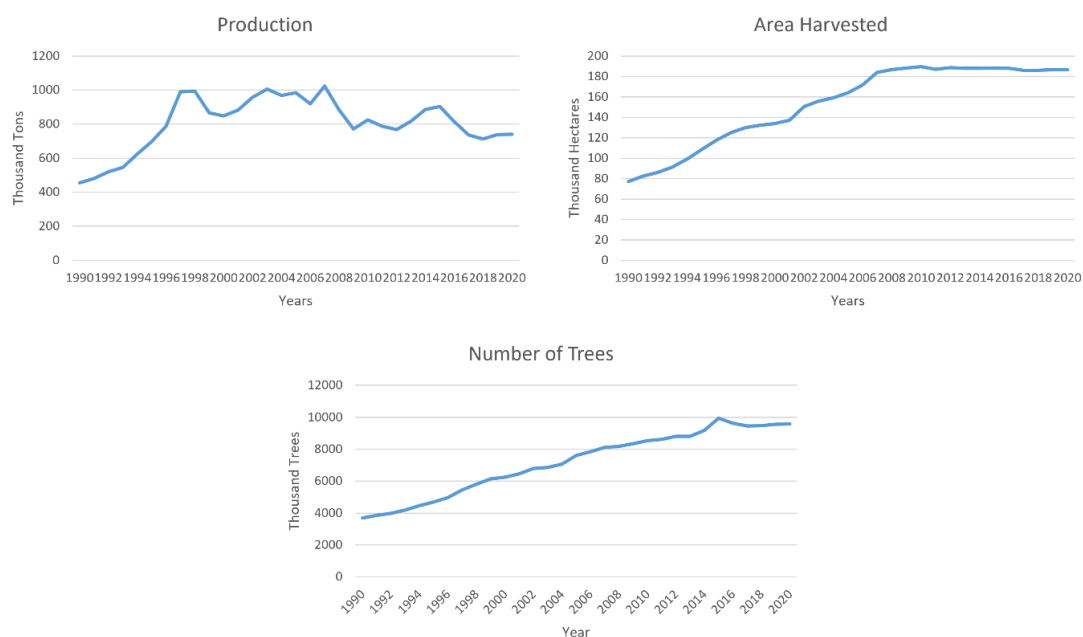


Figure 6.6. Mango production, area harvested, and the number of trees in the Philippines, 1990 to 2020.

Note. Data source: PSA.

**Box 6.1: The major mango pests and diseases in the Philippines**

The two parts of a mango plant susceptible to pests and diseases are its flowers and fruits. For flowers, the most common pests and diseases are the mango leafhopper, mango tip/twig borer, mealy bugs, scale insects, mango thrips, anthracnose, and sooty mold. For the fruits, the common pests and diseases are the fruit fly, mango seedborer, pulp weevil, mango thrips, mealy bugs, scale insect, capsid bug, cecid fly, ants, anthracnose, scab, sooty mold, and diplodia stem-end rot. Of these, the three growers and the DA consider the most problematic are the cecid fly, pulp weevil that is only found in the Southern Palawan island, and the anthracnose disease. All three are also especially singled out in the Mango Industry Roadmap 2017 to 2022 and the report mentions that these require more R&D for their management and control.

Note. The contents of this table were adapted from DTI-Bureau of Product Standards (DTI-BPS) (2009) and DA-HVCDP (2018)

Mango exports may be dropping because of the substandard compliance with quality assurance and SPS standards (Fernandez-Stark, Couto, and Gereffi, 2017). Furthermore, there is a lack of Good Agricultural Practices (GAP) adoption in many mango farms (DA-PRDP, 2017). Although the idea of GAP certification has been a priority since 2005 (DA) and the Code for Good Agricultural Practices for Mango<sup>14</sup> issued in 2009 (DTI – BPS), growers have barely adopted it, with some citing the high cost of maintaining the GAP certification (DA-PRDP, 2017). Moreover, for the GlobalGAP, as of January 2021, no individuals nor groups have a GlobalGAP certification – a much-required standard for large export markets (Fernandez-Stark, Couto, and Gereffi, 2017).

Another circumstance exporters face in the Philippines is the high domestic demand for mangoes. Figure 6.7 shows the supply utilization of mangoes in the country<sup>15</sup>. As seen in Figure 6.7, domestic utilization of locally produced mangoes covers more than 90% of the total annual supply. Looking at exports closer, Figure 6.8 reveals that exports have decreased sharply until around 2008 and continue to exhibit a general decline in more recent years. Exports accounted for about 2.66% of the total mango supply from 2000 to 2020.

---

<sup>14</sup> The researcher could not find a list of certified Philippine GAP (PhilGAP) mango farms.

<sup>15</sup> Please refer to Appendix 11 for PSA's mango supply utilization accounts.

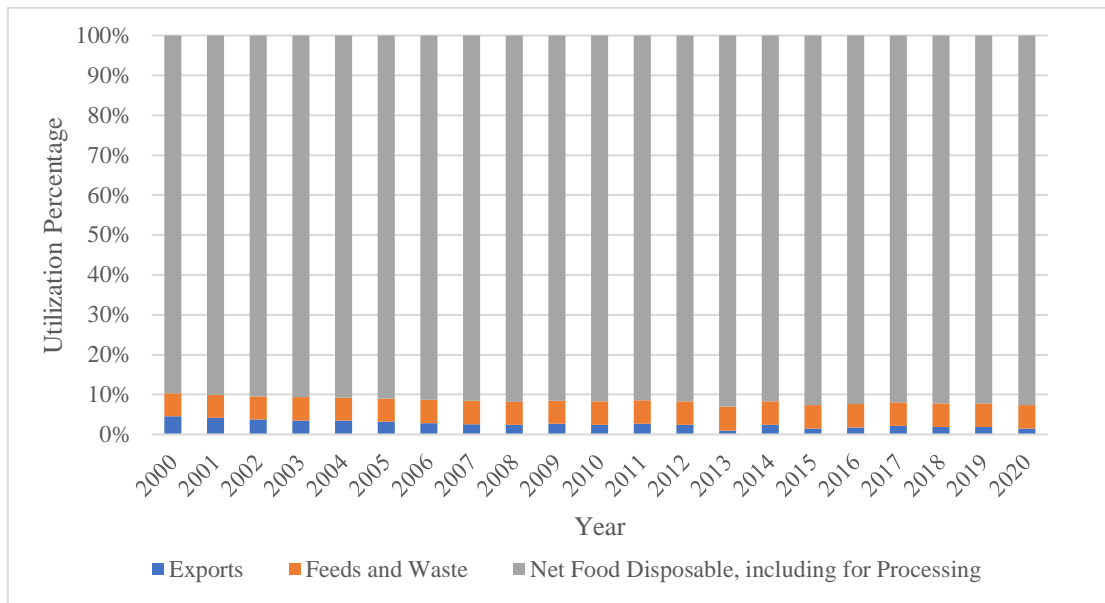


Figure 6.7. Philippine mango supply utilization, 2000 to 2020.

Note. Utilization for processing is included in net food disposable. Data source: PSA.

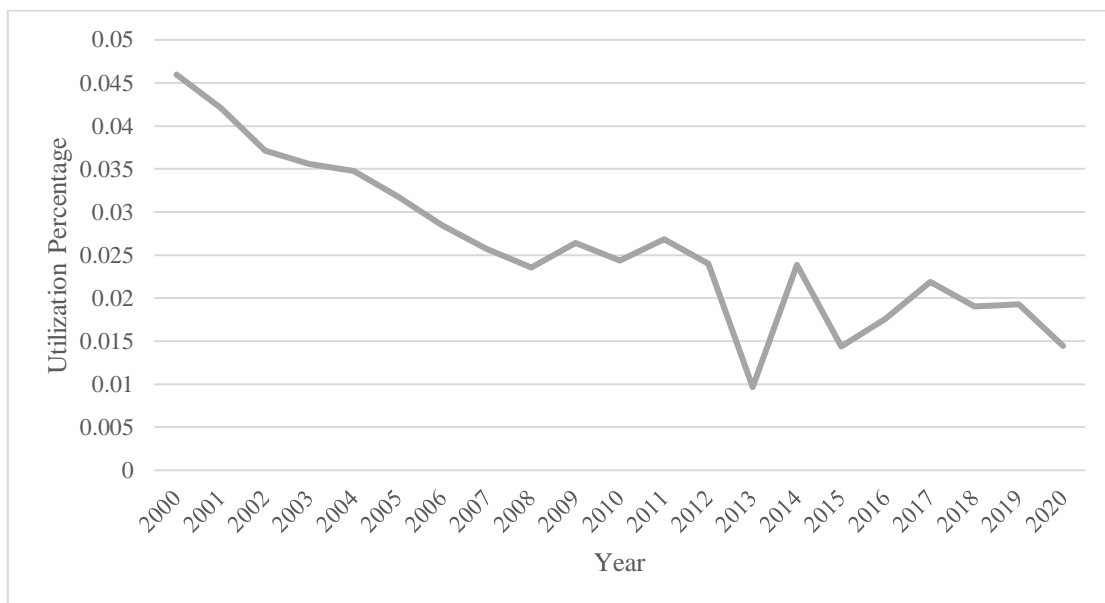


Figure 6.8. Utilization percentage of mangoes for export, 2000 to 2020.

Note. Data source: PSA.

Unfortunately, the PSA data does not disaggregate export of and specifically for processed mango in their supply utilization accounts. Instead, it considers the demand by mango processors as part of local demand or utilization. This may be due to mango



processors typically procuring their stocks from the "open market" and not through their owned farms or contractual arrangements with growers, of which only 23% of processors do (Briones, 2013). According to an expert interviewed, processors shy away from contractual arrangements due to the risks associated with weather or pest-related issues in mango growing. Though supply may be assured, the processors lose out on their investment if weather or pest shocks occur. Interviews with mango product processors also confirm that they often procure their supply from public buying stations rather than undergo contracted growing arrangements.

Another likely reason many processors would instead buy on the open market is the lack of economies of scale in production (Briones, 2013; Fernandez-Stark, Couto, and Gereffi, 2017). As Briones (2013) says, mango production is unique compared to banana and pineapple production. The mango industry generally comprises small- to medium-scale farming operations dispersed in many areas, while primarily large firms control the production of the other two fruits. As an expert from the University of the Philippines (UP) claimed, it is too costly for processors – or even exporters – to have growing and logistical arrangements with several individual farmers dispersed in different, sometimes far-flung, areas.

Due to the lack of economies of scale, competition in gaining fresh mangoes seems high, especially for exporters (DA-PRDP, 2017). Industry experts from the DTI confirmed that large-scale processors and exporters must be highly astute to ensure their mango supply. Unlike the large-scale competitors, MSME processors exhibit weaker competition as their market is usually highly localized, and upgrading attempts are individually taken (DA-PRDP, 2017). Moreover, the DTI experts add that mango

processing MSMEs sometimes have difficulty gaining their needed raw materials because large-scale firms buy in significant quantities of the already limited supply. A PMIFI representative shares an anecdote of large-scale buying. To help one of their members in Cebu source mangoes for processing, the representative met with a grower in Luzon and chartered a commercial flight that same day to Cebu with the mangoes as the passengers just to guarantee the supply required and that the quantity did not fall into a competitor's hands.

The areas where mangoes are also grown are usually far from the large-scale processing centers of Manila, Cavite, Bulacan, Cebu (Briones, 2013; DA-PRDP, 2017), and newer developments in the Davao region of Mindanao, according to representatives interviewed. Some processing firms may also be performing ODM of processed mango products for other exporting firms, as in the case of PDE and their arrangements with a large fruit processing firm in the Philippines.

Table 6.2 presents the regional distribution of production, harvest area, and the number of trees in the country. As the Table shows, the regions with the most considerable production capabilities are not near the processing centers mentioned and export ports in Manila and Cebu (DA-HVCDP, 2018). For example, the Ilocos region in Northern Luzon produces about a quarter of all mangoes in the country. The Zamboanga region in Mindanao is attention-grabbing as it now makes about 10% of total production but used to produce only 2.91% in 1990. Another highly curious region is Central Luzon. It hosts nearly 20% of the total area harvested and fruit-bearing trees; however, it only produces 6.29% of total production. Moreover, Figure 6.9 shows that Central Luzon mango yield

per tree is less than the country's average, while the Ilocos region's yield is roughly 100 kilograms per tree, more than the average.

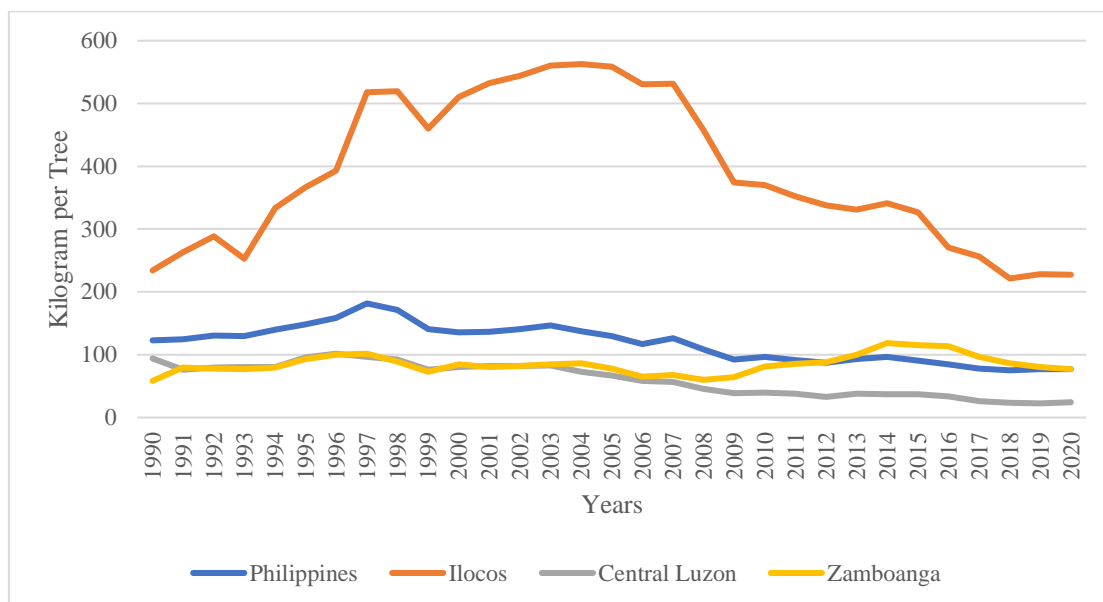


Figure 6.9. Mango yield in the Philippines, Ilocos, Central Luzon, and Zamboanga, 1990 to 2020.

Note. Data source: PSA.

Table 6.2 Regional Distribution of Mango Production in the Philippines

	Production (in thousand tons)				Area Harvested (in thousand hectares)				Fruit Bearing Trees (in thousands)			
	1990		2020		1990		2020		1990		2020	
CAR	2.56	0.56%	2.40	0.32%	0.50	0.65%	0.78	0.42%	21.34	0.58%	32.95	0.34%
<b>Ilocos</b>	<b>137.42</b>	<b>30.27%</b>	<b>178.24</b>	<b>24.11%</b>	13.41	17.38%	22.47	12.03%	587.83	15.91%	782.75	8.17%
Cagayan Valley	30.00	6.61%	50.11	6.78%	5.87	7.61%	10.30	5.52%	465.26	12.59%	940.83	9.82%
<b>Central Luzon</b>	44.26	9.75%	46.52	6.29%	<b>11.20</b>	<b>14.51%</b>	<b>33.57</b>	<b>17.97%</b>	<b>471.69</b>	<b>12.77%</b>	<b>1878.18</b>	<b>19.60%</b>
CALABARZON	52.83	11.64%	40.68	5.50%	7.83	10.14%	13.58	7.27%	421.06	11.40%	906.95	9.46%
MIMAROPA	10.21	2.25%	18.09	2.45%	2.36	3.05%	3.47	1.86%	133.28	3.61%	194.24	2.03%
Bicol	1.70	0.37%	1.84	0.25%	0.75	0.97%	2.81	1.50%	26.96	0.73%	64.88	0.68%
Western Visayas	46.77	10.30%	51.42	6.96%	7.20	9.34%	10.54	5.64%	223.44	6.05%	434.71	4.54%
Central Visayas	40.32	8.88%	74.16	10.03%	9.31	12.07%	11.98	6.41%	453.81	12.28%	573.17	5.98%
Eastern Visayas	0.41	0.09%	0.50	0.07%	0.14	0.18%	0.76	0.41%	4.94	0.13%	19.20	0.20%
<b>Zamboanga</b>	<b>13.21</b>	<b>2.91%</b>	<b>73.74</b>	<b>9.97%</b>	3.68	4.77%	14.96	8.01%	226.17	6.12%	955.09	9.96%
Northern												
Minadanao	15.42	3.40%	53.45	7.23%	3.66	4.75%	8.83	4.73%	216.45	5.86%	500.64	5.22%
Davao	13.23	2.91%	48.24	6.53%	3.51	4.55%	18.77	10.05%	123.80	3.35%	460.28	4.80%
SOCCSKSARGEN	22.44	4.94%	64.82	8.77%	4.40	5.71%	17.02	9.11%	193.88	5.25%	989.10	10.32%
CARAGA	9.33	2.06%	19.81	2.68%	1.58	2.04%	2.63	1.41%	77.82	2.11%	204.56	2.13%
ARMM	13.88	3.06%	15.23	2.06%	1.75	2.26%	14.35	7.68%	46.74	1.27%	646.96	6.75%
Philippines	453.99	100.00%	739.25	100.00%	77.14	100.00%	186.80	100.00%	3694.48	100.00%	9584.48	100.00%

Note. Unit: Thousand tons, thousand hectares, and thousand trees. Data source: PSA

Despite the rather grim state of the industry presented in this study, the DA-PRDP (2017) report showcases developments in the regional cluster of CAR, Ilocos, Cagayan Valley, and Central Luzon's ability to produce mangoes effectively. The DA-PRDP highlights the more favorable mango growing climatic condition of a prolonged dry season than in other regions. Growers in these regions also adopted climate change mitigating technologies such as production programming, fruit bagging, and off-season production practices. Moreover, the DA-PRDP mentions the active presence of the region's federated mango growers' association, composed of smaller associations present in smaller provinces in each region, contributing to the cluster's success. However, the report cautions that these associations require further capability-building. They do not have any physical offices and supporting staff and are primarily composed of mango growers but lack involvement from other industry actors. They also report notes that only micro-scale processing activities occur in the cluster.

Another significant gap commonly cited by studies and reports on the Philippine mango industry (Briones, 2013; DA-HVCDP, 2018; DA-PRDP, 2017; Fernandez-Stark, Couto, and Gereffi, 2017) is the lack of R&D. Table 6.3 shows the R&D budget for public funds that include mangoes as part of their possible research topics. The table shows that the overall budget has not grown significantly from 2016 to 2018 and has even dropped in 2019. As mentioned, the budget presented covers a wide range of crops. Given that, R&D on mangoes is only a fraction of the total budget, and it is pretty challenging to ascertain the proportion solely dedicated to mango research. More R&D may truly aid in upgrading the industry. One such R&D project being eyed is the varietal or genetic development of the Carabao variety. According to the DA-HVCDP (2018), the Carabao mango is characterized by its thin skin, making it more prone to bruising, disease, and

pests. In addition, it ripens rather quickly, leading to lower handling and distribution resiliency. R&D that may address these characteristics may help boost its trade capability in the export market.

Table 6.3 Estimate of Government R&D Budget for the Philippine Mango Industry (US\$ 2010 constant price)

<b>Item</b>	<b>2016</b>	<b>2017</b>	<b>2018</b>	<b>2019</b>
ESETS	85,074.79	93,091.01	71,900.06	64,656.16
R&D	31,564.73	22,447.21	21,457.21	17,348.96
PHILMECH	33,981.82	41,791.15	43,338.87	35,247.26
PCAARRD	178,302.46	201,972.28	197,190.52	180,471.47
ITDI	28,182.52	32,485.40	74,505.45	70,896.32
<b>Total</b>	<b>357,106.33</b>	<b>391,787.05</b>	<b>408,392.11</b>	<b>368,620.18</b>

Note. Calculations are converted to US\$ 2010 constant price, 2010 = 100. Data in this table is an estimate of the total R&D budget for the rice industry and is derived from the annual General Appropriations Act budget documents of the Republic of the Philippines (DBM, 2016, 2017, 2018a, 2018b, 2019, 2020). The budget for ESETS and R&D are items listed under the High-Value Crops Development Program. More sources of R&D may be allocated in the annual budget documents but not clearly stated as such. PHILMECH and PCAARRD R&D budgets also cater to other agricultural, aquatic, and natural resource industries. ITDI budgets also cater to technological applications in other industries that are not necessarily food-related.

Nevertheless, a representative interviewed from the GNCRDPSC argues that much research has been done on mangoes. For example, he cites the GNCRDPSC's successful study proving the absence of mango seed and pulp weevils in Guimaras, allowing the island province to export fresh mangoes to mainland US and Australia. The study was later replicated across most provinces around the country. One other extremely significant breakthrough in Philippine mango R&D, although discovered in 1974, is the 1% aqueous Potassium Nitrate ( $\text{KNO}_3$ ) solution of Dr. Ramon Barba, which induced flowering in mango trees, vastly boosting the country's capability in mango production. Box 6.2 details his award-winning discovery and benefits to the mango industry. Nonetheless, the GNCRDPSC representative, supported by Briones (2013), contends that

further investments in extension work through diffusion and adoption of modern production, post-harvest, and processing technologies may yield better outcomes.

Both the DA and the DTI consider mangoes one of the country's AFB product priorities. Given the current state of Philippine mango exports, the government seeks to revitalize the industry and capitalize on the mango's export potential opportunities. With the Philippine Mango Industry Roadmap 2017-2022 (DA-HVCDP, 2018), the government is pursuing to improve the global competitiveness of producers and MSMEs involved in the industry. While this initiative to reinvigorate the mango industry by the government holds a positive tone, Fernandez-Stark, Couto, and Gereffi (2017) warn that coordination between the industry and the government is currently insufficient, claiming that the DA and DTI have two separate industry plans. Briones (2013) also stresses the private sector's importance in fostering vertical linkages within the industry. The government simultaneously provides the necessary soft and hard infrastructures that allow the industry to be more competitive. Briones further adds that fostering horizontal linkages between small producers may help create economies of scale, bearing in mind that this feat may be possible when addressing other industry issues. As the mango industry builds itself towards a more export market-oriented development, many of the issues and gaps present need to first be addressed by the stakeholders involved.

***Box 6.2. Dr. Ramon Barba's revolutionary discovery for the mango industry***

In December 1969, Dr. Ramon Barba started conducting experiments to induce flowering in a mango tree farm located in San Jose del Monte, Bulacan, Philippines. At that time, he was doing his experiments privately and far from his workplace as his proposals were being shot down by the then senior researchers at the UPLB – College of Agriculture. The farm has about 500 trees that were 10 years old but had not flowered and were very unproductive. He conducted an exploratory study on potential chemicals for mango flower induction. Of all the chemical solutions he tested, he found that trees sprayed with a 1% aqueous solution of  $\text{KNO}_3$  showed bulging of shoots after a week and flowering the week after. To verify his discovery, he replicated the experiment in December 1970 to over a hundred more trees in that farm, which turned out to be a great success.

By early 1971, the discovery was not made public yet. A former research assistant at the university had asked Dr. Barba to visit the farm where the experiment occurred. Trusting the promise the research assistant made to not reveal any information, Dr. Barba agreed and showed the assistant his discovery. Later that year, Dr. Barba learned that the research assistant started using the technology for commercial purposes, even being credited for the discovery. In the years following, this mistake was corrected, with the discovery eventually credited to Dr. Barba.

His perils, however, did not end there. In 1974, he discovered that someone else was in the process of patenting his technology. Fearing he would lose credit for the invention and unable to freely use his discovery, he, with some help, vigorously filed a patent application. He was awarded the patent. Though the patent is now expired, he has never enforced nor claimed royalties for use of this technology as he wanted farmers to freely use it and gain from its application.

Prior to his discovery, mangoes were often seasonal, biennial, and erratic in its fruit production. With proper tree management and the  $\text{KNO}_3$  flower induction, mangoes may be harvested annually and year-round, even during supposed off-seasons.

Dr. Barba's discovery revolutionized the Philippine mango industry and induced heavy investment by the government to develop the once commercially neglected fruit. His technology, too, was found to be effective in Mexico, Kenya, Brazil, and other Latin American countries, effectively greatly developing their mango industries.

Note. The contents of this box were gathered from Southeast Asian Regional Center for Graduate Study and Research in Agriculture (SEARCA) (2014) and Dr. Ramon Barba (personal communication).



### **Section 6.3 The government's mango industry development policy**

To regain its better standing in the world market, the DA HVCDP (2018) crafted the Philippine Mango Industry Roadmap 2017-2022. This roadmap was formulated in consultation with industry stakeholders through eight industry forums held in different country regions and conducted between August and November 2017. The plan's mission and vision highlight the need to improve the industry to regain its global competitiveness. The roadmap hopes to promote innovation in the production segment of its value chain and its post-harvest, product processing, and marketing segments to achieve its vision. A key element in the success of the industry's development the DA-HVCDP emphasizes is the private sector's activeness in providing most of the work and cost to develop and rehabilitate the mango farms.

On the other hand, the government's role will be to support their efforts by providing farm inputs, conducting R&D, and setting up post-harvest and processing facilities. Throughout its document, the roadmap clarifies that there is a greater need to invest more in R&D and diffusion of currently available and new technologies<sup>16</sup>, which the report cites as a distinguishing characteristic that Thailand, Vietnam, and Mexico exhibit compared to the Philippines. Some of the R&D projects planned are breeding and variety improvement, product utilization of seasonal surplus, and pest and disease management. Of the different pests that plague mangoes, growers and reports underline the Cecid fly requiring immediate attention.

---

<sup>16</sup> For a list of current and available technologies for the Philippine mango industry, see Appendix 12.

To achieve its vision of the Philippines as a global leader in mango innovation and supplying the local and world market with safe and high-quality mango products, the report targets three main objectives to achieve eight goals. These three objectives and the planned support or intervention for each is described in Table 6.4. The eight goals the government hopes to achieve by 2022 are:

1. To increase production by a minimum of 3% per annum;
2. To increase per capita consumption by a minimum of 3% per year;
3. To increase the export value of fresh mangoes and export volume of processed mango products;
4. To reduce production costs by 25% to 30%;
5. To reduce post-harvest losses from 40% to 14%;
6. To have at least ten mango farms a year gaining GAP certification;
7. To increase the income of mango growers; and,
8. To create more job opportunities in mango growing communities.

Table 6.4 The Targets, Strategies, and Interventions of the Mango Industry Roadmap 2017-2022<sup>17</sup>

Target	Planned Strategies and Interventions	Target Timeframe
1. Increase production	<ul style="list-style-type: none"> <li>• Establishing, rehabilitating, and maintaining plant production facilities for new mango varieties (i.e., nurseries, groves)</li> <li>• Strengthening regulations for nursery accreditation and plant material certification</li> <li>• Providing production inputs and farm machinery/equipment</li> <li>• Establishing Mango Learning Sites for mango tree rehabilitation, GAP, and other mango-related training programs</li> <li>• Enhancing the DA – Bureau of Plant Industry's capability for pest and disease monitoring, forecasting, and response</li> <li>• Strengthening the information dissemination of new and current technologies, practices, techniques, farm and tree management, standards, and others</li> <li>• Investment into more R&amp;D and establish the Fruit and Tree Crop Development Institute</li> <li>• Mango Rehabilitation Program for trees ten years old and up – a PHP 600 (approx. US\$ 30) per tree loan program that includes training, fertilizer, and pesticide provisions</li> <li>• Fruit Production Insurance Program</li> <li>• Consolidate and build the capabilities of mango cooperatives, associations, and other groups or organizations</li> </ul>	<ul style="list-style-type: none"> <li>• 2018 to 2022</li> <li>• 2018 to 2022</li> <li>• 2018 to 2022</li> <li>• 2020 to 2022</li> <li>• 2018 to 2020</li> <li>• 2018 to 2022</li> <li>• 2018 to 2022</li> <li>• 2018 to 2020</li> <li>• 2018</li> <li>• 2018 to 2022</li> </ul>
2. Increase export with new and better products	<ul style="list-style-type: none"> <li>• Promotion of new products through trade fairs, expos, exhibits, and missions</li> <li>• Benchmarking and market reconnaissance</li> <li>• Establishing common use community-based processing and post-harvest facilities (i.e., packing houses and hot water treatment facilities)</li> <li>• Product processing and marketing support</li> <li>• GAP certification support for mango growers</li> <li>• Development of new mango products</li> </ul>	<ul style="list-style-type: none"> <li>• 2018 to 2022</li> <li>• 2018 to 2022</li> <li>• 2018 to 2022</li> <li>• 2018 to 2022</li> <li>• 2018 to 2022</li> <li>• 2018 to 2022</li> </ul>
3. Increase mango consumption for better health	<ul style="list-style-type: none"> <li>• Promotion of mangoes as healthy produce, in coordination with the DOH</li> <li>• Promotion of other mango varieties as green and for product processing</li> </ul>	<ul style="list-style-type: none"> <li>• 2018</li> <li>• 2018 to 2022</li> </ul>

*Note.* Information is summarized and adapted from the Philippine Mango Industry Roadmap 2017 to 2022 (DA-HVCDP, 2018).

<sup>17</sup> As of the writing of this dissertation, no evaluations for the Roadmap interventions are available yet.

#### **Section 6.4 The Philippines' innovation system relationship with and participation in the mango global value chain**

With a more export market-oriented approach, the Philippine mango industry is at the point where it needs to develop local production to meet the standards high-value export markets impose. Regaining its position and integrating further into the mango GVC entails more investment in R&D for variety development and pest management, rehabilitation of mango trees, training on better farm management, and better connectedness of its value chain actors (Fernandez-Stark, Couto, and Gereffi, 2017; DA-PRDP, 2017; DA-HVCDP, 2018). To achieve these, a better understanding of how the local mango IS interacts with the mango GVC. Figure 6.10 illustrates this study's compilation of the Philippines mango IS and GVC and depicts the interplay between their different facets. The rectangles' lengths represent the reach institutions, laws, practices, and actors have on the many segments of the mango GVC.

Like the previous chapter, the lack of R&D as a value chain segment in Figure 6.10 does not mean it is inexistent. Instead, the researcher observed that the conduct and diffusion of R&D is an essential function in an intermediary's role performance. Thus, for this study, the researcher discusses R&D and its diffusion in the next section on intermediaries in the Philippine mango AFB GVC.

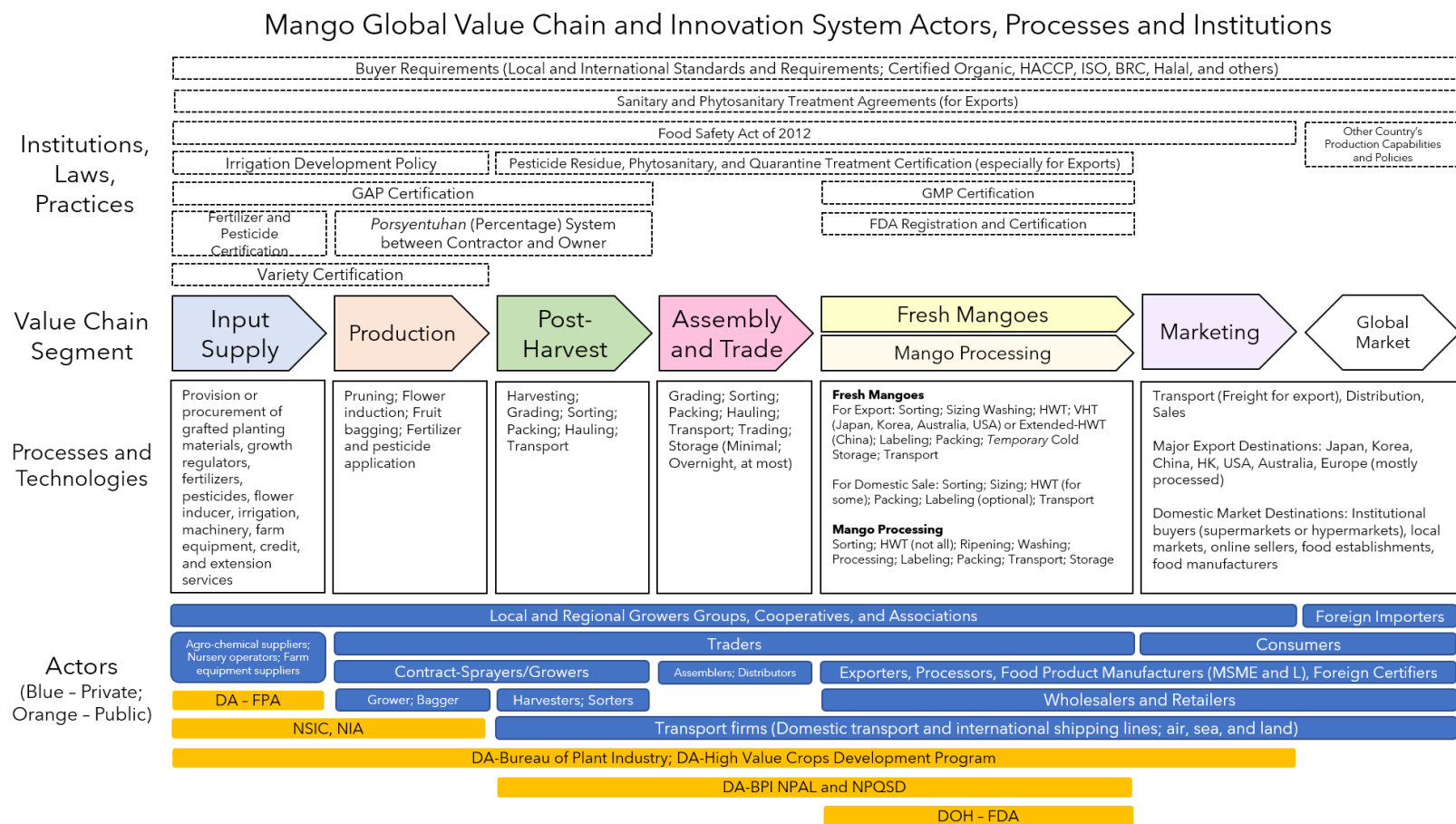


Figure 6.10. The Philippines' innovation system relationship with and participation in the mango global value chain.

Note. The researcher adapted this figure from Sarmiento et al. (2012), Briones (2013), Fernandez-Stark, Couto, and Gereffi (2017), DA-PRDP (2017), and DA-HVCDP (2018), with additional inputs from his field research.

#### *6.4.1 Institutions, laws, and practices*

The Philippine mango industry hosts multiple institutions, laws, and practices. Of these, the two most critical to discuss for the Philippines' case are the international and national standards and certifications and the production contract practices present in the country.

According to Fernandez-Stark, Couto, and Gereffi (2017), the mango GVC exhibits several standards and certifications growers need to meet to sell their products in the export market. These requirements vary among countries, with some being stricter, like Japan, while others are relatively laxer, like China. As per the DA-PRDP (2017) and the DA-HVCDP (2018), growers need to adhere closely to these industry standards to capitalize on their export potential. The main hindrances to doing so are over-spraying chemicals and the costs associated with maintaining these certifications (Briones, 2013; DA-PRDP, 2018). The challenge in meeting these standards and certifications lies in producing fresh mangoes rather than processed mango products. Unlike fresh mangoes, where farm traceability and chemical residue amounts are deemed important, processed mango products require a different set of certifications and standards that are often less restrictive (Fernandez-Stark, Couto, and Gereffi, 2017). Examples of standards and certifications for processed mangoes are HACCP, DOH-FDA Certification, GMP, ISO 9000, and ISO 22000. Table 6.5 summarizes various agreements, standards, and certifications relevant to the mango industry.

Table 6.5 Agreements, Standards, and Certifications Relevant to the Mango Industry

	Public	Private
National	<ul style="list-style-type: none"> <li>• Legislation (chemical residue; labor regulations; permitted chemicals; facility inspection requirements)</li> <li>• FDA Standards and Certifications (e.g., USDA, DOH-FDA as a requirement for processed products)</li> <li>• PhilGAP</li> <li>• National organic programs</li> <li>• Hazard Analysis Critical Control Point (HACCP)</li> <li>• List of certified nurseries</li> <li>• DA-BPI Quarantine SPS Certification for exporting</li> <li>• Japan's "positive list"</li> </ul>	<ul style="list-style-type: none"> <li>• Certified Organic</li> <li>• Nature's Choice (Tesco)</li> <li>• Field-to-Fork (M&amp;S)</li> <li>• Terre et Saveur (Casino)</li> <li>• Conad Percoso Qualità (Italy)</li> <li>• Albert Heijn BV: AH Excellent (Netherlands)</li> <li>• British Retail Consortium (UK)</li> <li>• Assured Foods Standards (UK)</li> <li>• Organic certification</li> </ul>
Regional	<ul style="list-style-type: none"> <li>• EU regulations</li> <li>• EU FTAs</li> <li>• ASEAN Trade in Goods Agreement</li> </ul>	<ul style="list-style-type: none"> <li>• Filieres Qualite (Carrefour)</li> <li>• Dutch HACCP</li> <li>• Qualitat Sicherheit (Belgium, Holland, Austria)</li> <li>• International Food Standard (Germany, France, Italy)</li> <li>• Organic certification</li> </ul>
International	<ul style="list-style-type: none"> <li>• WTO SPS and trade agreements</li> <li>• ISO 9000</li> <li>• ISO 22000</li> </ul>	<ul style="list-style-type: none"> <li>• GlobalGAP</li> <li>• GMP</li> <li>• Fairtrade</li> <li>• Global Food Safety Initiative</li> <li>• Social Accountability Certification 8000</li> <li>• International Federation of Organic Agriculture Movements Standard</li> <li>• Safe Quality Food 1000/2000/3000 (USA)</li> <li>• Halal Certified</li> <li>• National Sanitation Foundation</li> <li>• Kosher</li> <li>• Organic certification</li> </ul>

Note. This table is adapted and modified from Fernandez-Stark, Couto, and Gereffi (2017) and DA-PRDP (2017), with additional input from the investigator's desk and field research.

The Philippines' critical and relatively unique growing practice is the hiring or partnership with contract-sprayers that began in the 1980s with the boom of the country's mango production (SEARCA, 2014). With the introduction of the fruit induction spray by Dr. Barba and the very spread distribution of small backyard mango trees (Briones, 2013), contract-spraying became common. Contract-sprayers lease mango trees by shouldering the input, labor, and marketing costs associated with growing and harvesting the mangoes (Briones, 2013; Dela Cruz, 2007). These contract-sprayers do not own mango trees but scour for mango trees in villages located in different provinces. Contract arrangements with contractors, as they are sometimes called, may hold either of these three main types of practices (Dela Cruz, 2007; Briones, 2013; Fernandez-Stark, Couto, and Gereffi, 2017):

1. *Leasehold* – the tree owner agrees to lease their trees to the contractor for at least one year. Payments vary depending on the trees' age and size. Timing of payments may have a down payment arrangement of 50% before fruiting and the remaining after harvest. The contractor assumes temporary ownership of the tree and shoulders all costs related to growing the fruits.
2. *Output-Sharing* – the grower and the contractor share the output of all the owner's trees at harvest. The contractors assume all the costs related to caring for the mango trees. Sharing arrangements may be 50:50 but are more often 60:40 or 70:30 in favor of the contractor. According to an expert interviewed, the grower or farmer's share grows the more cost or work the farmer's shoulders. Moreover, several mango growers interviewed who experienced output-sharing arrangements cited that the contractors would give the farmers



the mangoes of lower quality as their share and then ask them to buy those mangoes for lower than the prevailing market price.

3. *Contract Buying* – contractors or traders pre-purchase mangoes from growers for the prevailing market price. Mango growers assume all costs and the risk in growing the mangoes. These contractors may also provide the harvesting and packaging materials required to ensure the mangoes' quality. Contractors may also make an advance payment to ensure that the mangoes are sold. According to experts and growers interviewed, the price may vary on the mangoes' quality (i.e., payment based on further segregation to export quality, domestic sale, or processing), or traders may buy all the mangoes at similar prices.

Of the three arrangements, Briones (2013), DA-PRDP (2017), and experts and growers interviewed claim that output-sharing is the most dominant contract practice. Briones (2013) cites that output-sharing is a middle ground between the other two arrangements. Leasehold sees the contractor assuming all the risk, paying the tree owner regardless of how the harvest goes. On the other hand, farmers assume all the risk in contract buying arrangements. For output-sharing, even though the contractor assumes almost all the costs necessary, farmers still have the incentive to maintain and ensure that the trees are cared for properly since farmers also only gain if the contractor successfully produces mangoes.

Briones (2013) and Fernandez-Stark, Couto, and Gereffi (2017) caution that leasehold arrangements may pose the biggest threat to trees as contractors may abuse the trees by over-spraying them to maximize the trees' fruiting capability. One expert

interviewed mentioned that farmers under output-sharing arrangements experience disputes with their contract partners. Neither party wants to claim responsibility for the need to conduct basal fertilization and other tree care practices necessary after harvesting. The DA-PRDP (2017) confirms this as an issue as they note that farmers consider their share as net income and do not re-invest part of the amount into pruning, rejuvenation, or fertilization will help the tree in the long run. Of the three arrangements, contract buying seems to show better environmental benefit for the trees, and the land in the long run since the farmers or growers cultivate their trees (Briones, 2013; Fernandez-Stark, Couto, and Gerefi, 2017).

#### *6.4.2 Value chain segments, processes, and technologies*

The mango value chain in the Philippines is composed of seven segments. The first six segments represent the parts of the production cycle for fresh and processed mango products. The final segment represents the interaction of the Philippine mango industry with the global market.

1. *Input Supply* – the mango value chain begins with input supply. Mango growers or contractors procure or receive the necessary inputs to produce mangoes or ensure proper care for existing mango trees. The recommended material necessary for new mango trees is grafted mango trees from DA-BPI accredited nursery operators. The other necessary inputs are the flower inducers, fertilizers, growth regulators, pesticides, irrigation systems, farm equipment and machinery, credit, and extension services from private or public organizations. Several technologies available in this segment are: the use of different mango varieties, farm mechanization (e.g., use of sprayers), new fertilizers and pesticides, shift towards

organic materials, training availability for updated and appropriate mango production, and tree care practices (e.g., planting trees with appropriate distances, basal fertilization).

2. *Production* – the segment where growers or contractors work to produce mangoes.

The Luzon island's high-yielding season is between March to June, while the parts of Visayas and Mindanao experience the high-yielding season between August to December. Though it is also possible to produce mangoes during the off-season, it is deemed difficult due to the rainy season experienced during the lean months. Thus, giving the tree and the land the time to recuperate during the leaner months is also recommended. The processes involved in this segment include pruning, flower induction, fruit bagging, and fertilizer and pesticide application. Technologies found in this segment are: the use of appropriate and high-quality fruit bags<sup>18</sup>, appropriate or the introduction of organic fertilizers, flower inducers, growth regulators, and pesticides, integrated pest management, integrated crop management, and application of training and farm practices.

3. *Post-Harvest* – a very critical segment that involves processes that ensure the mangoes do not get damaged upon harvest. Harvesting, fruit grading and sorting, packing, hauling, and transport are the activities found in this segment. According to an expert interviewed, packaging materials will vary depending on the contract arrangement with growers. For domestic sales or processing, the use of boxes or *kaing* (a type of large basket) is appropriate. For export quality mangoes,

---

<sup>18</sup> For fruit bagging, the growers in the Philippines usually use recycled papers (old newspapers from South Korea and Hong Kong are prominently cited), pages of telephone directories, or specially designed bags (DA-HVCDP, 2018; Field research)

containers may vary by weight (5kg to 12kg) and size (24 to 14 pieces) depending on the destination market. Farms in this segment may incorporate several technologies and processes such as initial sorting at the farm level, the use of picking poles with nets, checking fruit maturity through a 1% salt solution, and subjecting fruits to hot water treatment (HWT) – a minimum requirement for several export markets.

4. *Assembly and Trade* – this segment usually coincides with the *post-harvest* segment, with similar activities occurring. According to experts interviewed and the researcher's observations on social media posts on mango groups, this segment is critical because of how mango farms are scattered, with most still exhibiting backyard operations of a few trees. The need to consolidate the harvest by contractors, traders, or grower organizations creates economies of scale. The processes involved in this segment are grading and sorting of the fruits, hauling, transport (through land or air), trading, and storage. Because mangoes ripen quicker in warmer temperatures, it is vital to transport these during the evening when the mangoes are set for fresh trading. Storage, too, requires cooler temperatures. According to Fernandez-Stark, Couto, and Gereffi (2017), DA-PRDP (2017), and DA-HVCDP (2018), one of the technologies desperately needed by the Philippines is cold chain management facilities and transport. Lacking these technologies limits Philippine mangoes' resiliency and shelf life, especially the Carabao variety.
5. *Fresh Mangoes / Mango Processing* – this study considers *fresh mangoes* and *mango processing* two separate segments that co-occur, thus, merging both segments into a single segment that occurs before *marketing*. For *fresh mangoes*,

the processes are further segmented for those going to the export market and domestic sales. For export market mangoes, the processes include sorting, sizing, washing, HWT, vapor-heat treatment (VHT) (required for Japan, South Korea, Australia, and the USA), or extended-HWT (required for China), labeling, packing, cold storage, and transport. For the domestic sale of mangoes, the processes include sorting, sizing, HWT (for some buyers), packing, labeling (if necessary), and transport. For *mango processing*, the processes include HWT (if necessary), ripening, washing, processing, labeling, packing, transport, and storage. Examples of processed products are dried mangoes, mango puree, mango juice, frozen mango cuts, mango pastries, mango jams, mango slices and cubes, mango pudding, mango candies, chocolates, and mango flour, to name several. As previously mentioned, PSA's mango supply utilization data shows that at least 90% of annual mango supply goes into the domestic market either as fresh or for processing. Technologies in these segments are the introduction or use of HWT, VHT, irradiation, modified atmosphere packaging, individual quick freeze (IQF), new equipment and machinery, cold chain management facilities and transport, R&D for lengthened variety shelf life and delayed ripening, training, and the creation of new processed products (DA-HVCDP, 2018, field research).

6. *Marketing* – the processes in this segment include transport through land, air or sea freight, distribution, and sales. The major export markets for Philippine mangoes are Hong Kong, China, the USA, South Korea, Canada, Singapore, Japan, and Europe (mostly processed). On the other hand, the primary domestic markets are institutional buyers (supermarkets or hypermarkets), local markets, online sellers, food establishments, food manufacturers, and souvenir shops.

7. *Global Market* – this segment gains its significance with the Philippines being a player in the global trade of mangoes. In the early 2000s, the Philippines had a more significant standing in the global market but dropped significantly. Currently, the country's processed mango products have a more significant imprint or participation in the GVC, with approximately 85% of processed products heading towards the export market (Briones, 2013; Fernandez-Stark, Couto, and Gereffi, 2017). As the entire mango industry aims to regain its former standing, especially in the fresh mango trade, interaction and learning from the global market are essential.

#### 6.4.3 Value chain actors

Several actors make up the Philippine mango industry. They are depicted in Figure 6.10 in either blue for private actors or orange for public actors. The length of their shapes signifies the coverage of their actions in the value chain. Several actors in the value chain that exhibit more intermediary roles are left out of Figure 6.10. These intermediaries are discussed in the succeeding sub-sections. Actors in Figure 6.10, on the other hand, perform actions directly related to the value chain.

1. *Agro-chemical suppliers,, nursery operators, and farm equipment suppliers* – providers of necessary inputs for mango production. The materials and farm equipment may be imported abroad or manufactured in the Philippines. The nursery operators also provide grafted saplings or trees for those starting their mango production. Getting accreditation from the DA is necessary for agro-chemical suppliers and nursery operators.

2. *Growers* – these actors are the farmers that grow and care for the mangoes themselves. They should all the costs and do the necessary land preparation, pruning, spraying, bagging, harvesting, and other activities.
3. *Contract-Sprayers/Growers or Contractors* – actors who do not own mango trees but go into contracts with mango tree owners in leasehold or output-sharing agreements.
4. *Baggers* – trained or experienced actors hired by growers, tree owners, or contract-sprayers to do the fruit bagging activity during the production segment.
5. *Harvesters* – trained or experienced actors hired to harvest the mangoes properly.
6. *Sorters* – experienced actors hired to sort harvested mangoes by size, shape, quality, and weight.
7. *Local and Regional Growers Groups, Cooperatives and Associations* – groups of individual growers and sometimes other actors in the mango production segment that consolidate their produce. Depending on a group's capabilities, their activities may range from *input supply* to *marketing* their produce. Though not often done, some groups also do simple mango product processing.
8. *Traders* – the primary role of these actors are to consolidate supply of mangoes from different farms. Traders in a region or province often act as contract-sprayers or contractors (DA-PRDP, 2017). Traders have the contacts and resources necessary to trade and transport mangoes to vital areas or buying stations.
9. *Assemblers and Distributors* – these actors operate storage facilities that supply nearby local markets with mangoes and other fruits. According to the DA-PRDP (2017), these actors often have formal contractual arrangements or purchase orders from processors, wholesalers, retailers, and institutional buyers.

10. *Food Product Manufacturers* – these actors process mangoes into other manufactured products. The more prominent mango product manufacturers are Profood International Corporation, FPD Food International, Inc., and M'Lhuillier Food Products, Inc. (Fernandez-Stark, Couto, and Gereffi, 2017). Though MSMEs engage in mango food product processing nationwide, the large-scale facilities are in Manila, Cavite, Bulacan, Cebu (Briones, 2013; DA-PRDP, 2017), and, in recent years, in the Davao region.
11. *Exporters* – these actors are firms that export mangoes and primarily engage only with trusted traders, assemblers, and growers to achieve the requirements set by their export destination. These actors are usually Filipino-owned companies or subsidiaries of importing firms.
12. *Foreign Importers* – these actors are firms located in foreign countries that buy fresh or processed mango products from the Philippines to sell in their respective countries.
13. *Wholesalers and Retailers* – actors that sell fresh or processed mangoes to the final consumer or other retailers. They may be in various markets that differ in size and sell mango products at different price points and quality.
14. *Foreign Certifiers* – these actors are paid by fresh mango exporting companies to physically inspect that the mangoes going to the certifier's respective country undergoes the proper and required processes.
15. *Transport Firms* – actors that provide land, air, or sea transport services to the different actors in the GVC.
16. *Consumers* – the final destination of fresh and processed mango products. Taste, packaging, and quality preference differ among consumers, especially in foreign



- countries. An example of highly particular consumers is the Japanese, who are keen on only purchasing products that exhibit no damage or discoloration, are highly sweet, traceable, GAP-adhering, and well-packaged (Ohta, 2014).
17. *DA-FPA* – the government body that tests and certifies all chemicals that may be used in mango production.
  18. *NSIC* – the government body that certifies the different mango varieties that may be produced.
  19. *NIA* – government office in charge of irrigation development and maintenance.
  20. *DA-BPI*– the DA-Bureau of Plant Industry is a DA-affiliated office in charge of the entire plant industry, of which mango is a part. This government entity provides the following critical certificates, permits, or accreditations: plant nursery accreditation, NPQSD certificate of registration, plant quarantine service certificate, exporter accreditation, package facility accreditation, farmer/grower accreditation, quarantine treatment service provider accreditation, PHILGAP accreditation, and laboratory accreditation.
  21. *BPI-NPQSD* – the BPI's National Plant Quarantine Services Division is critical in the value chain. They are the only government body that may issue the Phytosanitary Certificate required to export fresh mangoes.
  22. *BPI-NPAL* – the National Pesticide Analytical Laboratory and its satellite offices in other provinces provide laboratory services to check the chemical residue present in fresh mangoes. Receiving an analysis from NPAL is necessary to export fresh mangoes.
  23. *DOH-FDA* - a government entity that certifies food products that may be sold in the consumer market.

#### *6.4.4 The financial structure of mango production in the Philippines*

Regarding the financial structure of mango production in the Philippines, Table 6.6 presents a breakdown of the costs associated with major players in the value chain. The key actors included in the cost breakdown are the growers or contract sprayers, traders or assemblers, exporters, wholesalers, or retailers. Furthermore, the table distinguishes between mangoes sold to the export and domestic markets.

In both markets, it is clear that the growers or contract sprayers incur the most cost at 75% and 83.99% for the export and local markets, respectively. They also gain the highest profit margins amongst the players in the value chain. On the other hand, traders or assemblers incur relatively the same costs since their large destination markets house exporters and major domestic buyers (DA-PRDP, 2017). Wholesalers and retailers incur the least added cost and the smallest profit margins. Alternatively, exporters gain a substantial profit margin of roughly 22% of the total price while incurring 16% of costs, as shown in Table 6.6.

Table 6.6 Financial Structure and Position of Key Actors in the Fresh Mango AFB Sector, 2017

Key Actor	Cost			Profit			Margin	
	Total unit cost	Added unit cost	% Added cost	Unit price	Unit profit	% Profit	Unit margin	% To price
<i>Export Market</i>								
Grower/Contract Sprayer	18.00	18.00	74.00%	30.00	12.00	58.04%	30.00	66.67%
Trader/Assembler	32.43	2.43	10.00%	35.00	2.57	12.42%	5.00	11.11%
Exporter	38.89	3.89	16.00%	45.00	6.11	29.54%	10.00	22.22%
TOTAL		24.32	100.00%		20.68	100.00%	45.00	100.00%
<i>Local Market</i>								
Grower/Contract Sprayer	18.00	18.00	83.99%	27.00	9.00	66.32%	27.00	77.14%
Trader/Assembler	29.43	2.43	11.34%	32.00	2.57	18.94%	5.00	14.29%
Wholesaler/Retailer	33.00	1.00	4.67%	35.00	2.00	14.74%	3.00	8.57%
TOTAL		21.43	100.00%		13.57	100.00%	35.00	100.00%

Note. Adapted and modified from DA-PRDP (2017). The researcher made the additional and revised calculations. Prices are all in Philippine Peso per piece of mango.

Growers and contract sprayers do not incur added costs in growing mangoes when vying for export quality mangoes as roughly 15% of total harvest only qualify as export-grade (DA-PRDP, 2017). Assuming there are genuinely no additional costs between export and local grade mangoes, it would benefit growers the most to strive for export quality since they earn Php 3.00 more per piece than those for the local market. However, interviews with mango growers and contractors reveal that they do not chase after export-grade mangoes because they feel that much more effort is required to maintain the quality required. Moreover, many export countries have much stricter chemical residue standards that many producers feel are too risky because of all the pests associated with mango growing. Additionally, growers and contract sprayers may only realize this profit difference if the harvest is sorted at the farm level and paid according to grade. If traders or contract buyers purchase mango harvests for a flat price and sort afterward, growers or contract sprayers may sell their export-grade mangoes at the local price.

Although growers and contract sprayers profit the most per piece, one must always consider the distributed nature of mango trees and farms in the Philippines. With most exhibiting small-scale backyard operations (Briones, 2013; Fernandez-Stark, Couto, and Gereffi, 2017), growers may be unable to achieve the profits capable when scale economies are taken into consideration. Conversely, other players, most especially traders and assemblers, may, in reality, earn the most as they can make up the lower profit margins with the sheer quantity they can amass or procure from growers.

With horizontal and vertical integration, upstream actors may capture more gains. For example, suppose growers consolidate to join or form associations or farmer groups. In that case, these organizations may achieve a stronger position in the value chain by

capturing downstream segments into their operations. Moreover, strengthening the horizontal relationship between growers may produce better quality mangoes through enhanced information sharing as upstream producers tend to exhibit bandwagon effects (DA-PRDP, 2017). Another example of integration may come from contract sprayers. If these actors lease or create contracts with multiple tree owners or growers, they may capture gains from economies of scale.

#### *6.4.5 The governance structure of the Philippine mango industry*

Globally, the mango GVC is a buyer-driven chain led by the world's largest supermarkets (Fernandez-Stark, Couto, and Gereffi, 2017). Their power is more evidently real for fresh mangoes, as evidenced by the influence the different standards and certifications hold for producers to sell in high-value import markets such as the US, Japan, and Europe. The same is true for processors of intermediate mango products, such as those that go into juices and pastries, among others, to adhere to the standards set by leading global food manufacturers (Fernandez-Stark, Couto, and Gereffi, 2017). For countries that cannot consistently adhere to buyer requirements, shifting towards processed mango products is a viable option as the conditions are much more attainable (Fernandez-Stark, Couto, and Gereffi, 2017). An example of this is PDE's processed mango products it exports to European markets. Unable to export the fresh mangoes, the NGO-firm purchases fresh mangoes from Aeta<sup>19</sup> communities in the Zambales region and growers from the Davao region. These mangoes are processed through one of the prominent mangoes processing firms. PDE can utilize the processing firm's HACCP,

---

<sup>19</sup> A collective term for certain indigenous ethnic groups of Filipinos residing in parts of the Luzon of the Philippines.

GMP, ISO, and other certifications to sell processed mango products under their brand with the addition of the Fairtrade certification. Moreover, PDE adds value to its products by having Naturland Organic and Naturland Fairtrade certifications.

Fernandez-Stark, Couto, and Gereffi (2017) state that the leading supermarkets also influence how much and when growers are paid. Mango traders are exhibiting less control than mango traders used to have. However, this may not be true in the local context of the Philippines. The local mango value chain still exhibits a buyer-driven chain but is led by large processors, traders, and assemblers (Fernandez-Stark, Couto, and Gereffi, 2017; field research). Although these influential actors control price and quality by dictating farm input requirements, production and harvest practices, and marketing, they hardly provide saplings, fertilizers, or producers' training (Fernandez-Stark, Couto, and Gereffi, 2017). While Fernandez-Stark, Couto, and Gereffi (2017) claim that large processors hold a more significant position within the chain, several interviewed experts and value chain actors argue that large traders and assemblers hold even greater or as much authority. The interviewees assert that the traders and assemblers can determine where and to whom they can sell their consolidated harvest.

Both globally and locally, producers appear to be at the bottom of the governance structure (Fernandez-Stark, Couto, and Gereffi, 2017). Particularly in the Philippines, producers seem to be in a captive relationship with buyers. However, a difference from more traditional captive chains is that most local chain leaders do not appear to exhibit the desire to help the producers upgrade, only dictating what is required of them and buying the harvest set at the leaders' price. Nonetheless, in online fresh mango trades, growers and contract sprayers moved towards a market structure where they would only

sell their produce to a buyer that provides a higher price per kilogram. Still, these structures may evolve further with the entire industry's desire to regain its former glory in the global market. Several firms have been trying to introduce new technologies and upgrading paths for their suppliers.

An example of this is PDE teaching their community partners how to grow organic mangoes, make their fertilizer, and integrate organic farming of multiple crops. Another example is Diamond Star, a Japanese fruit importing company, flying their trusted Filipino mango growers to meet their growers in Thailand to learn about new technologies and crop management. The company hopes that its Filipino growers can supply more mangoes that adhere to the strict Japanese requirements. When asked about whether the Japanese company fears their technologies and training would be spread, the representative interviewed said it would be best that the techniques and technologies the Filipino growers learned are diffused freely to others. If the information spreads, the company may source fresh mangoes from numerous growers that match their requirements instead of being restricted to a few locally capable growers.

#### *6.4.6 The GVC-IS co-evolutionary trajectory of the Philippine mango industry*

The GVC-IS co-evolutionary relationship of the Philippine mango industry appears to exhibit an *aborted* trajectory. The *preliminary development* stage seems to have arisen in conjunction with Dr. Barba's breakthrough discovery, leading to the exponential increase in production and eventual export of Philippine mangoes. According to Diamond Star and GNCRDPSC representatives, the generation and adoption of several growing, post-harvest, and exporting technologies took place from the 1980s to the 2000s, which further led to the industry's movement towards the *expansion and strengthening*

period. However, the Philippine mango industry appears stuck between the two periods as exports have dropped. One likely reason why the industry took an *aborted* trajectory may be the inability of many of its growers to shift towards attaining and maintaining global standards and certifications as the GVC environment moved in this direction.

Moreover, the local technology generation environment did not expand extensively despite industrial growth. Now faced with climate-related problems, the R&D requirements for the industry continue to grow too. Despite the apparent *aborted* trajectory, there appear to be some developments in the industry as more technologies for and generation of processed products have taken place to combat the industry's inability to compete as well as it did before.

A shift to the *maturity* stage of GVC-IS co-evolution requires strengthening the absorptive capacity of the upstream actors and the further support of its IS's technology generators and diffusers. As such, the role that innovation intermediaries play in addressing systemic issues of the industry may be critical.

## **Section 6.5 Innovation Intermediaries in the Philippine mango industry**

To build the case for intermediary organizations in the Philippine mango industry, the researcher gained the participation of ten organizations: ATI, HVCDP, GNCRDPC, DOST-ITDI, PHILMECH, PMIFI, MFP, PMRH, Diamond Star, and PDE. Table 6.7 provides further details on these organizations.



Table 6.7 The Participating Intermediary Organizations in the Philippine Mango Industry

	<i>Year Established</i>	<i>Number of Employees and/or Members</i>	<i>Type</i>	<i>Ownership</i>	<i>Geographic Scope</i>	<i>Value Chain Segment Involvement</i>
ATI	1987	173 employees	Government Agency	Public	National with Regional Counterparts	Input Supply, Production, Post-Harvest Processing, Fresh and Product Processing, Marketing
HVCDP	1995 (law creating the office)	24 in the central office; range of 5 to 10 employees in regional offices (number subject to priority of the LGU)	Government Agency	Public	National with Regional Counterparts	Input Supply, Production, Post-Harvest Processing, Assembly and Trade, Fresh and Product Processing, Marketing
GNCRDPC	1969 as a nursery; officially in 1993	17 regular employees; 4 contractual personnel; and daily job hires (2020)	PRI	Public	Regional with National Research Sharing	Input Supply, Production, Post-Harvest Processing, Fresh and Product Processing
PHILMECH	1978 as National Institute for Research and Extension; 2009 as PHILMECH	186 employees (2019)	PRI	Public	National	Input, Supply, Production, Post-Harvest Processing, Fresh and Product Processing, Marketing
DOST-ITDI	1987	334 (2017)	PRI	Public	National	Fresh and Product Processing, Marketing

(Table 6.7 Continued)

*(Table 6.7 Continued)*

	<i>Year Established</i>	<i>Number of Employees and/or Members</i>	<i>Type</i>	<i>Ownership</i>	<i>Geographic Scope</i>	<i>Value Chain Segment Involvement</i>
PMIFI	2002	1 permanent; 1 or 2 on a job order; at least 56 member associations	Industry Association	Private	National with Regional Counterparts	Input Supply, Production, Post-Harvest Processing, Assembly and Trade, Fresh and Product Processing, Marketing, Global Trade
MFP	2017	2 administrators and 1 moderator; 4911 members as of March 2021	Online Groups	Semi-public	National with International Reach	Input Supply, Production, Post-Harvest Processing, Assembly and Trade, Fresh and Product Processing, Marketing
PMRH	2015	2 administrators; 13,782 members as of March 2021	Online Groups	Semi-public	National with International Reach	Input Supply, Production, Post-Harvest Processing, Assembly and Trade, Fresh Mango Trade, Marketing
Diamond Star	1987	22 (15 in Davao; 7 in Manila)	Private Company	Private	International	Input Supply (Previously), Production, Post-Harvest Processing, Fresh Products, Marketing, Global Trade
PDE	Foundation in 1974; Fairtrade in 1993	6 employees; 483 mango producer members	NGO	Non-profit; Private	Regional with International Sales	Input Supply, Production, Post-Harvest Processing, Assembly, Fresh and Product Processing, Marketing, Global Trade

Note. The author gathered the information for this table based on interviews and secondary desk research from publicly available sources. Moreover, the researcher assigned the organization type and value chain segment involvement based on the interviews and his understanding of the programs and services provided by the participating organizations.

Delineating by organization types, this study considers two government agencies, three PRIs, one industry association, two social media groups, one private firm, and one NGO. The researcher compares the findings from five public sector intermediaries and five private sector intermediaries. Moreover, the investigator finds that all organizations provide a broad range of services, with several unique to certain intermediaries. Nonetheless, these organizations conduct innovation intermediation consistent with Partners' (2007) four roles of intermediaries.

Looking at their value chain segment participation and support, the ten organizations locate themselves expansively throughout the mango value chain, with many spanning the entirety of the chain. As one may see in Figure 6.11, the minimum number of segments an intermediary may support is two segments, and the maximum an intermediary may support is seven segments or the entire chain. Although none of the public sector intermediaries are a part of the Global Market segment, these organizations still support the development of value chain actors that hope to participate in the export market. Moreover, HVCDP and DA-BPI, the mother organization of GNCRDPC, interact with exporting companies to learn about the export market or provide the documents necessary for exporting fresh mangoes. As a note, Diamond Star used to perform intermediary roles in the Input Supply segment. However, it has stopped providing these in more recent years. A much lighter shade of blue indicates its experience in this.

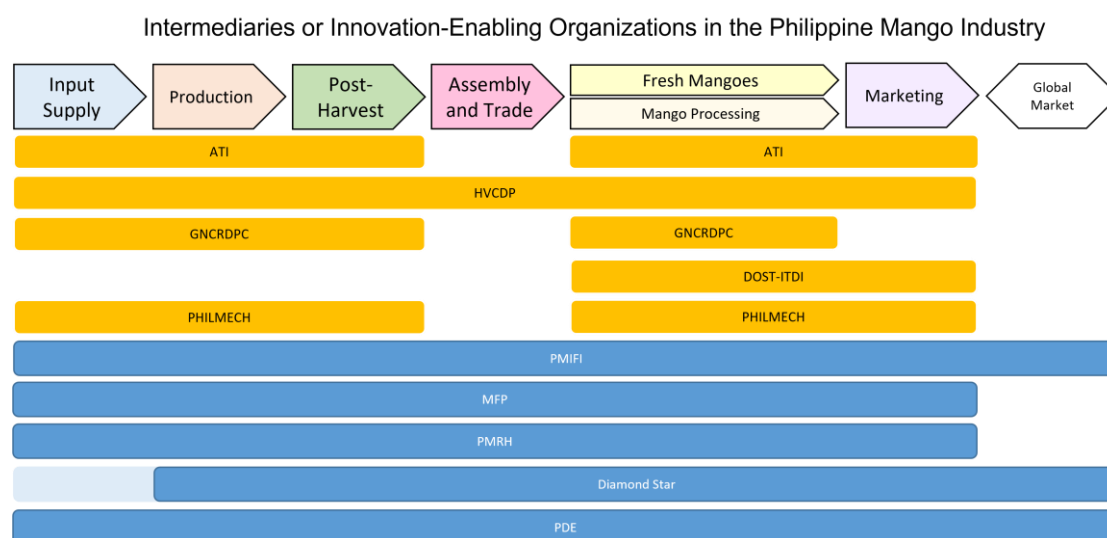


Figure 6.11. Value chain segment support and participation of intermediary organizations in the Philippine mango industry.

Note. The placement of organizations in the figure is based on the study's findings. Organizations in orange boxes are from the public sector, and those in blue are from the private sector.

The subsequent sub-sections will present the findings of the roles and key-capabilities of this study's participating mango industry intermediaries. In addition, these sections will compare the variations in intermediary role performance, and key-capability building as their organization types and value segment participation or support differ. Following these is a discussion on how intermediaries perform and develop under a more export market-oriented industry.

#### 6.5.1 Differences in role performance and key-capability building by organization type

The roles emphasized by participating intermediaries of the Philippine mango industry are presented in Table 6.8. Looking at the results, the researcher finds many organizations performing brokerage roles the most. Following brokerage, a mix of emphasis appears between the other three roles. Resource provision and consultancy seem ahead of mediation if one were to rank them. Nonetheless, a lack of emphasis on certain

roles does not mean that the intermediaries do not perform understated roles. The investigator finds all organizations performing the four roles in glimpses or in full.

Table 6.8 Innovation Intermediary Roles Emphasized by Organization Type in the Mango Industry

	Brokerage	Consultancy	Mediation	Resource Provision
ATI	**	**	***	***
HVCDP	**	***	***	***
GNCRDPS	***	**	*	***
PHILMECH	***	**	*	**
DOST-ITDI	***	**	**	**
PMIFI	***	*	**	*
MFP	*	***	**	**
PMRH	*	***	**	*
Diamond Star	***	***	*	*
PDE	***	*	**	***

Note. Criteria for judging emphasis are based on focused roles during interviews and an FGD with respective organization representatives and triangulated through other data sources.

Two of the most important government institutions for the mango industry are the ATI and the HVCDP. As innovation intermediaries, their primary role is to mediate or orchestrate their respective networks. For ATI, it refers to agricultural extension, and, for HVCDP, their network consists of orchestrating the development of multiple crop industries, one of which is mangoes. These two organizations emphasized this role, especially with their need to coordinate with their provincial and local implementing counterparts. In coordinating, the two central offices monitor the progress of national and local programs and projects to ensure that they achieve annual targets.

Moreover, they mediate between industry players and government services that aid in developing and deploying mango-related resources. The HVCDP, specifically,

meets with mango growers to promote farm consolidation. At times, the HVCDP also aids in price mediation between different value chain actors, especially between growers and commercial traders. The ATI also introduces potential buyers to producers but does not necessarily aid in price mediation.

Another role that the GAs emphasized is their resource provision role. Both organizations are mandated to provide several public resources. ATI is tasked with delivering agricultural extension and training programs designed to increase the knowledge and skills of mango growers and those interested in mango farming. Moreover, they provide an assortment of information-education materials that growers may avail themselves. ATI and their local implementers also set up farm schools that cater to various crops that a town or province may produce. Recently, they have also been bolstering their online extension portal. For HVCDP, the office is tasked with overseeing the distribution of planting materials, flower inducers, mango-related machinery, and other necessary production materials. As it coordinates with its local counterparts, the HVCDP learns and assesses where these resources may be distributed. Moreover, the HVCDP supervises procuring of these resources.

While performing resource provision roles, the GAs also simultaneously perform brokerage. For example, ATI brokers training programs and establishes training centers around the country, apart from those already mentioned. On the other hand, the HVCDP brokers resources, community processing facilities, linkage to credit-granting agencies, and has recently introduced beekeeping as an intersectoral upgrading initiative with mango growers. Although many of these projects, technologies and programs primarily utilize the financial and human resources of the GAs, they may still be considered

brokerage as providing these often involves the coordination and negotiation between several parties. For example, the setting up of training centers and farm schools by ATI requires the commitment of a farmer or group that needs certification and training. In addition, for HVCDP, community processing facilities require negotiating with local government and the communities. These also require training and brokering of the knowledge for product processing, which HVCDP may not necessarily have the human resources to conduct.

For consultancy, it seems that HVCDP is more active than ATI. However, the difference between the two may be due to the HVCDP representative being more targeted toward the mango industry. In contrast, ATI needs to accommodate a more comprehensive set of crops. Although the HVCDP also caters to other crops, ATI's mandate requires it to have a more sector-encompassing stance. The HVCDP staff assigned to the mango industry also appears more active. The person has recently become part of the social media chat group that includes several key industry actors. Assigned staff from the central and some local counterparts also attend the annual mango industry congresses to provide consultancy and learn. Nonetheless, both organizations have some similarities in their consultancy role, such as the setting and promoting industry standards for mangoes like GAP, insecticide resistance management, and other mango production techniques. Moreover, both offices are open to consultations from and with the private sector to learn about their needs and see how the government can address different barriers to innovation.

Moving towards PRIs, the researcher finds a heavy emphasis on brokerage roles. This is not surprising as these institutions are mandated to generate and diffuse their hard

and soft technologies. Many of these that the PRIs broker is farming equipment or processing machinery for hard technologies. PHILMECH and DOST-ITDI specifically are very active in generating and disseminating these technologies. On the other hand, GNCRDPSC focuses more on the mango fruit itself. Although they also have processing technologies, many of their brokered innovations are soft or genetic technologies. Nonetheless, the GNCRDPSC representative mentioned that they also provide hard technologies but in the form of simplified tools. For example, instead of procuring a state-of-the-art hot water treatment facility to eradicate fruit fly larvae or eggs in mangoes, the GNCRDPSC proposes an alternative of using a drum and manually monitoring the temperature.

Moreover, the PRIs broker new markets for their technology adopters and recipients. In the experience of PHILMECH and DOST-ITDI, they create markets for machinery manufacturers or expand the markets for communities that use their processing machinery, giving adopters opportunities for additional products. GNCRDPSC took another direction in that the institution allowed many Philippine provinces the opportunity to export their mangoes to foreign markets, especially the US and Australia. By proving the absence of mango seed and pulp weevils initially in Guimaras Island, mango growers in the area could export their produce to the countries mentioned. From there, the initial study was replicated almost throughout the country.

Coupled with brokerage is the performance of consultancy roles too. In providing technologies, the PRIs also offer expert advice for prospective adopters on which technologies are best to adopt and the proper use, maintenance, and repair of their technologies. Moreover, the PRIs help business development, especially PHILMECH and



DOST-ITDI. In addition, the PRIs also provides individual consultations for mango industry players. The GNCRDPSC representative claimed that they receive many physical and internet inquiries from all over the country, sometimes even requests for site visits and training for various mango-related topics. These organizations can also provide advice on where adopters may apply for funding.

A somewhat surprising role these organizations perform is resource provision. In previous literature (Van Lente et al., 2003; Intarakumnerd and Goto, 2018), PRIs are often seen as the generators of technologies, brokers, consultants, and mediators, but not always the providers of a variety of resources. In the case of the three PRIs, they are often mandated to give resources to industry players. These are not always freely given, but many of them are. For example, GNCRDPSC is tasked to produce and provide quality planting materials (i.e., grafted mango saplings) given to mango growers or nursery operators. Apart from mangoes, the research center also produces planting materials for other fruits and vegetables.

Moreover, GNCRDPSC allows clustered growers in Guimarães to use their packing house facility for post-harvest treatments. On the other hand, the two other PRIs provide market matchmaking and use of several of their facilities. For example, DOST-ITDI allows adopters to use their product packaging facilities to create packaging or market samples. In addition to these, the three PRIs also allow their staff to be requested as resource persons for seminars, workshops, or training hosted by other public or private organizations.

The role least emphasized by PRIs in the mango industry is mediation. Nevertheless, the PRIs practice mediation roles more in R&D collaboration or work than

in mediating trades or creating partnerships for value chain actors. To ensure smooth relationships, the PRIs strictly adhere to the roles and responsibilities stated in their agreements. Abiding by this help the PRIs build their reputations as respectable research institutions in their fields. However, the researcher does not find a suitable lead based on the data acquired when considering their role in orchestrating the mango research network. Several individual scientists and other institutions are also known for mango-related R&D, but no organization leads the overseeing of the mango R&D network. PHILMECH and DOST-ITDI have specific niches, but they are not confined to mangoes. GNCRDPSC, as the known mango R&D center, may hopefully take this role. However, the institution may need further financial and human resource support to lead the mango research network.

The researcher finds performing brokerage as the most emphasized role for the one industry association that agreed to participate. From several interviews conducted with a representative and several value chain actors, PMIFI has been able to broker post-harvest materials like boxes or crates for export and open markets for producers. According to the representative, the organization has been critical in raising the buying price of mangoes in various provinces. In addition to these, the organization is leading the push to establish a large-scale processing center.

In performing brokerage roles, the organization also practices mediation by linking members or mango stakeholders to appropriate organizations that may aid in equipment manufacturing, technology provision, and mango-related training or seminars. Moreover, the organization helps its members find possible sources of fresh mangoes. According to one member interviewed, this is the essential role PMIFI performs for them.

For resource provision and consultancy, PMIFI did not emphasize this too much. The organization currently faces one issue: its limited workforce, with the current president as the only known resource person from the association. Nonetheless, PMIFI tries to provide expert advice to those who may need it by relaying their needs to other local associations. Moreover, the organization offers information for exporting and standard adherence. The president may also provide advice but on her accord and not as a member of PMIFI. Still, PMIFI is a recognized leader in the industry, often being tapped by government agencies to draft position papers for the industry or industry consultation.

Compared to PMIFI, the SMGs – PMRH and MFP – emphasized their consultancy roles more than any intermediary role. As groups set up to aid and answer inquiries about mango growing, it is not surprising to learn that consultancy is what the group performs extensively. The SMGs provide their members the space to post any mango production-related inquiries. Members may also ask about inputs, potential markets, and farming equipment, apart from growing-related matters. Anyone from the group may respond to questions via comments or send personal messages to other members. According to representatives interviewed, another aspect of consultancy that is quite indirect is price monitoring. Since members may post looking for mango buyers or suppliers with prices indicated, other members can monitor the rates fresh mangoes or other items may be bought.

The second most emphasized role common between the two groups is mediation. Although the group does not meddle in price mediation, it is an online platform that allows members to meet and create a business or personal relationship with each other. Moreover, following Intarakumnerd and Charoeonporn (2013a; 2013b), the researcher

finds conflict mediation most evident in the experience of the two SMGs. Administrators are active in correcting advice that may not suit inquiries. Moreover, the administrators reprimand members responding to inquiries by promoting certain products (e.g., insecticides, fungicides, fertilizers) that do not even help alleviate the problem faced by the poster. As the representatives say, members treat the group as a sales avenue and do not stand for the principles of the group.

Although the groups are not very active brokers, the researcher considers the broker role performed primarily in tandem with the mediation that MFP and PMRH do. By allowing their platform as an avenue for trades and inquiries, many members can learn and receive knowledge and technologies worldwide from all over the country. PMRH administrators help members contact prospective buyers for group members in different areas. Mixing in consultancy, the administrators are very adamant in trying to support the development of the industry in that they provide free monitoring and production support to new growers. The MFP administrator is quite active in this endeavor as he shares his growing protocols with any member. In addition to sharing it, he provides time for personal video conferences with adopters free of charge. Moreover, to further support members, the group provides resource provision by providing a gamut of information like contacts for input and contract growing service providers, and the DA-BPI certified nursery operators list. The experience of the two SMGs presents an example of how intermediary roles quite often overlap, especially in more non-traditional types of intermediary organizations.

For the private firm Diamond Star, the findings show that it emphasizes its brokerage and consultancy over the other two roles. These two highlighted roles often

work in tandem with one another. As a fruit exporting company, Diamond Star has indirectly brokered the Japanese and other country markets for local growers to introduce their mango produce. The company advises how growers may achieve the strict requirements countries have when opening these opportunities. A prime example is the Japanese market, which incurs the most rigorous requirements with a minimum residue limit and a heavily controlled list of variables. Diamond Star agriculturists visit their trusted growing partners to monitor chemical usage and assist them in achieving the requirements. Another mix of these roles Diamond Star performed was setting the standard for sizing and packaging for mango exporting, especially to Japan. As one of the pioneering Japanese export companies in the Philippines, the role Diamond Star played a crucial role in developing and introducing the use of the VHT machine facility, another necessary process that started with the Japanese market and is now increasingly required by other countries.

Although mediation and resource provision is underemphasized, the company still underwent several efforts to perform these roles. For mediation, it is primarily the partnership and information sharing between its Philippine office, its head office in Japan, and sister offices in other parts of the world. Through their global partnership, knowledge learned abroad is quickly passed to other offices. Moreover, by having a mother company in Japan, the local Diamond Star companies can more easily shift their operations and requirements in response to changes in Japanese fruit importing policies.

Again, resource provision is also made in tandem with another role, brokerage. With the fall in Philippine mango exports, one resource provided and brokered by Diamond Star is their VHT facility usage by other exporting companies. As the facility

itself requires heavy investment, many exporting companies lease Diamond Star's facility for their use. Rather than have it left unused, the company decided to allow others to lease it, thus brokering the technology and facility. Another resource provision and brokerage service the company did was to sponsor a week-long educational trip for two of their most trusted mango growers to learn from the experiences of growers in Thailand. The representatives interviewed mentioned they hoped that the information would spread once any growers yielded positive results. However, the one that attempted to replicate the techniques and technologies was unsuccessful. Years before this incident, the company also tried providing production resources for growers, as these were items growers themselves said they needed to meet Diamond Star's requirements. The company provided mango wrapping bags, plastic crates, and credit to farmers that did not yield the expected results. Diamond Star has since stopped providing these resources to mango growers but still does so for their papaya and banana growers that continue to hit their targets. The experience of Diamond Star as a resource provider reveals the need for reciprocation from intermediary partners. As a private firm, Diamond Star recognizes these provisions as support for the development of their partners but still investments on their end. Thus, recipients or partners of private firm intermediaries may need to be more proactive in ensuring that these resources yield the desired outcomes.

As an NGO, PDE performs brokerage and resource provides the most. Apart from being a pure NGO, PDE works as a social enterprise that assists mango growers in selling their produce. PDE brokers mango product processing and international markets for their partner growers. Unlike private firms that indirectly broker growers to global markets, PDE differs in their practice of providing fair-trade premiums to their mango growers, making them have a more significant stake in the entire process. Payments for mangoes

are immediately after delivery, and fair-trade premiums are provided in the following months.

Moreover, PDE provides its partners with an assured market. The NGO is not as selective in the size, shape, and blemishes of the mangoes produced, as all these will be sent for processing. Furthermore, unlike the usual trade of processors, PDE ensures that they procure their mangoes above the prevailing market price, giving their partners an even greater incentive to continue with PDE. The only requirements of PDE are that the mangoes remain organic and that the communities pledge to follow fair trade principles.

Apart from providing group certifications for organic farming and fair-trade practices for resource provision, PDE provides planting materials and inputs if necessary. More than these, PDE and its sister organization, the People's Recovery, Empowerment, and Development Assistance (PREDA) Foundation, provide a wide range of community development assistance to their partner communities. These come in educational scholarships, home improvements, community toilets, water systems, and seminars on women and children's rights, responsible parenting, and indigenous people's rights.

Following these two roles, PDE emphasized its mediation role as it traverses several organizations and partnerships to ensure that their operations continue. Apart from speaking with the community, the organization mediates between foreign buyers, the processing companies, packaging producers, and the certification bodies. The mediating actions do not end with coordination but also include record matching of sales and production outputs with their company partners. In mediating between partner growers and other institutions, PDE stands as a representative and does all necessary applications and processes on behalf of their partners. Moreover, PDE and the PREDA Foundation

assist each other in providing various development-related resources offered by non-mango-related groups.

Although PDE may perform this role the least as a consultant, the organization still provides advice in organic farming training, fair-trade seminars, and consultation on family matters through their sister foundation.

Overall, many intermediary organizations in the mango industry seem to focus on performing brokerage to address the industry's lack of consolidation and technologies. Intermediaries often perform brokerage in tandem with one or several other roles. Comparing public and private sector intermediaries, the researcher finds that the public sector may most provide the provision and brokering of resources and hard technologies. Being mandated and provided the budget places these intermediaries as the favorable choice for brokerage and resource provision. However, this does not mean that the private sector does not have a hand in providing these. Although GAs are considered network orchestrators, the private sector intermediaries may take a stronger hand in mediating between members, mango stakeholders, and organizations that provide technologies and resources. Knowing individual industry players may help private sector intermediaries tremendously by diffusing what is available. Consultancy is somewhat mixed, with public sector intermediaries providing a more comprehensive range of advice but the private sector offering particular advice to individuals, especially mango growers. Currently, there also appears to be dissonances between the advice given by different parties and organizations. Although standards are set, the government and Philippine mango industry intermediaries may need to take a more united stand in pushing for standards that will lead to more export quality mangoes.



The data collection process reveals that the participating innovation intermediaries emphasize knowledge-building capabilities most for their key-capability development. Table 6.9 also presents that internal communication and management capabilities follow. Although external networking capabilities are the least emphasized, this does not directly allude to the falling export numbers. Nonetheless, in each organization taken individually, one finds that certain key-capabilities are given priority over others. Again, a lack of emphasis does not mean the immediate absence or weakness in a key-capability.

Table 6.9 Innovation Intermediary Key-Capabilities Emphasized by Organization Type in the Mango Industry

	External Networking	Internal Communication	Knowledge- Building	Management
ATI	**	***	***	**
HVCDP	**	***	**	**
GNCRDPS	**	*	***	**
PHILMECH	***	**	***	**
DOST-ITDI	***	**	***	**
PMIFI	**	**	***	*
MFP	*	**	***	***
PMRH	*	**	***	***
Diamond Star	**	***	*	**
PDE	**	***	**	***

Note. Criteria for judging emphasis are based on focused key-capabilities during interviews and an FGD with respective organization representatives and triangulated through other data sources.

The GAs emphasized their internal communication capabilities the most compared to the other key-capabilities. As network orchestrators and overseeing the implementation of national programs, it is not surprising that ATI and HVCDP consider this a critical capability they need to build. Moreover, the building and practice of this

capability involve coordinating with both the public and private sectors. On the public sector side, both organizations need to build this capability to convey policies and delineate the distribution of resources more effectively. ATI leads the generation and diffusion of extension programs, training materials, and seminars. Specifically, the head office manages the training of trainers (i.e., municipal or provincial extension workers, industry leaders, and learning site operators). At the same time, their local counterparts deliver the training and materials down to the grower or community level. HVCDP, on the other hand, monitors and heads the implementation of DA-led mango industry interventions. Although they have local counterparts, the coordination with these counterparts depends on the availability and prioritization of mangoes in the different provinces. Unlike HVCDP, ATI needs to coordinate with all regions as extension work cuts across all forms of crops. However, like HVCDP, the availability of mango-related interventions, training, and extension programs under ATI may be limited to certain regions that prioritize and are suitable for mango growing. On the private sector side, ATI and HVCDP exercise their internal communication capability in their consultations with the private sector and adjustments to program implementation to address the most pressing needs of their stakeholders. The task of fostering internal communication is needed more by HVCDP as the staff assigned to the industry needs to balance the needs of various value chain actors as the industry struggles through its current phase of attempted unification.

The two GAs emphasize their knowledge-building capabilities following their internal communication capabilities. Their knowledge-base stems from the organization's history and is continuously built by the expertise of their staff. ATI and HVCDP employ

persons with agricultural backgrounds or who previously worked in agricultural industries. On ATI's side, they train their staff to compensate for the newly hired staff's lack of knowledge. For HVCDP, however, staff may need to learn about assigned commodity groups independently because of the limited availability of human resources and time.

Thus, the representative mentioned that one vital capability their staff needs is the ability to immerse and be independent learners. By immersing in the industry, they learn the intricacies and foster the relationships they need to do their work effectively. This innate capability of staff targets knowledge-building and touches upon external networking and internal communication. A concrete step taken by the staff assigned to mangoes is joining social media chat groups of private sector actors. As part of the group, the staff assigned learns and can respond quickly to concerns and may easily communicate with actors around the country, thereby building trust. In addition, although not as directly interactive, both organizations continue their industry consultations on various political levels to learn from their constituents. The fruits of these consultations are translated into improved and adjusted policies, new programs, additional budgets for necessary materials or research, knowledge resources that are publicly accessible, and information sharing within the various DA offices. Moreover, these two organizations improve their programs based on post-project evaluations and consistent data monitoring.

Their external networking capabilities are built and exercised primarily through calls for public consultations and forums with the private sector. Moreover, as their offices are the government-mandated offices for extension services and DA-program assigned to care for the mango industry, the private sector may initiate approaching their

offices for inquiries, partnerships, and other mango-related concerns. In addition, the ATI has a more active stance in making itself accessible online through various social media and video streaming platforms where different levels of the organizations get the opportunity to interact with its technology adopters. ATI also has an e-extension portal where individuals or groups may enroll in online training and seminars. HVCDP, on the other hand, may not necessarily be as accessible. However, the staff assigned to mangoes has built their relationship with the industry so well that requesting introductions to anyone else in the industry may be possible. Moreover, the trust built by the staff with the industry allows the private sector to be more comfortable bringing more mango stakeholders into the conversation as they try to rebuild the industry.

For management capabilities, two themes were highlighted. First is the management of their programs. Both highlight the significance of evaluations that allow them to adjust and hit targets set for the year. As network orchestrators, it is also natural that monitoring of budgets and program implementation remains under their purview. Nonetheless, these two intermediaries have also learned to alter old practices to address issues. For example, ATI sets aside a contingency budget for unplanned training needs the industry would suddenly require, like food handling and safety training during the surge of COVID-19. Similarly, HVCDP reformed its procurement timing by doing the necessary pre-procurement processes a year in advance to ensure that government provisions arrive during the appropriate mango production time frames.

The second highlighted part of management capabilities was the importance of human resource development. Both organizations involved the limitations posed by the numerous contractual and co-terminus positions in their offices. However, this issue is

not as heavy a problem for ATI as for HVCDP. Another related issue raised by ATI is the importance of having supportive leadership. If leadership positions continuously change, it also poses a problem for the continuity of programs. On both accounts, continuity of support for programs becomes a risk. Moreover, retraining and rebuilding relationships become necessary when new staff is assigned, even if the previous ones endorse them.

An additional aspect of management capabilities that may hamper HVCDP more would be the recent passing of the Mandanas court ruling that will effectively devolve many roles and responsibilities from national agencies to provincial or local government offices. Although the court ruling is not directly part of the organization, its effect on how the intermediaries operate may affect their management capabilities. As of the data collection period, the HVCDP was still unsure what the impact on their operations would be. However, it is assumed to be significant in the possible loss of several roles and responsibilities. The primary issue related to that is that crop support will be left to the prioritization of local governments. If an elected official wishes to prioritize certain crops over others, staffing and availability of support for other crops may dissipate. Unlike when HVCDP oversees certain commodities, the national office may allocate resources in every province. This issue may not affect ATI as severely since many facets of extension work have been devolved earlier. Since then, the national office has monitored local implementation, accrediting learning sites, training trainers, and managing nationally available materials like their video streaming channel and the e-extension website.

For the PRIs, knowledge-building capabilities reign as the most significant and necessary of the four key-capabilities. It is not surprising that this is most emphasized,

given that these institutions thrive off the technology and research they generate. Like other intermediaries, their knowledge-base comes from their staff, consisting of many scientists and researchers with advanced degrees. Moreover, they learn further by engaging in R&D collaborations with other institutions within and outside the Philippines. In addition, the staff participates in technology and product expos, academic conferences, and other career development opportunities. Apart from their staff efforts, the three PRIs also learned of the needs of the mango industry through consultations and inquiries made by the private sector. Some consultations are done industry and government-wide, while the inquiries are mostly made on a person or company basis.

PHILMECH and DOST-ITDI reported conducting feasibility studies and assessments before providing the appropriate post-harvest or processing technology when applying and diffusing their knowledge and technology. On the other hand, GNCRDPSC would conduct site visits to view the actual trees when providing particular treatments or technology advice. Regardless of how these engagements are conducted, all three PRIs request evaluations and feedback from adopters and stakeholders.

Following their knowledge-building capabilities in terms of emphasis are the PRIs' external networking capabilities. These institutions also conduct R&D collaboration work with other research and academic institutions. They learn and build their reputations as credible research institutes by doing so. Their reputations have made them known as the institutes for mechanization, national mango research, and industrial technology. Although GNCRDPSC stands as the national symbol for mango research, they also conduct R&D on other crops like cashews and vegetables, and many other institutes conduct R&D on mangoes. Another aspect of their external networking is individual staff

efforts to share and post their work on various social media outlets to garner readers and potential collaborators. Participation of their staff in academic conferences and other events is another way to build on their reputation and network.

To build the industry side, the PRIs employ different strategies. For example, PHILMECH and DOST-ITDI document and post write-ups of successful technology adopters on their various social media pages and sponsor them during trade shows. In addition, GNCRDPSC heeds training and seminar requests by other government and non-government organizations. Compared to PHILMECH and DOST-ITDI, which cater to a broader set of agriculture and manufacturing industries, GNCRDPSC feels that a positive sign of the center building its external networking capabilities is the measured increase in inquiries from many mango stakeholders from individual growers, government agencies, cooperatives, and industry associations. Years ago, the representative recalled that they would usually only be able to entertain those that visited the center personally, with most coming from Guimaras or nearby islands. However, in more recent years, they have been receiving more phone calls, email inquiries, and site requests from across the entire nation.

When doing R&D collaborations, the PRIs also build on their internal communication capabilities. Part and parcel of their reputation building are also maintaining the reputation that they built. The PRIs employ various methods to ensure that they uphold their good reputations. GNCRDPSC often takes the initiative to start and coordinate R&D partnerships that benefit the mango industry. They do so not only with academic institutions but also with private sector firms, especially those around the Guimaras island. PHILMECH and DOST-ITDI, on the other hand, do not hold back in sharing pertinent information with potential adopters, and these two institutions sponsor

adopters in technology and product shows. Doing these actions promote the trust that builds the foundations of their reputations.

Another facet of the practice and building of their internal communication capabilities is the management of their networks within the organization and with other government agencies. For example, PHILMECH has a system that allows everyone who has taken part in developing certain technologies to receive a fraction of the royalties provided to the institution. In addition, DOST-ITDI practices work task exchanges to foster the relationships between their technology generators and their technology diffusion teams. When it comes to their network of other public partners, the institutions also take great initiative. For example, mandated to produce and distribute quality mango planting materials, GNCRDPSC coordinates extensively with national and local counterparts to deliver grafted mango saplings and other necessary inputs. In addition, DOST-ITDI attends local DOST-affiliated events to promote their technologies and facilitate diffusion in the local setting. Finally, the DOST representative interviewed reported that their office conducts business feasibility studies for their adopters to help build their confidence in adopting their technologies.

Like the GAs, the PRIs exhibit two distinct facets in their management capabilities. The first is on the implementation of their operations. As PRIs, their primary purpose is to generate technologies that support their targeted industries. As such, the budget for R&D primarily comes from their annual appropriations, but they may also receive additional funding from research grants from other institutions. Given limited budgets, the PRIs need to be creative in their allotments to ensure that they can maximize and achieve their desired targets and accomplish the research they set out to do. GNCRDPSC



exemplifies one way of conducting R&D reviews to check on the status of ongoing projects to see whether these are still worth continuing or suspending. They also reassess and readjust plans and programs during these meetings to ensure they hit their targets. As they are also tasked with delivering quality planting materials, GNCRDPSC constantly works around its budget to balance conducting research and generate the necessary inputs for the industry. Compared to the mango center, PHILMECH and DOST-ITDI are much larger institutes requiring greater technology management. The two PRIs have intellectual property rights or technology diffusion divisions that manage patents and technology adoption to support their work. As public institutions, the technologies developed by the three organizations hold non-exclusive rights. Moreover, the institutions cannot mass produce their technologies for the organization's gain. Instead, they seek local firms to manufacture machinery or equipment or produce plant technologies as resources to provide.

The second aspect of management capabilities is human resource development, which most public intermediaries in this dissertation highlight. Compared to the two larger PRIs, GNCRDPSC does not have a human resource development program. Instead, it shares this with its mother and sister organizations. Similar to PHILMECH and DOST-ITDI, scientists and researchers from GNCRDPSC are encouraged to pursue further studies. However, unlike the prior two, the GNCRDPSC need to apply to these on their accord. At the same time, their mother organization, BPI, balances the availability of scholarships and study opportunities between all its research centers. As a result, GNCRDPSC needs several more specialists for mangoes, such as entomologists, pathologists, and plant breeders.

Moreover, a common issue that the three PRIs face is the limits set by public service contracts. There are still limited permanent positions in their respective institutions, and there is a risk of losing out on employees with great potential. Although the PRIs face these issues, the researcher finds that most staff still decide to contribute a large portion of their career and life to serving under these PRIs. One common foundational trait that representatives from these institutions shared was the passionate and service-oriented perspective on work that they espouse in their staff.

Before delving into the discussion on the IA's key-capabilities, it is necessary to preface it with the unique circumstance surrounding PMIFI. Although well-known as *the* government's national industry association for the mango industry, the researcher finds the association on the brink of losing industry leadership. Currently, PMIFI is essentially operated by one person. This is not to say that this is a negative feature. Nonetheless, the circumstance presented does affect the association's key-capabilities, especially its management capabilities.

Of the four key-capabilities, PMIFI emphasized its knowledge-building capabilities the most. As a longstanding organization, PMIFI has the history and knowledge necessary to assist members in sourcing and trade fresh and processed mangoes, both domestically and internationally. According to the representative, the association is further enhanced by members of value chain actors and those that support the industry, like logistics companies and some government agencies. With the current president's contacts, the association also receives opportunities to learn from the experiences of other mango-producing countries. One may be unable to deny the depth of knowledge that PMIFI may possess, especially when looking at the extent of

consultancy the association provides the government and its plans for a large-scale processing facility.

Looking at external networking and internal communication, several strengths and weaknesses reveal themselves. With the extensive network of the president, the association has done its work in partnering with numerous other local associations from across the country. In terms of supporting one another, PMIFI courses mainly request value chain support from other members. Communication passes through the president, and that person relays the requests to the relevant members or linkages. According to a member interviewed, the primary form of support they receive from PMIFI helps source fresh mangoes for processing. This is one service that the PMIFI representative also highlighted as part of building and exercising their external networking and internal communication capabilities. In addition, the association is active in traveling across the country to meet with current or new mango growers to aid in selling their products or help export or processing company members to find suitable suppliers. To this end, reports from several secondary sources and interviews feel that PMIFI is only after the welfare of its members and not the entire industry.

In trying to learn more about the association, the researcher found some difficulty in having industry players recognize PMIFI, with most not even knowing the association existed. Its ability to network and communicate its purpose and mission has likely dwindled for several years. The lack of recall and reputation may be due to weaker intermediary management capabilities. According to the representative, PMIFI is a self-sustaining association in that it does not ask for membership or annual fees to join it. As it is listed as a foundation, the organization cannot be a profiting one. However, PMIFI

would export mangoes and conduct training services to sustain its operations. Apart from that, PMIFI recoups some operating costs when they conduct their National Mango Congresses. The association requires revamping and organizing if it wishes to continue its stake as a leader in the industry.

Although this study only considers one industry association for the mango industry, several attempts were made to have other associations participate. However, these were met with a lack of interest and time to participate in the study.

The SMGs also emphasized their knowledge-building capabilities. The representatives highlighted the membership that formed the base of the groups. Most are mango growers that are either experienced or interested in learning. Others are part of industry associations, extension workers, researchers, and input suppliers. Moreover, the administrators have also experienced mango growers that are more than willing to share their knowledge and contacts with their members. For example, the MFP administrator provides a written document of his growing protocols. In contrast, the PMRH administrator has a wide range of contacts from the government, buyers, and input suppliers that are shared with the group. Both group administrators do their best to verify, and correct information posted and shared in the group.

Coupled with the emphasis on knowledge-building capabilities is the emphasis on the groups' management capabilities. Managing thousands of members and daily post requests in the group is very time-consuming. Therefore, each group has developed rules to help maintain the relevance and purpose of the group. For example, MFP requires each member to show their faces on their social media profiles. The administrator will scour through its membership and remove persons who do not follow this rule from time to

time. An old method MFP previously utilized was a chat group between administrators and moderators. However, those assigned eventually did not continue to help moderate the group. For common group management methods, the researcher finds both groups practicing membership approval requests, post requests, and deletion of group irrelevant or old posts. Even if the group does not request fees or the administrators get paid for the group's management, they continue to do the work as the administrators share a common passion for uplifting the country's mango industry and being of service to mango growers of all experiences. Having such a mindset and practicing group management allows the administrators to show how they are consistent and fair to members, leading to growth in membership and trust.

Following management capabilities, the groups emphasized their internal communication. Members may post mango-related inquiries, sales, requests, and opportunities, subject to the administrators' approval. Moreover, members may provide comments or advice to others that post or through private messages. Although members are free to comment, the administrators monitor the discussions to ensure a sense of order in the group, and little debates ensue.

The least emphasized is the groups' external networking capabilities. The researcher finds that the groups are not very active in promoting the group. Nevertheless, the groups' reputations develop through the trust built within the group. By controlling membership and posts, members see how serious the group is about mango production and may recommend the group, thus increasing its membership further. Although the groups may not be building their external networking capabilities actively, the group stands as a platform that expands the networks of its members. By meeting through MFP

or PMRH, individual actors meet and create relationships with others. For some, these become their buyers, suppliers, or business partners. In this sense, the SMGs mediate through the mild exercise of their external networking capabilities built soundly on their online nature.

Unlike the previous intermediaries, Diamond Star emphasized building and focusing on its internal communication capabilities more than other key-capabilities. Referring to their emphasized roles, their focus on internal communication coincides with the brokerage and consultancy they provide in communicating the benefits of producing export-grade mangoes. According to the representatives interviewed, the company has over a hundred possible suppliers they contact every season for mango supply. Of the more than a hundred, they have ten that reliably receive export-grade mangoes. Communicating their needs and the requirements is how the firm exercises this capability, at least on the supply side. Another side of their internal communication is their relationship with their head and sister offices in Japan and other countries. As they communicate with these offices, the Philippine subsidiary can learn of new developments in fruit farming that they may adopt in the country and, most importantly, quickly learn of new policy developments in Japan, which they can immediately relay to their mango suppliers. Although these offices work independently, there are efforts within the entire company to support each other. An example of this is hiring a Filipino staff in the Japanese head office. The intention is for the Filipino staff to learn the intricacies and tastes of the Japanese market, which the company hopes may be translated back to the Filipino growers.

Through its relationship with its mother and sister organizations, Diamond Star in the Philippines can also exercise and build its external networking capabilities. The partnership provides the Philippine exporting company access to many institutional buyers in Japan and other countries. Additionally, their exporting experiences to Japan helped them take the initiative in exporting to other countries like Korea or China. With the Filipino staff in Tokyo, the mother company has also expanded its market within Japan to foreigners living in the country. The company also expands its network on the Philippine side by searching for more suppliers that may meet export standards. Another method they may have utilized to expand their supplier network would be to tap their export associations. However, according to the representatives, the mango export association has not been active for the longest time, and the company does not even know if it still exists. Currently, they are not members of any other associations and instead choose to maintain and build their relationships with government agencies that support export procedures.

The succeeding capability emphasized by Diamond Star is its management capabilities. The organization is professionally managed because it is run as a for-profit firm, as it should be. Nonetheless, several facets of its management capabilities help support its intermediation. One aspect of it is hiring knowledgeable staff or having backgrounds in the fruits they export. These employees are also assigned to visit current and discover new mango suppliers.

Additionally, Diamond Star allows its staff to learn growing techniques from their sister offices in other countries to adapt their learning to better production in the Philippines. Moreover, having a Japanese country manager in the Philippines makes the

communication lines between the head office and the Philippine subsidiary smoother. The manager acts as one of the bridges between cultures and brings ideas from abroad to the Philippines, and similar success may be hoped for in bringing Filipino staff to the Japan office.

Although the least emphasized, the knowledge-building capabilities of Diamond Star may still be considered quite rich. Having been one of the pioneering mango-exporting companies in the country, one cannot deny the extent of knowledge learned and diffused by the company. Through the years, Diamond Star has built its knowledge from the staff hired and the experiences its mother and sister companies have had in other countries. Moreover, their knowledge in exporting and crop production has allowed them to export more fruits to Japan and other countries. By exercising external networking and internal communication capabilities, the company still learns new developments from abroad and its suppliers, attempting to diffuse this knowledge to others. The knowledge-building capabilities are there but are primarily exercised and applied in tandem with networking capabilities as the company tries to expand its product selection and supplier base for better exports.

Like the Diamond Star, PDE emphasized its internal communication capabilities the most. This is also followed by their extensive emphasis on management capabilities too. For PDE, internal communication reigns above the others because of the coordination work the intermediary needs to do to ensure that its operations perform smoothly. The NGO needs to communicate with its partner mango growers, foreign buyers, local processors, and packaging suppliers to operate its fair-trade export. Although most of the communication work with the foreign buyers, processors, and packaging suppliers is done



online or with minimal visits, the coordination with their partner local growers requires several physical visits and training. Therefore, PDE set up a system where the communities assign what they call a local inspector to act as a bridge between the community and the NGO to properly communicate and coordinate with their indigenous peoples and Mindanao mango growers. These persons are tasked with monitoring and ensuring that the PDE partners abide by the fair-trade principles and follow proper organic farming practices. Through their consistency and effectiveness in communication, PDE has fostered the trust necessary to sustain their operations and current network. As a result, the NGO has amassed multiple foreign buyers that support the products from 361 indigenous farmers from Luzon and 122 growers in Davao.

Built closely together with its internal communication capabilities are PDE's management capabilities. Although listed as a non-profit organization, PDE operates similarly to a business to ensure that it can sustain itself and its other community development projects and support the PREDA Foundation. When interacting with the mango growers, their agriculturists and community organizers employ participatory approaches to ensure that the communities understand their stake in the business. Coupled with this is the capability development of chosen local inspectors too. To foster trust further, PDE promotes transparency by validating and sharing production records with their partner communities, especially when distributing their fair-trade premiums.

As PDE performs its intermediary roles successfully, the NGO can also build its external networking capabilities with more growers and foreign buyers approaching the organization for partnerships. A great aid to PDE's external networking capabilities is its partnership with the PREDA Foundation. With PREDA nominated and winning several

service distinctions locally and abroad, many more organizations have learned about PDE's work with PREDA. With the partnership, both organizations mutually benefit from one another through the network that each has made. Another aspect of their external networking capability is PDE's certifications with Naturland organic and Naturland Fair. These certifications act as a signal to others of the reliable work that the NGO does. In addition, it raises interest and trust with foreign buyers to partner with PDE and provides support to their cause.

Cementing these three capabilities are PDE's knowledge-building capabilities. These are built on the organization's well-entrenched institutional knowledge built by the PDE staff that have been with them for the last ten to twenty or more years. They hire the necessary staff with the appropriate skill sets and degrees. When hiring those interacting with their partner growers, PDE ensures that their staff are trained agriculturists and provided ample knowledge of fair-trade and organic farming. More than having agriculture-related knowledge, their staff is also trained and educated in indigenous peoples' laws and culture. They are also provided seminars given by the PREDA Foundation that they may diffuse to the communities they visit. Moreover, the staff seems proactive in their desire to learn more, with several representatives claiming that they need more advanced training in organic farming. With an expansion towards other crops as a viable option, building the knowledge for these will likely only aid in developing the NGO further.

In general, the researcher finds that intermediaries in the Philippine mango industry build their key-capabilities depending on the roles they need to perform, quite similar to the findings of Sutthijakra and Intarakumnerd (2015) and Go (2019). Many

emphasize the significance of their knowledge-building capabilities. Those who did not make this capability their most emphasized still act as a foundation for the other three. Knowledge-building capabilities form the base of what intermediaries may share and how their staff skills are applied. Thus, it is not surprising that this capability is the most emphasized or foundational.

Moreover, although emphasizing certain key-capabilities, the researcher finds that these are also built and practiced with one another. How knowledge is built is exercised through networking by sharing and communicating results to stakeholders or other development partners. Management capabilities work in tandem with the other capabilities delivered effectively and given perspective. Similar to how some roles are performed simultaneously, so do building key-capabilities.

Nonetheless, human resources are an aspect of key-capabilities that the researcher hopes to highlight further. For the mango industry, it is clear how developing human resources helps tremendously in the success of the intermediaries. Often, staff or employees, apart from members, also form the base of an intermediary's knowledge-building capabilities. Both public and private organizations recognize the need to develop their staff further. Aside from professional development, many intermediaries acknowledge the significance of having a socially oriented perspective for their staff to perform intermediation effectively. Given this point, it may be plausible to argue that human resource development is a separate key-capability regardless of innovation intermediary type.

### *6.5.2 Differences in role performance and key-capability building by value chain segment support*

Table 6.10 presents an intermediary's role performance markers in each Philippine mango value chain segment. The researcher plotted the table based on the gathered interview data and secondary data. Overall, one notices that most intermediaries participate or support most of the value chain. Intermediaries perform roles in response to the needs of actors in a segment. Comparing every segment, a general observation that may be made is that intermediaries perform more roles in the input supply and fresh mangoes / processed mangoes segments of the chain. One likely reason for this is that these two segments require more hard technologies and learned knowledge (i.e., training or soft technologies) for value chain actors involved compared to the other segments that require more application of knowledge like in the production or post-harvest segments or markets mediation like in assembly trade, the marketing, or global market segments.

Table 6.10 Roles Performed by Participating Intermediaries in the Mango Value Chain

	Input Supply	Production	Post-Harvest	Assembly and Trade	Fresh Mangoes / Processing	Marketing	Global Market / Export
ATI	B, C, RP	C, RP	C, RP		B, C, RP	M	
HVCDP	B, C, M, RP	C, M	B, C, M, RP	M	B, M, RP	M	
GNCRDPS	B, C, M, RP	C, RP	C, RP		B, C, RP		B
PHILMECH	B, C, M, RP	C	B, C, M, RP		B, C, M, RP	M	
DOST-ITDI					B, C, M, RP	C, M	
PMIFI	B, C, M	C, M	B, C, M	B, C, M	B, C, M, RP	B, C, M	B, C
MFP	C, M, RP	C, M	C, M	C, M	C, M	M	
PMRH	C, M, RP	C, M	C, M	C, M	C, M	M	
Diamond Star	B, C, RP (Before)	C, RP	C, RP (Before)	B	B, C	B	B, C
PDE	B, C, RP	C, RP	C, RP	B, M	B, M, RP	B, M	B, M

Note. B stands for brokerage, C for consultancy, M for mediation, and RP for resource provision. The researcher based the assignment of roles in the value chain on the actions and services done by the organizations vis-à-vis the processes involved in each segment of the value chain. The data for this table is drawn from the interviews and an FGD with respective organization representatives and triangulated through other data sources.

Moreover, public sector intermediaries perform brokerage and resource provision considerably more than their private sector counterparts. As public sector organizations are mandated to do such, performing brokerage and resource provision is a very much expected finding. Comparatively, more mediation is performed by the private sector. However, this may be due to their more prominent presence in assembly, trade, and global market segments. Nonetheless, common between all intermediary types is the heavy performance of consultancy roles in numerous segments. Although not all intermediaries provide this in their present segments. However, all intermediaries still provide consultancy or expert advice in one form or another.

It is necessary to discuss each segment individually to understand how the value chain affects intermediary roles. Starting with the input supply segment, we find all participating intermediaries, barring one, perform intermediary roles. As shown in Table 6.10, many perform brokerage and resource provision roles. In executing these, the intermediaries enable value chain actors to receive the necessary inputs to begin mango production. These inputs are not confined to hard technologies such as farming equipment, chemicals, fruit bags, and the newly grafted saplings or grown trees but also include the training and knowledge necessary to care, grow, and produce mangoes correctly. These soft technologies pertain to understanding the pests and diseases that mire the tree and include proper techniques and knowledge in spraying or flower induction and tree care practices. For hard technologies, these are provided for or brokered for by many public sector intermediaries. However, some private sector organizations also provide or broker these inputs, but not to the extent and scale that GAs and PRIs do.

Moreover, the resources provided and technologies brokered also depend on the mandate and mission of an organization. For example, ATI focuses on training, HVCDP provides procured inputs or machinery, while the two PRIs generate and provide planting materials or farm equipment and some production training. For the private sector, PMIFI brokers training and inputs for growers and suppliers. PDE provides the necessary trees and knowledge for organic farming and fair-trade practices. Finally, the two SMGs provide information for training services and growing techniques.

Interestingly, the experience of Diamond Star represents the evolution of the roles of intermediaries. As mentioned, the company used to provide credit and other inputs until it did not realize the supposed gains. It has since then ceased providing input resources for its partner mango growers. Nonetheless, Diamond Star brokers knowledge when it deems it necessary and a worthwhile investment.

Above brokerage and resource provision, the intermediaries in the input supply segment perform more consultancy and mediation roles. In many ways, the organizations perform these similarly in providing expert advice on production techniques and knowledge, necessary inputs and equipment, export requirements, training opportunities, available government services, and the like. In addition, many intermediaries provide opportunities to meet input suppliers, credit providers, or contracting services when mediating. An interesting way consultancy and mediation are performed in the input supply segment may be gleaned from MFP and PMRH. These two roles are performed via their social media platform as online groups. Unlike other intermediaries that may receive inquiries and respond to the organization, the SMGs bridge value chain actors

directly where advice may be offered by multitudes of members or introductions mediated through commenting, or private messages members post in the group.

We find the same intermediaries present in the production segment, but roles performed have lessened primarily to consultancy, mediation, and resource provision. As this segment applies the knowledge and resources acquired from the previous section, mango growers in this section would usually seek additional knowledge on adjusting production to changes in the environment, pests, and other possible considerations. The primary way for intermediaries to provide for that need is by performing consultancy. However, the advice given may be different compared to the previous segment. In the previous segment, actors would ask for advice on prospective inputs, knowledge, and networks necessary to prepare and begin production. As a result, decisions on a grower or contractor's desired markets may be made clearer in the input supply portion and adjusted in the production stage. In addition, consultancy regarding production practice adjustments to address unforeseen or unexpected circumstances may be provided. Most intermediaries may either support advising on inquiries or with the SMGs.

In addition, the intermediaries may also mediate between the inquirer and credible experts to adequately address the inquiries better. Intermediaries such as PMIFI, HVCDP, and several in the SMG provide such mediation. Moreover, HVCDP also mediates by promoting the clustering of growers. Other intermediaries may also offer their consultancy in tandem with resource provision by having their staff conduct site visits either by request or monitoring. For example, organizations like the ATI, GNCRDPSC, Diamond Star, and PDE have their staff perform several site visits to partners or stakeholders to meet their production consultancy requirements.



Returning to mediation, another form of this role that intermediaries perform is linking actors between production and the post-harvest segments. As not all growers harvest the mangoes themselves, several intermediaries like PMIFI, MFP, and PMRH mediate between growers and traders or contractors that provide post-harvest services. For PMIFI, they link prospective growers to post-harvest service providers the organization knows in the surrounding area. For MFP and PMRH, the researcher observed that the groups are again used as a platform for growers to post harvesters' needs or offer their services.

For the post-harvest segment, the roles performed by intermediaries are somewhat similar to the production portion. However, as the Philippine mango industry exhibits post-harvest service providers, several intermediaries also perform brokerage and resource provision of physical inputs. Intermediaries like HVCDP and PHILMECH report to broker post-harvest machinery or inputs like treatment equipment and proper storage and transport boxes. PMIFI, in the past, has brokered the development of boxes that are acceptable for European export markets. Regarding resource provision, HVCDP and PHILMECH may provide the mentioned technologies out of their budget and provide the human resources to assist through site visits and demonstrations or training. In addition, post-harvest facilities may be provided for by public sector intermediaries, like GNCRDPSC, that allow local growers to utilize their center's facilities for various post-harvest treatments and packing. Furthermore, and as mentioned, Diamond Star used to provide hard inputs in mango storage and transport crates. Other intermediaries that perform resource provision roles do so in the form of human resources that provide on-site monitoring, consultancy, and training.

Like the previous segment, mediation is performed by linking value chain actors from previous and succeeding segments together. PMIFI, MFP, and PMRH conduct mediation primarily in this manner. In addition, HVCDP's cluster promotion may also extend its performance in this segment. PHILMECH may also mediate between post-harvest service providers or growers with manufacturers that produce machinery or equipment for mango production, harvesting, and post-harvest treatments.

Similarly, too, all the present intermediaries provide consultancy in this segment. Their advice may be coursed through various modes (e.g., posting in a group, e-mail, phone inquiries, in-person meetings) but revolve around post-harvest processes, proper storage, transport requirements, and market or buyer information. Several intermediaries like ATI, HVCDP, PHILMECH, GNCRDPSC, and PDE also have staff that visits growers and contractors to assist in post-harvest and organization purpose-related inquiries. For example, ATI and PHILMECH advise on mango-related training and mechanization topics that may originate from their organizations. GNCRDPSC, as the known mango PRI, is often asked by growers in their area to assess whether their trees are ready for harvesting. The representative also shared that several from outside Guimaras also called the center to ask how to make simple HWT solutions in their areas. On the other hand, PDE ensures that the mangoes are harvested in line with how their partner processors will need them.

In the succeeding assembly and trade segment, we find the significantly minute presence of the public sector intermediaries. Of the five public sector organizations, HVCDP is the only one that seems to perform intermediation. Its mediation role in this segment reveals itself as the institution attempts to unify the industry and promote

clustering between growers into farmer organizations, associations, or cooperatives. As many traders in the industry have strong voices, HVCDP mediates by orchestrating public fora that may address concerns in the assembly and trade segment, including transportation and storage solutions for mangoes. As PHILMECH also conducts R&D on cold chain management and storage solutions, the PRI may soon play a more significant role in this segment of the mango value chain.

The private sector intermediaries perform mediation, brokerage, and consultancy roles. Many perform market mediation by assisting growers, members, and stakeholders to find supply or market opportunities or gain better price points. The two SMGs offer their platform as a model for growers and traders to meet. Additionally, the PMRH group administrator assists individual growers in getting in touch with possible buyers in areas where the administrator has contacts. Mediation by PMIFI and PDE is often performed nearly simultaneously as its brokerage role. For example, PMIFI would mediate between growers and its members and may aid in brokering deals for them and, at times, for the association when it exports mangoes.

On the other hand, PDE would need to mediate or orchestrate the transport and delivery between their partner growers and processors. PDE brokers a market for both of their partners when mediating. Similarly, Diamond Star brokers foreign markets for growers that achieve export requirements by being the purchaser of their produce. Although the purchase of mangoes as part of their business should not count as intermediation, the processes to help ensure the crop achieves export standards and provide the opportunity of selling to foreign markets is what the researcher classifies as the brokerage that occurs. Finally, regarding consultancy, the three intermediaries that

exhibit this role perform it by providing advice related chiefly to the trade, storage, and transport of fresh mangoes.

Moving towards the fresh and processed mango segments, the researcher finds all the participating intermediaries present in this segment. Like the input supply segment, many more roles are performed at this point, with most of them seemingly coming from the public sector intermediaries. This segment also marks the entry of DOST-ITDI as an intermediary in the mango value chain. As this segment combines two segments, the numerous processes involved require a comprehensive range of hard and soft technologies and knowledge. Moreover, some of the processes included may repeat post-harvest and assembly and trade processes, like the HWT and repacking. Although the public sector performs multiple roles in this segment, most of these are done in the context of mango processing rather than in the fresh mango processes.

Nonetheless, some public sector organizations still support fresh mango activities through export preparation consultancy and some mediation between suppliers and exporters. In addition, public sector intermediaries may provide market consultancy and support for market mediation and brokerage for domestic sales. Still, the more common roles are performed for mango processing.

Different technologies come into the fray as this segment introduces food product processing. With the decline in fresh mango exports, many public sector intermediaries provide technologies for various processed products that require fewer certifications and more lenient adherence to certain production standards. Hard technologies are brokered or provided for by HVCDP, PHILMECH, and DOST-ITDI. The first of the three has established several community processing facilities in different parts of the country to

allow smaller mango-growing communities to produce their own simple processed products. However, one caveat to these facilities is that they are not yet commercially viable in the long term and may not be mass marketed yet. In addition, these facilities are typically unable to achieve most if not all the necessary FDA standards and certifications for processed food products yet.

Nonetheless, the HVCDP is working towards instituting future facilities that may achieve these. For the PRIs, they may broker or provide the technology necessary for processed mangoes. One of the more common technologies available and availed are fruit drying technologies. Although both PRIs may not provide the machinery for these directly, they assist by mediating, brokering, and sometimes provide some resources for adopters and machinery manufacturers. Moreover, both intermediaries provide business consultancy and provide business proposals. DOST-ITDI also provides packaging and product sample support for its stakeholders when requested. Depending on the products, DOST-ITDI may prototype these in partnership with the technology adopter.

Besides machinery, several public sector intermediaries provide soft technologies like training on product processing or creating new products. For example, ATI, PHILMECH, and GNCRDPSC are very active in this activity by brokering and providing several resources for interested adopters' training and knowledge development. This training focuses on more easily viable products, like processing dried mangoes and mango wine, juices, or pastries. Another form of brokerage that intermediaries may perform is intersectoral upgrading. An example is PHILMECH's adaptable technology utilizing mango peels for pectin production as a food thickening agent or stabilizer.

As with role performance in this segment's fresh mango activity portions, public sector intermediaries may use market mediation to connect the previous and the succeeding parts of the chain for product processors. Another form of mediation is that the intermediaries may introduce or connect possible adopters to financing agencies or other organizations that may provide technologies (e.g., HVCDP or GNCRDPSC introducing or forwarding prospective adopters to PHILMECH for drying facility technologies). In addition to mediation, most intermediaries also advise viable processed products and technologies dependent on an adopter's capabilities.

The researcher finds brokerage performed by the three private sector intermediaries active in the mango trade. PMIFI brokers and mediates for itself, its members, and fresh mango suppliers for export or processing. In addition to market brokerage and mediation, PMIFI is also mediating and brokering the establishment of a state-of-the-art processing facility between itself, several of its members, the government, and foreign technology providers. Similarly, Diamond Star also brokers hard technology by providing other fruit and mango exporting companies with their VHT facility for leasing. Like PMIFI, PDE brokers and mediates mangoes for processing and tried a hand at the fresh mango export. However, its attempt to export fresh mangoes many years back was unsuccessful due to the mangoes ripening too quickly before reaching the export destination. With the possibility of losing its organic certification if it were to spray chemicals to prevent the fruits from ripening too quickly, PDE decided to discontinue its export attempts. In the processing portion of this segment, PDE brokers the opportunity for processing to its partner growers. Moreover, by ensuring that their partner produces organic mangoes, its partner processors are also brokered and provided the opportunity to claim the ability to produce organic processed mango products. Regarding resource

provision in this segment, the private sector intermediaries, specifically PMIFI and PDE, would primarily use their financial resources to transport mangoes.

Consultancy by the private sector is similar to what the public sector intermediaries may provide. These are advice on fresh mango treatment processes or processed mango products. However, from the findings, the researcher finds that very little consultancy for processed mango products and processes is provided by intermediaries that perform consultancy. The advice requested often involves the proper handling of fresh mangoes, export processes, and market information. Although PMIFI appears to be quite knowledgeable about product processing, a member claims that the association is most helpful in brokering mango supplies for their company.

In the marketing segment of the mango value chain, one may see the dominance of mediation performance, which many organizations do by finding suitable markets for their stakeholders, partners, or members. One clear difference between public and private sector intermediaries is the lack of brokerage done by the public sector. The findings suggest that the government intermediaries in the mango industry merely assist in discovering potential markets, both domestically and internationally. Several like HVCDP report that it helps small growers with pricing. But final decisions on whether a trade will occur are dependent on the buyer and producers or manufacturers. Similarly, PHILMECH and DOST-ITDI provide some market mediation assistance for adopters of processed mango or mango-related products their institutes generate. Moreover, the PRIs may mediate for their technology manufacturers by looking for potential processors or users of their developed machinery.

The private sector intermediaries also perform mediation roles like their public sector counterparts. Again, the researcher finds the SMGs similarly performing mediation as they did in the previous segments. However, a difference between the two general intermediary groups is the brokerage that some private sector organizations provide for themselves or their members. PMIFI, Diamond Star, and PDE broker transactions between domestic and international partners and buyers to market fresh or processed mango products. Having members in logistics and freight transport, PMIFI also provides brokerage, mediation, and consultancy on domestic and international shipping of produce.

In the final global market/export segment of the mango value chain, the researcher finds the direct presence of four intermediaries that participate. These intermediaries are GNCRDPSC, PMIFI, Diamond Star, and PDE. The three private sector intermediaries involved in the segment export fresh or processed mango products to various countries. Primarily, the four intermediaries perform brokerage roles, with the three private sector intermediaries also performing either consultancy or mediation. GNCRDPSC performs, especially in the past, its brokerage role by conducting R&D on the absence of seed and pulp weevils that led to the capability of the country to export mangoes to the US, Australia, and other countries. Although the institute did not directly negotiate between the growers, exporters, and foreign importers, it still addressed a critical factor that led to the successful transactions and agreements to export Philippine mangoes.

Conversely, the brokerage performed by the private sector intermediaries revolves around the more conventional idea of brokering sales between markets. PMIFI would act as a broker for its members when necessary and broker exports for itself. Diamond Star brokers between itself, its mother organization in Japan, other foreign importers, and,



indirectly, Philippine mango growers. Likewise, PDE brokers between foreign buyers looking for organic or fair-trade processed mango products, capable local processors, and partner growers. The difference between the direct or indirectness of brokering for local growers between Diamond Star and PDE is PDE's fair-trade certification. Being part of a fair-trade organization, PDE would need to provide information on who their growers are. Because their growers receive fair-trade premiums, there is a more direct relationship between the growers and the foreign buyers. Moreover, as their PDE's success grows, more buyers are interested in partnering with them, leading to the need for PDE to mediate between the needs of foreign buyers and local suppliers.

For consultancy, PMIFI and Diamond Star have been quite active in providing these, especially to growers and organizations interested in entering foreign markets. Each may have specialized knowledge, like Diamond Star for Japanese markets. In addition, these intermediaries provide advice and information on requirements that different markets may have, like restricted chemicals, certifications, and necessary standard packaging.

The absence of more public sector intermediaries in this segment is not as surprising, at least for the participating organizations. Many of the targets set in the government's mango industry roadmap are not necessarily export-related actions but the rehabilitation of the local industry. The government may focus on export revival by focusing on production development, product enhancement, and expansion. With the current situation where many growers are not yet organized, GAP-certified, chemical-reliant, and combatting numerous pests and diseases, public sector intermediaries will need to prioritize changing practices and cultures for the country to return to its former

glory as a top mango exporter. Nevertheless, other public sector intermediaries participate or support the industry in the global market or export segment. However, the researcher was unable to receive their participation in this study. Still, many of those participating in this study are vital public sector intermediaries for the industry.

The researcher finds that intermediary roles performed are affected by the processes and inputs necessary for actors to participate in each value chain segment when analyzing individual segments. For example, intermediaries supporting the Philippine mango industry respond with appropriate roles depending on specific needs. However, an intermediary's response also hinges on their organization type and purpose. For example, public sector intermediaries are mandated to provide mango production materials or generate technologies but link adopters to manufacturers. SMGs perform consultancy and mediation roles but offer limited brokerage and resource provision roles because of their online nature in response to the value chain. Nonetheless, the previous section on intermediary types showed that SMGs may still perform brokerage. This is not as clearly visible in the context of a value chain.

Moreover, the researcher finds that certain segments induce the performance of several intermediary roles. For example, brokerage and resource provision roles are performed more in the input supply, post-harvest, and fresh and processed mango segments than the other segments. Scrutinizing these three segments, one finds the entry and acquisition of more hard and soft technologies. Other segments appear to be applications of acquired knowledge and technologies supported by technical advice and adjustments. To distinguish brokerage in the three segments further, brokerage in the

other segments often involves market or sales brokerage instead of technology or knowledge acquisition.

A critical pattern the researcher finds is the near-perfect participation of almost all value chain segments by the participating intermediaries, especially the private sector organizations. This may indicate that intermediaries understand the need for an integrated approach to providing support to their stakeholders, members, and intermediation partners. The integrated approach is primarily performed through their mediation and consultancy roles based on the roles mapping. Mediation involves introducing value chain actors to input supplies (e.g., machinery and equipment manufacturers or companies, agrochemical suppliers, mango production input providers, credit providers), and intermediaries may mediate between value chain segments by connecting actors to one another under market mediation. Although not all intermediaries, especially the public sector ones, perform mediation in the segments they are present in, those that integrate the value chain this way.

As the other chain integrating role, intermediaries perform consultancy in virtually all parts of the value chain. Although not all intermediaries provide advice in all segments, the researcher finds that consultancy is vital because it provides value chain actors a better sense of how integrated the industry is. Moving across the chain, one may notice that the consultancy provided may not only cover the segment where the service is requested but also seems to factor in the end market that the grower or product manufacturer desires to send their product. If export markets are the goal, the advice provided throughout the chain varies and works specifically towards certain markets. Nonetheless, there are still baseline improvements that the industry needs to develop, like

the need for tree rehabilitation and pest prevention and elimination. In addition, public and private sector intermediaries may provide for a difference in consultancy focus. Based on the data gathered, public sector intermediaries may focus on providing more general production improvement advice. In contrast, private sector intermediaries may offer specific advice on certain markets that growers or manufacturers hope to enter. Providing consultancy in the manner specified may mean that intermediaries in the mango industry approach their work in the value chain in an integrated way rather than focusing on individual segments.

Finally, the researcher finds that certain intermediary services are not captured effectively when attempting to understand intermediary roles in value chains. As value chains focus on the production process, intermediary services like R&D, community organizing, and lobbying may be left unseen. Although brokerage through R&D results was mentioned earlier, the role may be understood as more of an effect of R&D. Community organizing, like that performed by PDE, helps achieve scale economies and some form of uniformity in produce. Lobbying, which may result from industry consultations led by HVCDP, may ultimately help create a better institutional environment for the entire industry. These activities are not readily gleaned by focusing on the value chain alone, as these services may not directly add value to a product. Nevertheless, these services reveal roles that intermediaries may perform to affect the overarching innovation ecosystem for the industry.

The researcher finds that individual segments may not directly affect the added presence or development of certain key-capabilities on the effect of value chain segment support and participation in an intermediary's key-capabilities. Instead, the findings

support Sutthijakra and Intarakumnerd's (2015) in that key-capabilities are built based on the roles performed, which may be informed in the mango value chain by the participation in the broader sense of the chain rather than individual segments. In other words, intermediary role performance is a middle ground for key-capabilities and value chain segments to interact. The researcher deems that intermediaries establish knowledge-building and management capabilities as bases for value chain participation and support. Moreover, the intermediaries apply external networking and internal communication capabilities to move through the various segments in response to how their organization may perform to address industry needs and their mandates.

Tackling knowledge-building capabilities first, the most important aspect of this for intermediaries is to learn and understand the intricacies of the mango value chain. Without understanding the processes involved in every segment and how they link to succeeding processes, intermediaries will find it difficult to know what services to provide and what skills and knowledge they need their staff to learn. Moreover, their knowledge-building capabilities are built further through consultations with stakeholders and partners by learning about issues that hinder innovation and upgrading. By learning all these, intermediaries also apply their knowledge-building capabilities by performing roles that showcase their programs, services, and expertise. For instance, PRIs like DOST-ITDI and PHILMECH apply this capability by developing food processing technologies or better transport logistics. Knowledge is abundant in the Philippine mango industry, and many intermediaries are aware of it. The high consultancy performance throughout the chain suggests the richness of knowledge and the need to share it with many in the industry. Therefore, another aspect of knowledge-building capability

application may be an intermediary's ability to sift through the depth of information and provide stakeholders, members, and partners with the appropriate knowledge they need.

The innovation intermediaries also build and employ their management capabilities in applying their knowledge-building capabilities. The application of management capabilities may depend on the type of intermediary and services offered more than where an intermediary participates. For example, public sector intermediaries manage their programs under stipulations mandated by laws that create their institutions or offices. For PRIs, protocols and processes are in place to manage R&D projects and diffusion technologies. Given their online nature, SMGs build management capabilities that allow the group to manage posts better and ensure that the group's purpose remains intact.

Apart from an intermediary's type and services, the researcher notices that activeness in the export market may play a role in how an intermediary builds and applies its management capabilities. Taking Diamond Star and PDE as models, one may observe a more proactive stance taken by the organizations as they advance through the value chain processes. These two intermediaries are stricter as they abide by the international standards and certifications they received or required for their products. International requirements inform their management capabilities, and the intermediaries try to incorporate and diffuse international practices in their operations and partners.

Nonetheless, a critical aspect of effective management capabilities application may be human resource development. As in the experience of PMIFI, the researcher deems that the organization may be more successful if it was able to build its human resource base. As an industry association involved in the export market, PMIFI has had

difficulty managing its network and services in recent years. This is possibly due to the association being run by just one person. Although it does serve its members, the building and application of its management capabilities appear to shift towards more mediation and brokerage of fresh mango supply than industry cohesion, as many other intermediaries in previous literature do (van Lente et al., 2003; Intarakumnerd and Chaoroenporn, 2013a, 2013b).

Moreover, to sustain its operations, PMIFI looks like it is incorporating itself into the value chain by being a market player. However, doing such does not necessarily mean that the value chain directly affects PMIFI's management capabilities. Instead, the researcher finds that the management capability building and application direction are set by the remaining organization officer's professional experience.

Another important facet of management capabilities visible in the value chain for a vast majority of the participating intermediaries is full chain presence or possibly full chain management. Many intermediaries appear to practice whole value chain approaches in the intermediation that they perform. Although not all are involved in the export market segment, we may still consider these whole chain approaches as the domestic market is an end market on its own. Even if most other public sector intermediaries are not involved in the assembly and trade segment except DOST-ITDI, many try to provide mediation services that link the production segments to those that involve end market trades. Several intermediaries may still apply their management capabilities in specific segments by providing process-specific training or technologies (e.g., providing HWT and VHT treatment facilities or setting up community processing facilities). However, these may be more effective when provided knowledge links previous and succeeding steps of a

value chain. Given the somewhat sensitive nature of mangoes, especially fresh ones, intermediaries need to adjust to the very integrated nature of the mango value chain by building their management capabilities as a chain-encompassing one.

The researcher observes that external networking and internal communication capabilities are built more as they are applied in the mango value chain work. These two capabilities are conveyed as intermediaries diffuse and provide technologies and resources, mediate trades, and connect actors within and in different value chain segments. Moreover, the specific application and building of these key-capabilities appear to be more informed by an intermediary's type and their mandates and required roles than by supporting any particular value chain segment. For example, ATI and HVCDP employ and build internal communication through their network orchestration that they need to supervise throughout the entire value chain. These two intermediaries require network expansion for external networking to achieve countrywide diffusion of programs, technologies, financing opportunities, and other hard and soft resources. As online platforms, MFP and PMRH widen their and their members' networks by being part and actively searching for possible clients and partners in the group. Although the administrators are not active in member promotion, the group can acquire new members who participate in various mango industry segments as current members endorse the group to their contacts from the various value chain segments. In the case of the three organizations that are also active players in the market – PMIFI, PDE, and Diamond Star – they build and employ external networking in similar ways like actively looking for new international buyers and local suppliers and in building a reputation by maintaining and delivering products that achieve international standards and certifications. Especially for PDE and Diamond Star, adherence to standards has been critical as these have



garnered them additional clients internationally. For the internal communications of the three active players, they must maintain relationships with their suppliers, members, and partners by ensuring that they, as intermediaries, address their expectations of them. For PMIFI, members would rely on the association to aid in searching for fresh mango suppliers.

In the same way, many suppliers have relied on PMIFI to provide fair prices when mangoes are purchased for the association or brokered for members. Similarly, Diamond Star and PDE maintain trust with suppliers through site visits and consistent purchasing, with PDE purchasing above trader prices and providing fair trade premiums. In addition, Diamond Star is active in updating its suppliers on changes in requirements of their markets and provides advice to help their partners adjust their growing procedures.

Another application of external networking and internal communication capabilities that the researcher finds are those not evidently seen in the value chain at first glance but still quite relevant to the purpose of several intermediaries. Several of these roles and actions were reported earlier in the roles and value chain sub-section. Using several instances as examples for this point, one may take R&D conducted by PRIs. Besides building and maintaining their technology diffusion and resource provision network, PRIs highlight their network expansion to gain R&D collaborations with other local and international institutions. By properly managing their R&D work, the PRIs also maintain and build their internal communication capabilities as they continuously foster and have added collaborative work and staff opportunities with current partners. PDE exhibits an additional way these key-capabilities are built. Its partnership with the PREDA Foundation provides the NGO with additional networks to help promote its cause.

Similarly, PDE shares its current network to help support the operations and programs of the PREDA Foundation. According to its representatives, PREDA's international partners conduct immersion programs and provide community development initiatives (e.g., communal toilets, water systems, housing material aid) to the mango growing community partners of PDE. In doing so, PDE also develops and maintains its relationship with its partners. Capability-building activities and opportunities like these are not immediately visible in a value chain as these do not always have a direct effect on value chain processes. However, these still are part of an intermediary's key-capabilities.

The research argues that participation and support in individual mango value chain segments do not directly build intermediary key-capabilities. However, if an intermediary were an active market player in the chain, there may be some effects. Nonetheless, as innovation intermediaries, the researcher finds organization type, their purpose or mandate, and roles more directly inform and contribute to the building and application of key-capabilities. These factors may act as the middle ground for key-capabilities and value chains. Through the interaction of these three factors with the value chain, key-capabilities may be built incorporating the context of the value chain.

Moreover, although individual segments may not directly affect key-capabilities, the value chain entirely affects how intermediaries build their key-capabilities. The researcher finds that the knowledge-building capabilities of the mango industry intermediaries act as a base that allows them to learn about the value chain processes, the participation hindrances of their stakeholders, and the applications of their built knowledge. Through learning, intermediaries build and employ their management capabilities. One aspect of the mango value chain that informs their management

capabilities is the integrated nature of the mango production process. Because of the ripening sensitivity of the fruit, intermediaries appear to build their management capabilities in a more chain-integrated or encompassing approach, as evidenced by the very active presence of the participating intermediaries in almost all segments of the mango value chain. For external networking and internal communication capabilities, intermediaries build and apply these as they move between processes in the value chain and connect actors. Another critical point to highlight for these two key-capabilities is their applications outside of value chain processes.

### *6.5.3 Role performance and key-capability building as an export market-oriented industry*

To develop a case for intermediary role performance and key-capability building in an export market-oriented industry, the researcher utilizes the findings from the previous two sections to present what intermediaries may prioritize. Following Intarakumnerd and Chaoroenporn's (2013a) work, Table 6.11 presents the priority roles and services intermediaries in the Philippine mango industry may prioritize. Moreover, the table adds requirements that may be necessary for intermediaries and the entire industry to ensure successful intermediation and industrial development. Succeeding that is Table 6.12 that presents intermediary key-capability building to support further the role performance of intermediaries in an export market-oriented industry.

Table 6.11 The Roles Performed by Innovation Intermediaries in the Philippine Mango Industry, an Export Market-Oriented Industry

	Roles	Intermediary Services	Requirements to Work Properly	Requirements for Industry
Public	<ul style="list-style-type: none"> <li>• <b>Broker</b></li> <li>• Consultant</li> <li>• <b>Mediator</b></li> <li>• <b>Resource Provider</b></li> </ul>	<ul style="list-style-type: none"> <li>• Standards and certification monitoring, promotion, and acquisition support</li> <li>• Technology generation (for PRIs)</li> <li>• Facility, inputs, and machinery funding</li> <li>• Industrial and support policies</li> <li>• Technology adoption advice and training</li> <li>• Extension service provision</li> <li>• Network orchestration (For GAs)</li> <li>• Clustering promotion and development</li> <li>• Export advise and promotion</li> <li>• Price mediation</li> </ul>	<ul style="list-style-type: none"> <li>• Clear government mandate</li> <li>• Consistent public funding</li> <li>• Raise R&amp;D funding for more urgent production issues</li> </ul>	<ul style="list-style-type: none"> <li>• Having and adherence to common goals for the industry</li> <li>• Professionalized organization management and development</li> <li>• Willingness to invest to achieve certifications and standards</li> <li>• Export market-oriented mindset</li> <li>• Further developing industrial clusters and strengthening existing ones</li> <li>• Having a mango-specific export promotion policy or program</li> </ul>
Private	<ul style="list-style-type: none"> <li>• Broker</li> <li>• <b>Consultant</b></li> <li>• <b>Mediator</b></li> </ul>	<ul style="list-style-type: none"> <li>• Standards and technology promotion and acquisition</li> <li>• Technology diffusion and advice</li> <li>• Export requirement advice and promotion</li> <li>• Extension service provision</li> <li>• Market network linkage</li> <li>• Demand articulation and sourcing</li> <li>• Financial management support</li> <li>• Organizational development support</li> </ul>	<ul style="list-style-type: none"> <li>• Sustainable funding source</li> <li>• Professional organizational management and adequate human resources</li> <li>• Industry response and cohesion</li> </ul>	

Note. The researcher based the format of this table on Intarakumnerd and Chaoroenporn's (2013a) delineation of roles performed by public and private sector intermediaries. Italicized and the bolded text indicate suggested focus for intermediaries. The data for this table is drawn from the interviews and an FGD with respective organization representatives and triangulated through other data sources.

Table 6.12 The Key-Capabilities Built for Innovation Intermediaries in the Philippine Mango Industry as an Export Market-Oriented Industry

	Public	Private
External Networking	<ul style="list-style-type: none"> <li>• Open avenues for industrial consultation and contact</li> <li>• Adopt and continue using new lines of communication (social media, video streaming platforms, online platforms, R&amp;D online groups)</li> </ul>	<ul style="list-style-type: none"> <li>• Searches for and builds relationships in export markets and growers from other mango-exporting countries</li> <li>• Open to interacting with local and foreign growers, traders, and processors</li> <li>• Adopt and continue using new lines of communication (social media, video streaming platforms, online platforms)</li> </ul>
Internal Communication	<ul style="list-style-type: none"> <li>• Harmonize and coordinate policies, plans, and directives with regional/local counterparts, other agencies, and industry</li> <li>• Continue relationship with technology adopters</li> </ul>	<ul style="list-style-type: none"> <li>• Several tend toward supply competition</li> <li>• Build communication skills of staff</li> <li>• Need for actual demonstrations</li> <li>• Need to communicate global demand</li> </ul>
Knowledge-Building	<ul style="list-style-type: none"> <li>• Experts come from various fields but may need more specialized staff</li> <li>• Promotes innovations and upgrading that provide export opportunities</li> <li>• Learn and communicate end-market demands</li> <li>• Learn from national and global networks, and share knowledge, especially on exporting</li> </ul>	
Management	<ul style="list-style-type: none"> <li>• Clear mandates and a sustainable budget</li> <li>• Adjusts to client needs (i.e., specific export countries or non-export)</li> <li>• Human resource development and management are vital</li> <li>• Passion for service of the country</li> <li>• Make export a target</li> </ul>	<ul style="list-style-type: none"> <li>• Business and operations management skills help tremendously</li> <li>• Shifts toward processed products or other fruits for value-added or and to ease global trade restrictions</li> <li>• Make export a target</li> </ul>

Note. The data for this table is drawn from the interviews and an FGD with respective organization representatives and triangulated through other data sources.

The researcher finds that specific roles appear to fit either public or private sector organizations in intermediation, starting with role performance. The researcher notices that public sector intermediaries appear to be more dominant in providing intermediation based on the findings. However, the dominance may be due to the private sector's lack of a unifying force. Although the public sector leads network orchestration and technology development, the private sector still has a significant role in intermediation. The industry cannot simply rely on the government to provide all the innovation intermediation needed, so a delineation and prioritization of roles are proposed.

For the public sector intermediaries, the researcher finds and argues that they may prioritize performing brokerage, mediation, and resource provision roles. Compared to Intarakumnerd and Chaoroenporn's (2013a) findings, brokerage appears to take a more significant part in the role performance of public sector intermediaries in the mango industry. These intermediaries often broker mango production equipment, financing opportunities like the mango tree rehabilitation credit, community processing machinery or facilities, training opportunities, intersectoral upgrading opportunities like beekeeping and waste materials, foreign market opportunities, and collaborations and partnerships between industry actors. Quite often, brokerage is performed in conjunction with their resource provision roles as many of these technologies and inputs may be freely provided for by the public sector intermediaries. Mandated and providing the budgets, the public sector intermediaries have a better hand at offering these resources and technologies to various industry actors. Apart from those mentioned, resource provision may also come in the form of R&D by PRIs.

As public sector intermediaries perform brokerage and resource provision roles, they may also practice mediation. Although an information-sharing system exists between public sector intermediaries, they still need to mediate and coordinate the provision and brokerage of technologies and resources, especially those that do not originate from their organization. For instance, when HVCDP requires quality planting materials, it must mediate between the GNCRDPSC that produces these and local government counterparts to ensure the proper transfer and allocation of resources. Moreover, GAs and PRIs may mediate to connect their stakeholders or introduce them to markets, credit institutions, input suppliers, or machinery manufacturers. In addition, these organizations mediate export markets by hosting, sponsoring, or inviting adopters to international trade expos or missions, like those done by PHILMECH, DOST-ITDI, or by the DTI. Additionally, public sector intermediaries, especially the DA through the HVCDP, may take the lead in mediating the industry by orchestrating the mango industry network to address some of the prevailing discordances. Although annual summits and industry consultations occur, greater mediation or a recognized leadership role may be required from the different public sector intermediaries.

Contrary to Intarakumnerd and Chaoroenporn's (2013a) findings, the researcher finds that public sector intermediaries may lessen their priority in performing consultancy roles. This is not to say that the public sector need not perform consultancy anymore. Instead, the argument proposed is that these intermediaries focus on the three other roles but still provide consultancy, albeit minimally or take the initiative to conduct or host more industry-wide consultations. One reason for proposing such is the scale of service delivery required of the public sector. As these intermediaries cater to the entire industry, performing roles that may target a broader base will be ideal. As consultancy may be

individually catered, the private sector intermediaries may be better suited for such a role. Nonetheless, consultancy performance by the public sector will still be necessary as these intermediaries also house vital knowledge and expertise, as in the case of PRIs. One way for these intermediaries to make their advice more readily available would be to turn knowledge into widely available protocols or self-study modules, like ATI's video streaming platforms, and upload self-study modules on their e-extension website.

For the private sector intermediaries, the researcher finds them to be more suited to performing consultancy and mediation roles. Although brokerage is mentioned, public sector intermediaries are deemed more suitable for that role, especially in brokering and technological innovations. However, private sector intermediaries, especially IAs, NGOs, and Firms, may practice the brokerage of export markets, which is not necessarily done by their public sector counterparts. Coming from the experiences of PMIFI, PDE, and Diamond Star, the researcher, sees that these organizations may understand the export market more than other intermediaries. Thus, brokerage by the private sector may focus more on ensuring export market penetration, while the public sector brokers technologies to develop the domestic side of the industry. In addition, private sector intermediaries may support the diffusion of sectoral innovation and upgrading by brokering these to their stakeholders or members, especially those technologies that are made available through government support programs or those offered by public sector intermediaries.

Coupled with brokering, private sector intermediaries may perform mediation. The performance of this role may primarily come in the form of market mediation, especially in linking with the export market. The experiences of PDE and PMIFI relay how they would discuss terms and requirements for fresh and processed mangoes and



mediate these to suppliers in the Philippines. Moreover, market mediation may also be done in domestic market mediation. Many more private sector organizations participate, like SMGs acting as mediation platforms and PMIFI mediating trades between its members and fresh mango suppliers.

Another form of mediation is organization and representation when the intermediaries organize communities or stand as representatives for their members. These are most evidently seen in the experiences of PDE, MFP, PMRH, and PMIFI. PDE's experience shows it organizing indigenous peoples' groups into mango growing communities and acting as the representative for their partners in front of its foreign fair trade and organic certifiers. The two SMGs mediate the group's organization by setting the rules of how the group will operate. PMIFI stands as a representative for its members during government consultations.

In terms of scale, mediation performed by private sector intermediaries focuses on more organizational and individuals, while public sector intermediaries prioritize larger, macro-scale impacts. Although the public sector may provide individual or organization-specific mediation, these are often rarer than conducting mediation that targets a larger constituency. Mediation is highlighted for both types of intermediaries as they offer and may specialize in addressing mediation needs on varying scales.

Consultancy roles are suggested to be better suited for private sector intermediaries because of their capability of providing more individually specific advice. Compared to the public sector, staff in private sector intermediaries may provide more time per individual grower or value chain actor. Although public sector intermediaries like GNCRDPSC do offer excellent personalized advice, their limited human resources

cannot be focused on such work all the time as they are also tasked to conduct R&D and other industrial development projects. On the other hand, private sector organizations are specifically tasked to provide these kinds of advice to their members and should have set human resources that must do the task. Organizations like Diamond Star and PDE have agriculturists whose jobs are to visit and advise their partner growers on issues. MFP and PMRH members offer advice based on their experiences, and the administrators also provide teleconsulting to new growers. It may also help that intermediary members and partners often have a stronger sense of familiarity with the advice providers as the staff need to immerse themselves in the communities or, in the case of the SMGs, advice-givers are also mango growers. In addition to production advice, another form of consultancy that the researcher finds the private sector more adept in is providing advice on exporting, especially in maintaining international standard practices. As those involved in exporting either conduct it for themselves or others, these intermediaries always keep themselves updated on the latest developments abroad to ensure that they can achieve export requirements. These developments are always shared with partner producers or processors. Moreover, these intermediaries are approached by others interested in exporting to learn.

Regarding resource provision, this role is left unmentioned. As a result, this study's private sector intermediaries' resources appear comparatively less than the extent of industry-related resource provision that public sector intermediaries may provide. Nonetheless, private sector intermediaries, like PDE, may offer non-industry-related resources in the form of community development assistance.

In performing the suggested roles better suited for public and private intermediaries, suggestions for specific services may help in their role performance. For example, a common service for both intermediaries in promoting and acquiring standards and certifications is necessary to uplift mango producers and food processors. The industry must adhere to and attain certain global standards and certifications as it seeks to revitalize its export potential. Although both intermediaries may promote these, the researcher finds that certain intermediaries may be better suited for specific actions. For instance, PHILMECH and DOST-ITDI may show greater support in helping food processing firms or communities attain GMP or other food safety certifications. ATI, HVCDP, and GNCRDPSC push for Global GAPs for Mango standards and, most importantly, monitor the continued adherence of growers to it.

On the other hand, the private sector may focus on more country-specific or specialized certifications such as particular export requirements of Japan and South Korea, certified organic, British Retail Consortium, or fair trade. These intermediaries may also take on the task of monitoring adherence to these specialized standards and certifications. Nonetheless, intermediaries that cater to an extensive constituency base like the SMGs may focus on promoting more industry-encompassing standards like the GAP. Public and private intermediaries may also promote and monitor standards and certifications in their extension services.

Both intermediary types may have more specified services in terms of technological innovations. Technology generation may be undertaken and led by the PRIs as few private research institutes specialize in the mango industry. Moreover, the public sector may lead the provision of better-quality mango production inputs and farm

machinery for clustered grower groups. And, as HVCDP does, continue to establish community processing facilities but tying up with other intermediaries to achieve necessary processing standards. Although advice may be provided for technologies, private sector intermediaries may be better suited to learning and providing grower-specific consultancy. Moreover, the private sector organizations may articulate the technology and training demands required by the industry that the public sector organizations may provide. With the provision of these technologies, private sector intermediaries may also have the task of convincing their members and partners to adopt these technologies and diffuse adoption further by showcasing the success of their constituency as examples.

For type-specific services that may support the innovation ecosystem, public sector intermediaries may help create industrial policies backed by industry consultations and demands articulated with the help of private sector intermediaries. For example, as the DA's 'no cluster, no assistance' policy slowly extends to more crops, public sector intermediaries may assist mango growers by providing them with information on forming these organizations. The private sector may then provide training and monitoring services that teach these groups how to manage and develop their organizations properly.

Another form of support possible would be setting standard pricing for fresh mangoes, creating a healthier trade environment. As suggested by several interview participants, one concrete method of doing such may be establishing determined buying stations that offer standard trade pricing as is done in other Southeast Asian countries. Conversely, private sector intermediaries may continue to support the market by brokering trades between its constituents, suppliers, or buyers. As the broker and mediate

market and network linkages, it will also be crucial for the intermediaries to ensure fair prices are settled. Finally, although trade negotiations in SMGs are not meddled in, MFP and PMRH may help its members by providing them advice or resources on standard or average prices for the different grades of fresh mangoes, industry-standard service fees (e.g., spraying, harvesting), and canvass prices for growing inputs.

Like Intarakumnerd and Chaoreonporn (2013a), the researcher finds several requirements to help intermediaries perform their roles. First, for the public sector, these organizations must have clear government mandates to prevent overlapping work between intermediaries. The current setup shows that the intermediaries have their niches with HVCDP conducting overall industry orchestration, ATI on extension services and skill improvement of local implementers, GNCRDPSC, PHILMECH, and DOST-ITDI on a variety of R&D generation and diffusion. One potential danger is the implementation of the Mandanas ruling that may strip HVCDP of some of its mediating and brokering powers. However, it is currently unclear what will be taken from the office. If the industry wishes to attain clearer mandates, these issues need to be addressed soon, as discordance between public sector intermediaries may occur. Apart from a clear mandate, these intermediaries also require consistent public funding. This is where they draw the financial resources to provide and generate the technologies and resources for the industry. Related to public financing, the mango industry will need to clamor for more R&D funding to find solutions to pressing production-related issues like the cecid fly or lengthening the ripening period for Carabao mangoes.

Similarly, funding may be a requirement for the private sector intermediaries. Seeing the experiences of PMIFI, MFP, and PMRH, a lot more support may be given if

they had a more sustainable source of funding. Compared to the three organizations, PDE's sustainable revenue generation allows the intermediary to extend and improve its role performance to cover even non-mango-related assistance. Coupled with funding, a more professional approach to organizational management and having adequate human resources are critical requirements for success. From the experience of PMIFI, the lack of a management team or staff to oversee the association's support may be hampering its capability as an intermediary.

Nonetheless, a similar point may be made for several public sector intermediaries like HVCDP, where staff is assigned to oversee the network of several crop industries. Finally, another critical requirement the researcher finds is the need for industry response and cohesion. By industry response, the researcher means having intermediary partners or members positively respond or comply with outcomes set with the intermediaries. For example, Diamond Star ceased to provide any more inputs to its mango growing partners because these did not yield good results. On the other hand, if the mango growers put more effort into adhering to the firm's requirements, Diamond Star may have provided even more resources to help the growers develop.

For industry unity, intermediaries, in general, may have difficulty providing their services if the industry itself does not agree on the collective industry's direction. This point also marks a requirement that the greater Philippine mango industry must address for innovation intermediation to flourish and for many actors to develop. First, with the government's lead, the industry slowly sets common goals for everyone to strive for. However, the researcher finds that greater representation may be necessary as many individual growers interviewed are not aware or are still uninterested in participating in

this endeavor. Next, if export revival is a common goal, industry leaders may need to do greater work in developing and diffusing an export market mindset with the mango growers. Coupled with this perspective is the need for greater willingness to invest time and finances to achieve and adhere to global standards and certifications. In line with this, it is encouraged that the industry also invests in R&D to support research that addresses pressing production challenges. Finally, the industry will also need to develop and professionalize the management of clustered mango growers, processors, and communities.

To perform the suited roles and provide the suggested services better, intermediaries in the mango industry need to develop their key-capabilities. From an export market-oriented perspective, the researcher finds several points for the four key-capabilities that intermediaries may need to improve intermediation. First, for the external networking capabilities of the public sector, the researcher finds that these organizations may need to open their network availability more so than before. As the government seeks to revitalize the mango industry, it needs to communicate its new and available programs to the industry as effectively as possible. One proposed way of doing such is through the adoption and continued use of newer lines of communication like having various social media pages, video streaming channels, or participation in online local and international platforms.

However, the activeness of the intermediaries on these platforms is only critical. Having assigned staff responds to inquiries and messages on time is necessary. Thus, investments in network expansion demand participation and human resources. Several intermediaries like ATI, PHILMECH, and DOST-ITDI have these pages and networks

available but vary in activeness. On the other hand, HVCDP and GNCRDPSC, although members of several mango networks are difficult to get in touch with online. These two intermediaries may benefit tremendously from opening their institutions in the social media sphere. Having web pages and social media accounts may help push for export development and partnerships in an industry that requires global communication. In the same way, private sector intermediaries need to boost their avenues for communication to build their membership network and industry contacts, both locally and abroad. The SMGs are viable spaces for public and private sector intermediaries to connect and expand their networks.

Particularly for private sector intermediaries, the continued search and participation in export market networks help build the global market potential of their stakeholders. Doing so builds knowledge and trust in possible mediation and brokering of trades. Moreover, being part of these international networks opens the possibilities for diffusion and collaboration for mango-related technologies and adaptive practices. However, the network is also not limited to global networks. Participation and introduction to local R&D networks may be beneficial too in addressing and developing better products for the intermediary and its stakeholders. PMIFI, PDE, and Diamond Star exemplify the benefits of actively engaging with various global and local actors. PMIFI is developing a processing facility backed by technologies from other Southeast Asian fruit-producing countries. PDE's network with local processors and foreign buyers enabled the intermediary and partner communities to expand their processed mango product lines slowly. They are also developing other processed fruit products. Diamond Star engages its sister companies to help train their staff and adapt their learning to the Philippine setting as the local staff conducts monitoring and extension visits.



Investments in developing intermediary external networking capabilities will also likely positively affect their internal communication capabilities. These new networks will eventually turn into relationships that need sustaining through proper communication and maintenance of trust. The public sector intermediaries must harmonize and coordinate the implementation of policies, plans, programs, and directives with their regional or local counterparts, other agencies, and industry actors. As orchestrators of industry and R&D networks, the GAs and PRIs must develop the staff skills for effective communication. An important aspect of internal communication capabilities is effectively communicating changes or new opportunities to the industry. The use of social media may be effective in bridging this information as it may cover a broader range of their network. Moreover, being active and responsive through these accounts may breed transparency and show the progress of their work.

Another critical facet of internal communication, especially for PRIs, is their continued relationship with technology adopters. The three PRIs participating in the mango industry are in contact with their adopters and, at times, even ask them to provide demonstrations for other potential adopters. PHILMECH and DOST-ITDI also publish success stories of their adopters on their social media pages. Sharing these stories helps diffuse helpful technologies and convince more value chain actors to adapt and innovate their businesses.

Private sector intermediaries may do a similar method to promote effective diffusion communication. Coming from the interviews, the researcher found that many value chain producers, especially growers and contractors, become more interested in adopting certain practices when someone describes their success. In the MFP group,

growers that successfully produce good quality mangoes through the advice of the administrator or others often post about their successful harvests and share the changes they incorporated. Through posts like these, other members become interested and attempt to adopt changes the poster had made. PDE does something similar to convince others to adopt organic farming practices in their growing communities. As expected, this method would be effective if there were successful adopters. In the case of Diamond Star, although one trusted supplier attempted to adapt their learning from abroad, they were unsuccessful in producing better quality mangoes. Intermediaries will need to first coordinate with their early adopters and produce results that may influence others to adopt. In a similar light, intermediaries looking to support export development will need to communicate the successes of others too.

Moreover, building the skills to communicate global demand will be necessary. Apart from showcasing successes, intermediaries may need to explain the GVC to their partners and show how investments now will help bring more success in the long run. In addition, private sector intermediaries may employ their internal communication capabilities by mediating between those interested in entering export markets to those that already do so that these producers or firms may mentor one another. Internal communication is not limited to an intermediary conveying their services but creates and sustains a supportive network with the intermediary bridging stakeholders.

The researcher also finds that several intermediaries in the mango industry tend to compete in garnering fresh mango supplies for their members. This may hinder internal communication capabilities and networking in general for the intermediaries. Although supply matching may be a service usually provided by intermediary types, especially

industry associations, ongoing supply competition may breed ill will towards other organizations or persons. With the overall industry not as cohesive yet, it may be more effective for intermediaries, especially private sector ones, to prioritize the development of their stakeholders or provide production support. By helping build the production base of the industry, greater industry cohesion and ample quality produce may be possible.

As mentioned concerning internal communication, it would be helpful for intermediaries to relay end-market demand to their stakeholders and partners, especially for private sector intermediaries. In doing so, intermediaries also build and apply their knowledge-building capabilities. As an industry aiming to revitalize its export prowess, intermediaries involved in exporting or part of global mango networks may be essential in spreading the benefits of exporting. Furthermore, the export knowledge and process that intermediaries share may be gradually provided by aiming for markets that are easier to penetrate and slowly move towards higher-value markets that involve more stringent requirements. Nonetheless, a good intermediary would also share the challenges of transforming a grower or processor's operations to achieve export quality goods. If not aiming for export quality, intermediaries may still share information on the domestic market to allow growers and processors to learn about what customers are looking for and provide value chain producers, especially growers, the opportunity to learn and apply changes to their production.

The researcher finds that many necessary technologies and training are already available in the local mango industry. Most growers, contractors, and processors know about these requirements and innovations but need more support in financing and persuading changes in practices. More than learning about new technologies from local

and global networks, intermediaries in the mango industry may need to know more about the individual challenges and issues that their stakeholders or partners face and address these accordingly. However, simply asking about their needs may not be the best method. Coming from the experience of Diamond Star, upon learning about the lack of credit and inputs of several suppliers, they sought to provide these but was left unsatisfied with the results. It seemed that Diamond Star may have been more successful if they could monitor how these resources were used and addressed issues related to these through advice provision or training demonstrations.

Intermediaries would also require a solid foundation for their knowledge-building capabilities to apply all this knowledge. Although many intermediaries like the ATI, PRIs, and PDE have codified much of their learnings and information, all the intermediaries still require a set of professionals or experts knowledgeable in the mango industry or have backgrounds in agricultural industries. Several intermediaries cite the need for more specialized staff as the current pool of experts for the mango industry is limited, even with the many agriculturists in the Philippines. In particular, GNCRDPSC mentioned the need for entomologists, pathologists, and plant breeders not just for their institute but across R&D institutes, universities, and agricultural industries. In addition, intermediaries may expand their services and knowledge by having staff from other fields. For example, PDE exhibits a broader range of expertise among the ten participating intermediaries by having community organizers, social workers, teachers, and other professionals working or volunteering. Although these may not be directly innovation or upgrading-related, these other professionals target other development needs of their partners or stakeholders.

Managing and developing its human resource pool is also an important aspect of an intermediary's management capabilities. Both public and private sector intermediaries need to ensure that they can hire and support their staff's professional and personal growth. From the experiences of mango industry intermediaries, the organizations are at least able to satisfy these requirements as many of their staff remain in the organizations for long periods or have spent their entire careers with them. The researcher finds human resource development programs vital for public sector intermediaries in ensuring that their staff finds purpose in serving the organization. Moreover, most public sector intermediary representatives interviewed would mention the passion for service many colleagues have. In providing personal and professional growth opportunities for their staff, public sector intermediaries must also ensure that they sustain their employees' service-oriented mindset. In addition to supporting current staff, several changes may be necessary for government service work. Several intermediaries, especially the PRIs, have mentioned losing out on high potential researchers, scientists, and staff because of the lack of job security. Unable to land permanent positions in their institutions, many have left to work for private companies or other organizations that offered permanent positions.

In the same way that the public sector needs skilled human resources, so do private sector intermediaries. A difference the researcher finds is that the private sector emphasized the need for managerial staff. Nevertheless, the private sector intermediaries understand the significance of technical staff. The private sector intermediaries highlighted the need to develop their operational management skills to ensure that their organizations run smoothly and foresee and address potential operational issues as soon as possible. Although having the skills is critical, the researcher also finds that a set management team is essential. Comparing PMIFI, MFP, and PMRH to Diamond Star and

PDE, the latter seems to have wider operational bases and provide broader services and programs for their stakeholders and partners. Diamond Star extended its operations to cover other fruits apart from mangoes, and PDE provides a gamut of community development assistance projects and trialing other processed fruit products.

Another critical aspect of management capabilities would be financial sustainability. Comparing the private sector intermediaries, it is clear that PDE and Diamond Star provide the most services as they seem to be the most financially sustainable organizations. Although the other three intermediaries either earn little or not, they still operate their organizations, albeit unable to provide as many services. Still, the lack of funds for PMIFI or financial support for MFP and PMRH may stagnate the three intermediaries. The need for sustainable funding is also a vital management capability for public sector intermediaries in the same way as the private sector. However, unlike the private sector, GAs and PRIs are allocated annual budgets, making their organizations sustainable. Nonetheless, additional capabilities in their ability to justify and increase their annual budgets are what these intermediaries need to build. Additionally, the public sector intermediaries need to develop their foresight for industry needs as these budgets often take over a year to prepare.

Moreover, having clear mandates or organizational missions and purposes helps support the operational management capabilities of intermediaries. Public sector organizations have laws that create their offices, and these set the boundaries of what each institute is supposed to do. Unlike them, the private sector intermediaries are freer to set the boundaries of their intermediation. However, these are often set based on the needs of their stakeholders and partners, for whom an intermediary's mission or purpose is set.

In addition to having clear objectives and targets, both intermediary types need to build flexibility in adjusting to the needs and goals of their constituency. As the mango industry involves domestic and export markets, intermediaries must adapt their role performances to accommodate the target market. In addition to market adjustments, intermediaries may also develop their knowledge-building and management capabilities to provide food processing opportunities for their stakeholders. Given the mango industry's complexity, intermediary organizations' management capabilities may need knowledge and experience to maneuver domestic and foreign markets and understand the dynamic between fresh mangoes and possibilities for processed products.

In addition to all these requirements, it may aid the mango industry if the government would create an export promotion program specific to mangoes or other crops. Although supply-side promotion policies and programs are very present as gleaned from the industry roadmap (DA-PRDP, 2018), the researcher finds the push towards export revitalization to be lacking or simply a possible consequence of improvements in the production process. As learned from the interviews with intermediary representatives, convincing or persuading growers to abide by international standards or undergo the investments necessary for exporting may be the greater challenge.

Even without a specific export promotion policy, private sector intermediaries may still take the initiative and shift their roles towards export mediation to get growers to alter their practices leading to more exportable produce. For example, intermediaries may follow PDE and Diamond Star in ensuring that growers are given fair prices for their mangoes. These organizations' experience shows that growers paid at fair price points for organic and export-grade produce commit their practices to achieve these. However,

intermediaries need to consider another factor when supporting upstream actors: crop consolidation, allowing growers to share several transaction costs and gain a better footing when negotiating with buyers.

Nonetheless, with an export promotion policy, intermediaries may also be more direct with the key-capabilities they need to build to support their partners. For instance, programs targeting specific export markets may allow an intermediary and its partners to learn and develop its processes depending on the market they hope to achieve. Furthermore, as different countries have varying levels of chemical and physical requirements, intermediaries may assess which among the exportable countries are most achievable. With their partners, they may slowly work towards achieving stricter but higher-value markets like Japan.

In the product processing side of the value chain, export promotion of these products does not appear to be lacking. Many organizations, especially within the DTI, are active in this endeavor. Still, further R&D on processed product packaging and shelf life by intermediaries like the DOST-ITDI will aid in furthering the export of these.

## **Section 6.6 Chapter Conclusions**

The Philippine mango industry needs to address several issues to regain its place in the export market. The most pressing among its problems is the need for mango tree rehabilitation, improvements in grower production capabilities, addressing pest infestation, failure to adhere to international standards and certifications, lack of scale economies for fresh mango produce, and the need for more mango-specific R&D. Moreover, the researcher finds that the industry appears to lack a sense of unity. Many of



the problems mentioned may be solved through industry actors' innovation and value chain upgrading. Specifically, intermediary organizations' role performances may help unify the industry and accelerate innovation and upgrading. This chapter discussed how several intermediaries in the Philippine mango industry perform roles that seek to address these issues and how these organizations build the necessary key-capabilities to drive their role performance further. Role performances and key-capability building were assessed on three criteria: an intermediary's organization type, the value chain segments they support, and their presence in an export market-oriented industry.

Table 6.13 compares intermediary role performance in the Philippine mango industry compared to generalizations posited by Intarakumnerd and Chaoroenporn (2013a). The researcher generally finds consistencies in services provided by public and private intermediaries in this study and those from the original. Nonetheless, several variations were discovered by the researcher in the mango industry. Among the differences among public sector intermediaries in the significant brokerage role they performed. Moreover, as these intermediaries broker needs, the researcher finds that the intermediaries also often overlap it with the performance of other roles. For example, public sector intermediaries often perform brokerage with resource provision. These organizations perform these roles simultaneously, especially PRIs, due to public mandates responding to the industrial structure, where there seems to be a lack of resource providers, particularly hard technologies.

Table 6.13 Summary Comparison of Philippine Mango Industry Intermediaries' Role Performance

Intarakumnerd and Chaoroenporn's (2013a)			
	Original findings:	Consistencies in services and actions:	Variations in this study:
Public	<ul style="list-style-type: none"> <li>• Consultants</li> <li>• Mediators</li> <li>• Resource Providers</li> </ul>	<ul style="list-style-type: none"> <li>• Network orchestration (M)</li> <li>• Standards and certification setting, promotion, and training (B/C)</li> <li>• Provision of training and farm inputs (RP)</li> <li>• Value chain and market linkage (M)</li> </ul>	<ul style="list-style-type: none"> <li>• Significant brokerage role</li> <li>• Brokerage often overlaps with resource provision</li> <li>• PRIs doing resource provision</li> </ul>
Private	<ul style="list-style-type: none"> <li>• Brokers</li> <li>• Mediators</li> </ul>	<ul style="list-style-type: none"> <li>• Network catalyzation and linkage, especially markets (B/M)</li> <li>• Knowledge sharing (B/C/M)</li> <li>• Diffusion and introduction of technologies (hard and soft) (B)</li> </ul>	<ul style="list-style-type: none"> <li>• Significant consultancy</li> <li>• Competition for R&amp;D not present</li> <li>• Supply competition</li> <li>• SMG consultancy may be questionable</li> <li>• NGO as resource provider but not necessarily for industry-related resources</li> </ul>

Note. The contents of this table are summarized based on the findings presented in this chapter. B stands for brokerage, C for consultancy, M for mediation, and RP for resource provision.

The lack of technology providers in the private sector is likely due to the absence of R&D competition. From what the researcher gathered, most innovations stemmed the public sector R&D. Private sector R&D appears to concern itself more with some product processing and applications of foreign technologies for export treatments and new mango varieties. The seeming reliance of production-related R&D on the public sector may have created the shift towards intermediaries like PMIFI competing in the market to help their partners and themselves procure fresh mango supply – another likely discrepancy from

Intarakumnerd and Chaoroenporn (2013a). Still, supply competition by intermediaries may not necessarily be an adverse action by the organizations. In competing, these organizations perform several of their intermediary roles as in the experiences of PDE and Diamond Star.

Another departure from the original findings is the considerable consultancy provided by private sector intermediaries. Although all provide advice on technologies and techniques for growing and processing, the most significant expertise they share is advice on exporting fresh and processed mango products. With their experiences working with various markets, the intermediaries in this study show how they adjust to the needs of different markets and how they share this knowledge with their partners and other interested parties. In the case of the two SMGs, questions about whether the advice provided stands helpful may come due to the open nature of advice-giving on the online platform. Given the opportunity for discussion and options, it may be difficult for members to assess which advice would work best for their situations.

An additional and interesting finding is the resource provision role of NGOs, where they also provide non-innovation or upgrading-related resources. For example, although home improvement materials, common-use toilet facilities, and community water systems like those provided for by PDE do not directly affect a grower's ability to innovate, these still have indirect effects that may improve the production capabilities of partner growers through their personal and communal development.

Focusing on the mango value chain, the researcher discovers most intermediaries performing roles in almost the entire value chain, with most roles performed in the input supply, production, post-harvest, and fresh/processed mango

segments. Compared to the other segments, the mentioned segments exhibit the most role performances as value chain actors in these segments require the most knowledge, technologies, networks, and resources. Although other intermediaries do not perform as many roles in the aggregation and trade, marketing, and global market segments, these are observed to be connected still through the consistent performance of mediation and consultancy roles by intermediaries present in these portions. Moreover, given the presence of most individual intermediaries, especially private sector ones, in practically the entire value chain, the researcher posits that value chain integration and presence may be essential for commodities that have the possibility for export.

Additionally, the researcher finds that not all services and roles performed by intermediaries appear when conducting a simple value chain analysis. As the value chain focuses on the production process, different services like R&D by PRIs or community organizing or clustering by NGOs and IAs are looked over. These services have intermediary roles that may affect a grower or firm's operations and production. Moreover, services affect the greater innovation system that may allow their partners and the entire industry to innovate or upgrade further.

Over time the roles of the mango industry intermediaries also evolved. From the discussion, the researcher finds two significant factors that affect the performance of intermediaries. The first is national and global policy changes. As an export-oriented industry, shifts in international requirement policies significantly affect the way intermediaries choose to perform their roles, especially the content of their services. For instance, stricter adherence or new requirements will have intermediaries provide new knowledge as part of the consultancy, as in PDE cases in introducing organic and fair-

trade farming and Diamond Star in pushing for mango exports to Japan. Although the national policies set by the DA do not yet have very explicit clauses for export promotion, the services offered by public sector mango intermediaries are providing training and consultancy to help achieve entry into export markets. The second important factors are the needs and response of their partners. Looking at the case of the two SMGs, the clamor for more available mango growing consultancy led to the growth of the groups. Their partners' response is also important, as in the case of Diamond Star, which stopped its resource provision when it was met with the unfavorable outcomes as a response of their mango growing partners.

For intermediary key-capabilities in the Philippine mango industry, the researcher presents Table 6.14 that summarizes aspects of key-capabilities that public and private sector intermediaries may focus on or continue to do to build these further. From the discussions in the sub-sections, the researcher finds that organization types and organizational purpose or mission inform how intermediaries may build their key-capabilities. This adds to Sutthijakra and Intarakumnerd's (2015) argument that roles are the factor to inform how key-capabilities are built. To a certain extent, the type and purpose of an organization may form a broad set of intermediary roles. However, as the experiences of several participating intermediaries show, some types of organizations like PRIs, NGOs, and private firms may perform roles not traditionally suited to them.

Table 6.14 Summary Comparison of Philippine Mango Industry Intermediaries' Key-Capabilities

	Public	Private
External Networking	<ul style="list-style-type: none"> <li>• Creating and fostering relationships and keeping a good reputation to expand and sustain local and international network</li> <li>• Mandates and 'known for' or assigned tag provides credibility</li> <li>• Growing social media presence for some</li> </ul>	<ul style="list-style-type: none"> <li>• Significance of gaining fresh mango suppliers</li> <li>• Growing relationships with international partners for export and learning</li> <li>• Leverage 'known for' status of organizations to grow network</li> <li>• Growing social media presence for some</li> </ul>
Internal Communication	<ul style="list-style-type: none"> <li>• GA: harmonization and coordination of policies and monitoring of progress</li> <li>• PRI: fostering relationships with adopters, scientists (in-house and from other institutions), and collaborators</li> <li>• Openness to communicate and adjust to needs of stakeholders</li> <li>• May take the lead for industry cohesion</li> </ul>	<ul style="list-style-type: none"> <li>• Sustain 'known for' status to maintain and build reputation</li> <li>• Grow social media presence for more effective communication</li> <li>• Maintenance of relationships with current suppliers because of their capability for standard adherence</li> <li>• SMG: challenge in controlling communication; very free</li> </ul>
Knowledge-Building	<ul style="list-style-type: none"> <li>• Availability of knowledge for export and local mango development</li> <li>• Growing processed mango technologies</li> <li>• May need more specialized staff, especially in addressing pest infestation issues</li> </ul>	<ul style="list-style-type: none"> <li>• Built on the specialization or particularization of staff and members</li> <li>• Learning new processing technologies</li> <li>• Share export benefits, if possible</li> </ul>
Management	<ul style="list-style-type: none"> <li>• Restrictions on the HR side are limiting work and may entail higher training costs</li> <li>• Changes in leadership may change policies</li> <li>• Orchestrate network more</li> </ul>	<ul style="list-style-type: none"> <li>• Significance of having a management team to operate the intermediary</li> <li>• Consistency and ability to adjust to export requirements</li> <li>• Movement towards other fruits or processed products</li> </ul>
Underlying / Motivational	<ul style="list-style-type: none"> <li>• Passion for service</li> <li>• Service-oriented perspective with work</li> <li>• Supportive leadership</li> <li>• May need export-market strategies</li> </ul>	<ul style="list-style-type: none"> <li>• Perspective towards intermediation role is critical</li> <li>• May need export-market strategies</li> <li>• Work towards industry cohesion</li> </ul>

Note. The contents of this table summarize the findings from this chapter. HR stands for Human Resources.

An additionally important finding is the need for export strategies or mindset by the intermediaries as part of their underlying or motivational capabilities (Sutthijakra and Intarakumnerd, 2015). Even if the decision to export is ultimately the choice of their partners or stakeholders, intermediaries may still have a hand in pushing for export, especially as it raises production quality, as shown in the experiences of PDE and Diamond Star and reports from HVCDP and GNCRDPSC. Furthermore, as export revitalization is a goal of the government, it will also be essential to produce industry champions or have an intermediary perform mediation to create industry cohesion. Based on interviews and secondary sources, there seems to be some divide in the mango industry. This would require bridging that intermediaries may lead through their exercise of external networking and internal communication capabilities.

Another notable finding for this chapter is the significance of human resource development for intermediaries. Many of these human resources are well taken care of in the public sector through various development programs and advanced degree opportunities. However, the intermediaries report the lack of several specialists that will be of great help in the industry. In the private sector, many highlight the importance of their staff's managerial and communication skills as they operate their organizations and relay information to their intermediary partners. In addition, the intermediary representatives from the private sector highlighted technical skills and other types of knowledge in community building, indigenous peoples' culture, and foreign language skills as vital for their organizational development and capabilities. Common between the two types is the need to increase staff that support operations. Although some intermediaries are blessed with ample human resources, others like HVCDP, PMIFI, MFP,

and PMRH may perform more and better with additional staff or volunteers to further support intermediation roles. Coming from these points, the researcher posits that human resource development may be a separate key-capability from management or implementation capabilities (Sutthijakra and Intarakumnerd, 2015; Go, 2019).

Apart from their role performance, we also find several internal and external factors that affect the capability building of innovation intermediaries. First are policy changes, especially international policy changes. Like with roles, the mango intermediaries also base their knowledge requirements and operational processes on helping their partners adhere to global conditions. Changes in these inform intermediaries of knowledge and management capabilities they still need to build or networks they need to search for to acquire the necessary resources to further their role performance. Organizations like PDE, Diamond Star, PMIFI, and GNCRDPSC have and still adjust their operations or R&D to meet requirements. Because of this, policies are primarily external factors that intermediaries appear to be takers, especially global policies. A second factor is crisis events like the currently running COVID-19 pandemic. Events like these often hamper the operations of intermediaries. HVCDP, although moved towards discussing online, used to build networks physically as physical presence during conventions and industry conferences were deemed critical, according to the representative and several other value chain actors.

Similarly, many intermediaries that provided physical skills training opportunities had to cease and shift their operations online, albeit unideal. Still, several intermediaries also developed their capabilities during this time. For example, one management and networking capability built at this time were the ability to converse and hold decisions



online. But, again, the SMGs that saw growth in membership and online consultancy were clear winners in this.

Finally, a third factor we find important is organizational leadership. Differences in leadership styles appear to build key-capabilities distinctly. For example, PDE and Diamond Star have unique ways of capability building as Irish and Japanese people, respectively, lead these two organizations. The network brought by these two and the leadership style they bring generates a different kind of network and operations. For PDE, the community development assistance network and operational perspective are unique due to the leader's experience as part of the Catholic church. Diamond Star is running with Japanese standards, and the knowledge network the firm has allows it to learn and respond quickly to changes in international requirements. Leadership changes may also affect an intermediary's key-capability building process, apart from longstanding leaders. According to several public sector intermediaries, the priorities of their often-assigned directors or leaders create risks in the possible loss or diversion of attention towards programs or commodities that these leaders feel need more development. Similarly, for private sector intermediaries, leadership changes may also cause tensions. For instance, although the leader of PMIFI is an industry veteran, the operational and network priorities set by the organization may have caused it to gain a negative reputation among other industry players, leading to the lack of a clear mango industry leader.

In conclusion, the researcher finds that intermediary organizations in the Philippine mango industry perform roles that enable innovation and upgrading and address different industry issues. As these organizations continue to build their key-capabilities, various intermediaries may perform type-specific or common roles to foster

innovation and upgrading and enliven the innovation ecosystem for the mango industry. Moreover, the findings of this chapter may be applied by other intermediaries present in the mango industry. Based on the results, two policy implications are presented. First, the DA may establish more mango-focused PRIs in high production areas as the currently established PRI is far from other high yielding regions. Second, the government may consider creating a mango export policy or program that will focus on developing mango growers and processors driven to enter the export market. Services for such a program may include certification and production monitoring, and provision of resources to increase export livelihood.

**CHAPTER VII**

**CROSS-CASE COMAPRISON AND ANALYSIS OF INNOVATION**

**INTERMEDIARIES IN THE PHILIPPINE RICE AND MANGO AFB GVCS**

**AND INDUSTRIES**

**Section 7.1 Introduction**

Chapter VII compares the roles and key-capabilities of the innovation intermediaries in the Philippine rice and mango AFB GVC and industry case studies. Seven sections comprise the chapter. Succeeding this short introduction, Section 7.2 presents a brief comparison of the critical similarities and differences of the issues faced, SIS, and policy response of the two AFB industries. Moreover, several distinctions between the two value chains are given. Following that is Section 7.3, which briefly summarizes the innovation intermediaries in each industry and those organizations they share. Next, sections 7.4, 7.5, and 7.6 are arranged and discussed to answer the three sub-questions presented in Chapter III. Specifically, Sections 7.4 and 7.5 delivers the cross-case comparison as informed by an intermediary's organization type (Sub-Question 1) and value chain participation and support (Sub-Question 2), respectively. Each section heavily elaborates on the roles and key-capabilities of the intermediaries, with key similarities and differences especially influenced by their industry's domestic or export market-oriented nature or focus. Section 7.6 then compares roles and key-capabilities as informed by each industry's primary market orientation (Sub-Question 3) and delineated by the more comprehensive typology of belonging to either the public or private sector. Finally, Section 7.7 summarizes the cross-case comparison, highlighting critical findings

and implications. These underscored points are then discussed in-depth in the succeeding conclusion chapter.

## **Section 7.2 Key Similarities and Differences of the Two Industries**

In Chapter III, the researcher presented a brief comparison of the common and different characteristics of the Philippine rice and mango industries. From that point, Chapter V and Chapter VI described these two industries in richer detail. Before comparing intermediaries, it is vital to compare the contextual conditions of the two industries as these build and act as a foundation for the comparative analysis of intermediary roles and key-capabilities. In place of this, comparisons are made on the most pressing issues, the SIS, the overarching policy response and roadmap, and the value chains of the rice and mango industries.

Table 7.1 begins the contextual comparisons by presenting the common and distinct issues of the two industries. Based on the previous chapters, a clear difference between the two industries is competition with the global market. The local rice industry is attempting to develop to deter the need to import rice, while the mango industry seeks to reclaim its glory in the export market. These goals are exacerbated further by issues that each industry faces, like the high production costs for rice and the low compliance with international standards for mangoes. Comparing the history of the two industries, the researcher finds that the rice industry of the Philippines has gained much more support throughout its lifetime, including support for R&D, production and facility development, and government prioritization. This is not surprising as the industry has been developed and prioritized much earlier and is the staple crop of the Filipino people (DA, 2018). On the other hand, the mango industry seems to have failed to innovate with other exporting

countries, let alone adjust production capabilities to high-value market requirements in recent years (Fernandez-Stark, Couto, and Gereffi, 2017). Although breakthrough research like Dr. Barba's (SEARCA, 2014) completely changed the industry, much more support is necessary to address new challenges and keep up with other mango exporting countries.

Table 7.1 Different and Similar Issues in the Philippine Rice and Mango Industries

	Rice	Mango
Differences	<ul style="list-style-type: none"> <li>• Growing rice importation, exacerbated by the RTL</li> <li>• Need to compete with cheaper imported rice</li> <li>• High labor cost and several inputs in production</li> </ul>	<ul style="list-style-type: none"> <li>• Loss of placement in top mango exporting countries</li> <li>• Battle against pests (i.e., Cecid fly)</li> <li>• Low compliance with international standards and certifications (GAP)</li> <li>• High domestic competition for mangoes, with processors intensifying competition</li> <li>• Need for industry cohesion</li> </ul>
Similarities	<ul style="list-style-type: none"> <li>• Climate change and natural calamities (i.e., typhoons)</li> <li>• Dispersed, small-scale production by most leads to a lack of scale economies; there is a need for farm clustering</li> <li>• Low uptake of more modern and mechanized technologies</li> <li>• Need for more R&amp;D in extension and crop improvements</li> <li>• Significance and abundance of traders (i.e., middle traders)</li> </ul>	

Note. The author gathered the information based on interviews with experts and research participants and secondary desk research.

Differences aside, the most perennial problems the two industries face are similar. Both industries are affected severely by natural calamities and the effects of climate change. Although the crops are distinct, their industry structures exhibit similarities in their upstream processes, such as a majority conducting small-scale production and the lack of more modern and mechanized technology adoption. Moreover, the two industries

also display a significant reliance and abundance of middle traders that primarily funnel crop aggregation, connect the up and downstream processes of the value chains, and, at times, provide the capital loans needed by farmers or growers. Many of those interviewed for this study further describes that more R&D and support are required, especially in crop improvements and extension services.

From the distinct and similar issues of the two AFB industries, we compare the SIS of both. Table 7.2 compares under six categories: actors, networks, demand, institutions, and knowledge. Starting with actors, we find that the mango SIS exhibits more actors, especially in the production, harvest, and post-harvest processes that see several process-specific actors like the sorters, baggers, and harvesters. Although there may be similar counterparts in the rice industry, farmers or land laborers often do these aggregate processes themselves. In addition to these actors, several more also reveal the existing demand conditions in the industries. For example, the rice industry has the NFA and PITC for rice procurement and buffers stock maintenance that shows the significance of the crop to the country and the willingness of the government to procure these. In the mango industry, foreign certifiers and the BPI-NPQSD uncover the more stringent processes of mango exporting, especially fresh mangoes. Despite these distinctions, the two industries still show similar actors that, although named differently, perform like tasks and processes.

Table 7.2 A Comparison of the Philippine Rice and Mango Sectoral Innovation Systems

	Rice	Mango
Actors (except intermediaries)	Input suppliers Rice farmers and farm laborers Cooperatives and farmer organizations or associations Paddy/rice traders and agents Custom millers Miller-traders Processed rice product and by-product manufacturers Wholesalers Retailers Importers Exporters Transport firms Consumers DA-FPA NSIC NIA DOH-FPA NFA PITC	Input suppliers Growers Contract-sprayers/growers or Contractors Baggers Harvesters Sorters Grower groups, cooperatives, and associations Traders Assemblers Distributors Food product manufacturers Exporters Importers (from foreign countries) Wholesalers Retailers Foreign certifiers Transport firms Consumers DA-FPA NSIC NIA DA-BPI BPI-NPQSD BPI-NPAL DOH-FDA

(Table 7.2 Continued)

*(Table 7.2 Continued)*

Networks	Government-Industry	Government-Industry
	Government-Farmer	Government-Grower/Contractors
	PRI-Farmer/Millers/Processors/Input suppliers	PRI-Grower/Contractor /Processors/Input suppliers
	Farmer-Trader-Miller	Growers-Baggers/Harvesters/Sorters
	Farmer-Miller	Growers-Assemblers/Distributors/Traders
	Farmer groups-Miller	Contractors-Baggers/Harvesters/Sorters
	Farmer groups-Wholesaler/Retailer	Contractors-Assemblers/Distributors/Traders
	Miller-Wholesaler/Retailer	Trader-Food manufacturers
	Importer-Wholesaler/Retailer	Wholesaler/Retailers-Food manufacturers
	Retailer-Consumer	Traders-Food manufacturers
Demand	Domestic (high)	Grower/Contractor/Trader-Exporter
		Food manufacturers-Importer
		Exporter-Foreign Certifier/BPI-NPQSD
		Exporter-Importer
		Retailer-Consumer
		Domestic (high)
		Export (unstable but slowly picking up)
Institutions	Rice Industry Roadmap 2030	Philippine Mango Industry Roadmap 2017-2022
	Local industrial standards and requirements	International standards and requirements
	Retailed rice packaging, pricing, and grain mixes	SPS requirements
	RTL (RA 11203) and RCEF	International trade agreements
	Labor arrangements	Labor arrangements
	GAP and GMP certification	Mango rehabilitation program (need to reattempt)
	Fertilizer and pesticide certification	GAP and GMP certification
	Variety certification	Fertilizer and pesticide certification
	NFA certification	Food Safety Act of 2012

*(Table 7.2 Continued)*



(Table 7.2 Continued)

Knowledge	IRRI	Variety certification
	PITC procurement and NFA stock policies	SPS and quarantine treatment certification
	Agrarian reform laws and history	FDA registration and certification
	FDA registration and certification	
	Food Safety Act of 2012	
	Rice farming knowledge	Mango growing knowledge
	Pest and disease knowledge	Pest and disease knowledge
	Production and harvest technologies	Production and harvest technologies
	Milling technologies	Post-harvest technologies
	Disaster or climate-related resiliency technologies	Disaster or climate-related resiliency technologies
	Foreign technology adoption and adaption	Foreign technology adoption and adaption
	Processed rice product technologies and opportunities	Processed mango product technologies and opportunities
	Rice by-product technologies for intersectoral upgrading	Mango by-product technologies for intersectoral upgrading
	Many PRIs focused on rice technologies, with PHILRICE as specific for rice; many other private sector R&D firms on hybrid seeds and inputs (i.e., fertilizers and pesticides)	International market requirements knowledge
		R&D on mangoes is spread in different PRIs and universities; private sector R&D firms focused on mango inputs (i.e., fertilizers and pesticides)

Note. The researcher compiled the contents of this table based primarily on information from Chapters V and VI and interviews with experts and value chain actors.

Similarities are also found in the networks or linkages that abound the SIS of the Philippine rice and mango industries. We see very similar relationships from the table, albeit with different names. However, the mango industry exhibits more linkages due to the greater number of actors involved and the more requirement-laden export process.

As discussed in the previous chapters, both industries exhibit strong domestic demands. As a domestic market-oriented industry, it is not surprising for rice. Although, local production does not appear to satisfy overall domestic demand, leading to the need for imports. Without the industrial development necessary, the quantity of rice imported into the country may grow further, especially with rising demand.

For the mango industry, a very high domestic demand may cause heightened competition and issues in sourcing and pricing for the fruit, as mentioned previously. Moreover, this high domestic demand may pose problems to the exporting goals of the government and industry as growers may not find the additional investment in adhering to strict international buyer requirements worthwhile, especially when the price differentials between export-grade and local-grade mangoes are not significant or when the produce is bought in its entirety and not paid by grade.

Shifting attention to the industrial knowledge-base, we find that the AFBs industries have similar general technologies, knowledge, and opportunities. In terms of the present amount, the researcher finds that the rice industry appears to have more primarily due to its long history and the amount of support the government has given it in every administration. Although the mango industry may not have a similar history, knowledge of it has still been developed, albeit by a mix of PRIs and university-led research. The rice industry has had a similar experience but has grown more aggressively

by rice-specific institutes like IRRI and PHILRICE. In terms of private sector involvement in R&D, interviews and desk research reveals that the R&D is mainly done on the input (i.e., fertilizer and pesticide) side of production and not much on the crop themselves. Although several private firms conduct hybrid rice R&D and even distribute these, the focus has been on that specific kind of rice. Milling, farm machinery, and processing technologies also appear to be locally led by PRIs or adapted by foreign manufacturers and suppliers. Interviews with the PRIs showed that local adopters are often local manufacturers following the PRIs' specifications or technology users who still need to receive the machine from a manufacturer.

These knowledge-base findings in both SISs align with Pavitt's (1984) claim that technologies in agriculture-related industries originate from the supply side of government R&D, material suppliers, and extension providers. This study has shown that these originators also take innovation intermediary roles, with research institutes and GAs highlighted most as technology generators. However, Pavitt's findings may not necessarily hold as AFB value chains are not pure agricultural chains but include downstream processes of product processing and the distinct tastes of specific markets. The experiences of Diamond Star and PDE show that AFB value chains may take on some characteristics of *production-intensive* industries. For example, the development of PDE's processed mango products stems from food engineers of their processing partner and packaging designs from their international partners and buyers. For Diamond Star, the development of VHT facilities was done by their mother company to respond to the changing and stricter requirements of the Japanese market. Similarly, in the rice industry, a miller interviewed mentioned how advancements and innovations in their milling processes were conducted in-house or in partnership with machinery manufacturers to

become first movers or prevent immediate imitation by other millers. According to that miller, these developments were needed as they could not receive the same support given by the government to the upstream production in agriculture.

As AFB industries take on scale-intensive and performance or product-sensitive characteristics, the sources of innovation may also evolve and incorporate features of a production-intensive industry. As the industries appear to mix several of Pavitt's taxonomy characteristics, innovation intermediaries as possible sources of technologies, drivers of diffusion and translation, or industry network linkers may become essential in AFBs and other industries.

For institutions, many similarities again show between the two industries. These are seen in the common GAP and GMP certifications available for involved actors, general laws and policies that affect agriculture overall, and special labor arrangements present in both industries. Although each has more specific labor arrangement classifications, both industries exhibit a history of general produce and revenue sharing mechanisms that drive these special labor arrangements. More noticeable differences are primarily seen in export requirements for mangoes and the government procurement and stocking of rice. For mangoes, more standards are present, and these vary between countries.

Moreover, the Philippines and exporters need to consider trade agreements and impose local requirements like quarantine and treatment certifications. Conversely, the rice industry has the NFA and PITC policies to ensure rice stocks. Moreover, widely affecting policies like RTL, RCEF, and agrarian reform and international organizations

like IRRI give the rice industry an even richer and deeper institutional context to boost or stifle innovation.

Nonetheless, of all the institutions found in Table 7.2, the industry roadmaps designed by the Philippine government, primarily through the DA and in consultation with the private sector, act as possibly the most critical institutions. These institutions aim to develop the country's rice and mango industries and consider many other institutions listed as part of their implementation plan. Table 7.3 compares these policies, focusing on their overarching vision, targets, and relevant policies or programs.

Table 7.3 Existing Policy Response Comparison for the Rice and Mango Industries

	Rice	Mango
Policy	Rice Industry Roadmap 2030	Philippine Mango Industry Roadmap 2017-2022
Overarching Vision or Objective	Rice security as “availability, affordability, and accessibility of high-quality and nutritious rice at all times” (DA, 2018, p.6)	Regain global competitiveness through innovations in production, post-harvest, processing, and marketing
Goals or Targets	<ul style="list-style-type: none"> <li>a. Improve competitiveness (2017 to 2022)</li> <li>b. Enhance resiliency to disasters and climate risks (2023 to 2026)</li> <li>c. Ensure access to safe and nutritious rice (2027 to 2030)</li> </ul>	<ul style="list-style-type: none"> <li>a. Increase production</li> <li>b. Increase export with new and better products</li> <li>c. Increase mango consumption for better health</li> </ul>
Other Distinct and Highlighted Policies or Programs	Rice Competitiveness Enhancement Fund (2019 to 2025)	Mango Rehabilitation Program (need to re-attempt)

Note. The researcher compiled the information based on the fronted policies that the experts mentioned and from secondary desk research. Therefore, goals or targets for mangoes do not have specific timelines. Instead, these are marked to occur between 2018 to 2022.

One will notice that both roadmaps are vying for improved competitiveness, primarily through upstream production enhancements, innovation, and upgrading.

Although the visions or objectives differ in their overall goal – security for rice and global competitiveness for mangoes – detailed goals or targets aim for improvements in production capabilities first. The descriptions in Chapter V and Chapter VI on these policies also reveal that both roadmaps mention the need for better R&D and how more investments in it by the public sector are necessary. Though more explicit in the rice roadmap, the roadmap architects recognize the significance of R&D to mitigate the adverse effects of climate change and the focus on the health benefits of both crops in the long term. Apart from advances in upstream processes, mid-tier processing activities also require improvements. For example, activities in rice milling and mango post-harvest treatments demand lessened grain losses and enhanced treatment and handling applications. Most importantly, a common stance taken by the roadmaps is the need for the private sector to take a more active role in investing in the development of and support for technological diffusion in their respective industries.

Apart from a difference in the target market, a significant variation between the two policy responses is their implementation timeline. The rice roadmap exhibits a long-term view while the mango counterpart presents a short- to medium-term outlook. The difference in timelines may significantly impact the implementation of projects and programs. With the rice industry spacing out targets, organizations involved may be able to better adjust and prepare for implementing their respective parts. Compared to the mango industry, a great majority of targets have an implementation line from 2018 to 2022. With vastly less mango-focused public sector organizations, implementation falls into the hands of a few organizations that also need to work on other crops. Therefore, it may be wise for the government and industry representatives to reevaluate the roadmap and take a longer-term perspective in developing the industry. A point of comparison that

may highlight the need for reevaluation would be the difference between implementing the RCEF and the mango tree rehabilitation program. With earmarked funds for both programs, RCEF appears to have programmed better implementation protocols (DA-ATI, n.d.f.). On the other hand, the mango rehabilitation program did not find success as no local industry association qualified as an organization that could disburse the loans for the program. With plans to reimplement the tree rehabilitation loan, the industry will need to ensure that local associations develop their capabilities to qualify as trusted and well-managed organizations.

Regarding the similarities and differences in both value chains, the researcher first observes a general four-step production process, mid-tier processing, product split, and marketing in the two commodity chains. Both begin with input supply and the primary upstream production of the crop, and then they proceed to mid-tier processing. For rice, this involves milling, and for mangoes, it involves post-harvest processes or treatments. Before or after, aggregation of the primary commodity (i.e., paddy rice and fresh mangoes) occurs. In general, the aggregation step happens before milling and after the post-harvest segment for mangoes. However, the reverse may occur depending on trade arrangements or the actors involved. With the abundance of middle traders and various labor arrangements in production in both industries, certain processes may be integrated. Regardless of the arrangement, the point is that both industries exhibit similar upstream practices and processes. After the production and mid-tier processing, a product split occurs in both chains. These segments refer to the simultaneous but distinct segments of milled rice, fresh mangoes, or product processing in both value chains. Finally, the marketing portion refers to how final products reach consumers in domestic or export markets.

A second similarity between the two chains is the importance of standards and certification requirements. Both industries require the use of certified inputs such as fertilizers and pesticides. Moreover, they highlight the importance of using quality planting materials for mangoes from certified nurseries and annually certified rice seeds. Although the DA and other affiliated agencies push for GAP certification of farmers, the GAP appears to be more critical in the mango industry, as it stands as a minimum requirement for many importing countries. In product processing, specific standards and certifications also apply. Locally, only products certified by the FDA may be promoted as commercial products. Other standards and certifications that add to the value of a product are GMP, HACCP, and ISOs, among others.

For differences, one critical one is the number of actors present in the upstream production segments. The researcher finds that the mango industry may be more complicated as it has more labor-providing actors than rice. Apart from the mango grower who owns and cares for their trees, the industry has baggers, contract sprayers or growers, harvesters, sorters, and traders who may lead or provide these services. The labor-providing actors are the rice farmers, farm laborers, landowners, and traders in the rice industry. One implication of more actors may be the need for government programs targeting production processes and practices innovation to widen its audience scope, which may incur further costs.

Another difference in actors is the significance of certain public sector organizations. For example, the NFA is vital in rice milling, trading, and importation, especially before the RTL. Although it has lost several of its powers, the institution is still crucial as it controls the rice buffer stock of the country. Moreover, rice farmers may sell



their produce to the NFA at higher farmgate prices. Conversely, in the mango industry, the DA-BPI holds a significant position. The institution checks and provides the treatment certification required for fruit exports. In addition to the DA-BPI, several importing countries may also require visual inspections by representatives from their companies or products sent to certified or company laboratories for testing before export.

Finally, a critical difference between the two value chains is observed in the institutional environment that affects the value chains. For mango exports, adherence to international requirements matters tremendously. Failure to obey these means losing out on export sales. These requirements are much stricter for fresh mangoes than for processed mango products. Because of this, industry experts observed that more exporting companies have moved towards introducing processed product lines to alleviate pressure from the lack of export-quality mangoes.

Conversely, a momentous change occurred in the rice industry when the RTL removed the necessity of rice import licenses. Before the removal, rice importation was controlled through permits issued by the NFA. However, currently, persons with financial means may import rice. These changes and requirements affect the value chain profusely, especially in upstream production. The effects may be positive in that these may push value chain actors to upgrade or innovate their production processes, or these may have adverse effects such as large processing companies driving up domestic demand for mangoes and imported rice crowding out local rice farmers.

Section 7.3 Recap of Innovation Intermediaries in the Two Industries

A short recap of participating intermediaries in the two industries is provided to begin the comparisons. Figure 7.1 provides a visual summary of the participating intermediaries as presented in individual industries and overarching case study diagrams.

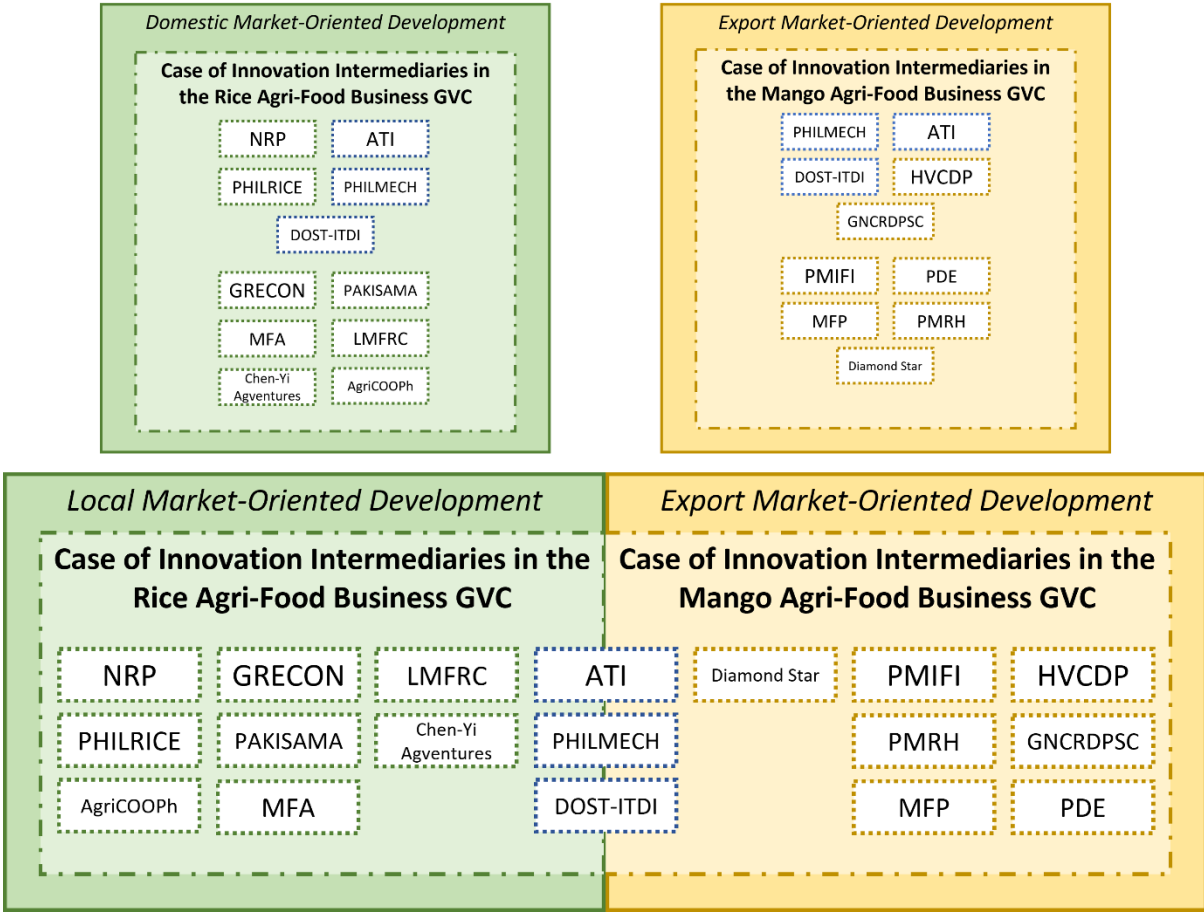


Figure 7.1. Individual industry case diagrams and the combined case study diagram of this dissertation.

Note. The researcher crafted the three case study diagrams guided by Yin’s (2018) case-study design.

Chapters V and VI respectively discussed the roles and key-capabilities of participating innovation intermediaries in the rice and mango industries. In total, 18 organizations appear in this study, with three of the intermediaries shared between both

industries. Of the remaining intermediaries, eight support the rice industry and seven for the mango industry. Although the 15 intermediaries represent a unique industry for this study, it does not mean that they solely support rice or mango development, as several of the participating organizations also support the development of other crops. Furthermore, both industries have at least one organization representing each intermediary type.

Regarding the similar intermediaries, all three are public intermediaries. One is a GA, and the two are PRIs. ATI, the GA, does not focus on any one crop. Instead, its extension work encompasses all crops available in the country and provides non-farm upgrading training with the TESDA. Nonetheless, the organization may be mandated to prioritize crops under specific programs such as the RCEF for rice.

Moreover, crop training and extension opportunities vary in each province or region depending on priority and viable crops in an area. Similarly, PHILMECH and DOST-ITDI cater to different crops and industries. Comparing both PRIs, PHILMECH focuses on the agricultural sector, while DOST-ITDI extends its expertise to the manufacturing sectors. Like ATI, PHILMECH may focus on a crop under a specific program.

Although shared intermediaries exist in the public sector for both industries, the researcher could not find a private sector organization that provides support to both the rice and mango industries. Including shared private sector intermediaries in future studies will surely add to the depth of understanding of intermediary roles and key-capabilities.

## Section 7.4 Cross Case Comparison by Organization Type

This section attempts to answer the first sub-question this thesis poses: how do differences in *organization type* affect the roles and key-capabilities of intermediary organizations? The section begins by discussing roles first and is followed by a discussion on key-capabilities.

To summarize the similarities and intricacies of each organization type participating in this study and their effect on intermediary roles, the researcher presents Table 7.4. The researcher finds that all participating intermediaries perform the four roles in varying magnitudes and approaches. Moreover, the researcher finds that similar organization types perform roles similarly even with differences in industry participation. The commonalities between types are as follows:

- i. *GAs* – brokering training opportunities, facility establishment, and credit linkage; consultations with industry; orchestrating and linking industry and government network; provision of production inputs, extension services, and information-education materials, among others
- ii. *PRIs* – conduct of R&D; brokering of their or adapting others’ technologies; support for technology fairs and training; provision of expert advice on scientific, technical, and business matters; mediating R&D networks and IP management; provision or use of production inputs, machinery, equipment, facilities, human resources, among others

Table 7.4 Similarities and Differences in Intermediary Role Performance by Organization Type

Type	Brokerage	Consultancy	Mediation	Resource Provision
GAs	<p><i>Similarities:</i></p> <ul style="list-style-type: none"> <li>• Establishment of farm schools, e-extension platform, and processing facilities</li> <li>• Providing training opportunities and credit linkages</li> </ul> <p><i>Rice:</i></p> <ul style="list-style-type: none"> <li>• Mushroom farming for intersectoral upgrading</li> <li>• Non-farm training under RCEF for low-yield regions</li> <li>• Indirectly created rice-related farm service providers (i.e., machinery-use providers)</li> </ul> <p><i>Mango:</i></p> <ul style="list-style-type: none"> <li>• Beekeeping for intersectoral upgrading</li> <li>• Offered tree rehabilitation but did not proceed well</li> </ul>	<p><i>Similarities:</i></p> <ul style="list-style-type: none"> <li>• Consultations with industry</li> <li>• Part of bodies that set and promote industry standards and relevant certifications</li> <li>• Provides advice on technologies, practices, and learning opportunities</li> </ul> <p><i>Mango:</i></p> <ul style="list-style-type: none"> <li>• National staff part of private sector online chat groups for direct consultancy</li> </ul>	<p><i>Similarities:</i></p> <ul style="list-style-type: none"> <li>• Network orchestration</li> <li>• Network introduction</li> <li>• Provides opportunities for private sector to demonstrate technologies</li> </ul> <p><i>Rice:</i></p> <ul style="list-style-type: none"> <li>• Extension component lead for RCEF</li> </ul> <p><i>Mango:</i></p> <ul style="list-style-type: none"> <li>• Price mediation</li> <li>• Farm clustering promotion</li> </ul>	<p><i>Similarities:</i></p> <ul style="list-style-type: none"> <li>• Provision of production inputs, machinery, extension services, processing and training facilities, information materials, some financial support</li> </ul> <p><i>Rice:</i></p> <ul style="list-style-type: none"> <li>• Resource support for regions outside of initial RCEF scope</li> </ul>

(Table 7.4 Continued)

(Table 7.4 Continued)

Type	Brokerage	Consultancy	Mediation	Resource Provision
PRI	<p><i>Similarities:</i></p> <ul style="list-style-type: none"> <li>Generates and brokers a variety of soft (skills, practices) and hard (better crops, machinery, equipment) technologies</li> <li>Supports adopters in technology fairs</li> <li>Conducts production, processing, and technology use and maintenance training</li> <li>Collaborates for R&amp;D</li> </ul> <p><i>Rice:</i></p> <ul style="list-style-type: none"> <li>Focus on seeds and labor-saving machinery</li> <li>Lead for RCEF seed and mechanization component</li> <li>Biomass powerplant for intersectoral upgrading</li> </ul> <p><i>Mango:</i></p> <ul style="list-style-type: none"> <li>Focus on mango fruit and processing machinery</li> <li>Opened foreign markets from pest absence R&amp;D</li> </ul>	<p><i>Similarities:</i></p> <ul style="list-style-type: none"> <li>Consultations with industry</li> <li>Part of bodies that set and promote industry standards and relevant certifications</li> <li>Provides advice on technology use and repair, practices, and learning opportunities</li> <li>May visit clients, consult online or through a phone call, or clients may visit offices</li> <li>Provides business consultancy</li> <li>Secondment of staff possible</li> </ul> <p><i>Rice:</i></p> <ul style="list-style-type: none"> <li>Development of several smartphone and web-based applications for farmers (Text Center, PalayCheck)</li> </ul>	<p><i>Similarities:</i></p> <ul style="list-style-type: none"> <li>R&amp;D network mediation and collaboration</li> <li>Strict adherence to agreements</li> <li>Linkage to possible funders</li> <li>Has IP rules for technology mediation and provision</li> </ul> <p><i>Rice:</i></p> <ul style="list-style-type: none"> <li>Orchestration of provincial offices for PHILRICE</li> </ul> <p><i>Mango:</i></p> <ul style="list-style-type: none"> <li>No set mango R&amp;D lead but may be led by GNCRDPSD if provided more resources</li> </ul>	<p><i>Similarities:</i></p> <ul style="list-style-type: none"> <li>Conduct R&amp;D and socio-economic research</li> <li>Provision of production inputs, machinery, extension services, processing and training opportunities, business coaching, and matching</li> <li>Use of packaging facility by DOST-ITDI</li> <li>Human resources as trainers requested by other organizations</li> </ul> <p><i>Rice:</i></p> <ul style="list-style-type: none"> <li>Production of high-yielding seed varieties and hosting of applications and databanks by PHILRICE</li> <li>Use of drying facility by PHILMECH</li> </ul> <p><i>Mango:</i></p> <ul style="list-style-type: none"> <li>Production of grafted mango saplings and other quality planting materials, and use of packinghouse by GNCRDPSD</li> </ul>

(Table 7.4 Continued)

(Table 7.4 Continued)

Type	Brokerage	Consultancy	Mediation	Resource Provision
IAs	<p><i>Similarities:</i></p> <ul style="list-style-type: none"> <li>• Brokering of markets, financing opportunities, collaboration with fellow members</li> </ul> <p><i>Rice:</i></p> <ul style="list-style-type: none"> <li>• Brokering common use technology by MFA</li> <li>• Community organizing by PAKISAMA</li> <li>• Catalyzes rice supply network for trades by GRECON</li> </ul> <p><i>Mango:</i></p> <ul style="list-style-type: none"> <li>• May set buying prices</li> <li>• Procures mangoes for itself or members</li> </ul>	<p><i>Similarities:</i></p> <ul style="list-style-type: none"> <li>• Attends consultations with national and local government and may draft policy or project proposals</li> <li>• Provides technical, market, and other advice as needed by members</li> </ul> <p><i>Rice:</i></p> <ul style="list-style-type: none"> <li>• Providing consultancy for non-rice related matters by PAKISAMA</li> </ul> <p><i>Mango:</i></p> <ul style="list-style-type: none"> <li>• Provides advice for exporting and international standards</li> </ul>	<p><i>Similarities:</i></p> <ul style="list-style-type: none"> <li>• Market mediation</li> <li>• Member network orchestration and linkage</li> <li>• Hosting of membership meetings</li> </ul> <p><i>Rice:</i></p> <ul style="list-style-type: none"> <li>• Attempts to form political parties by PAKISAMA and GRECON</li> <li>• Lobbying</li> </ul> <p><i>Mango:</i></p> <ul style="list-style-type: none"> <li>• Mediating plans for processing facilities</li> <li>• Price mediation</li> </ul>	<p><i>Similarities:</i></p> <ul style="list-style-type: none"> <li>• Provides training in industry-related and non-industry related topics</li> </ul> <p><i>Rice:</i></p> <ul style="list-style-type: none"> <li>• Conduct of policy and social research, legal assistance, and community development opportunities by PAKISAMA</li> <li>• Sharing of cheaper rice supply information by GRECON</li> <li>• Use and maintenance costs of common use equipment shouldered by MFA</li> <li>• Support in disaster relief</li> </ul> <p><i>Mango:</i></p> <ul style="list-style-type: none"> <li>• Hosting of industry-wide congress</li> <li>• Procurement of mangoes for its operations</li> </ul>

(Table 7.4 Continued)

(Table 7.4 Continued)

Type	Brokerage	Consultancy	Mediation	Resource Provision
SMGs	<p><i>Similarities:</i></p> <ul style="list-style-type: none"> <li>As an online platform for members to trade (sales of products, machinery, parts, equipment, inputs, or service provision)</li> </ul> <p><i>Rice:</i></p> <ul style="list-style-type: none"> <li>Specific for farm machinery and equipment</li> </ul> <p><i>Mango:</i></p> <ul style="list-style-type: none"> <li>Wide range of mango-related products and services offered by members</li> </ul>	<p><i>Similarities:</i></p> <ul style="list-style-type: none"> <li>Platform for members to post inquiries and receive answers from others</li> <li>Private messaging is allowed</li> <li>Members may monitor prices of inputs, machinery, and services</li> </ul> <p><i>Rice:</i></p> <ul style="list-style-type: none"> <li>Sharing of foreign machinery information</li> </ul>	<p><i>Similarities:</i></p> <ul style="list-style-type: none"> <li>As an online platform for members to meet</li> </ul> <p><i>Mango:</i></p> <ul style="list-style-type: none"> <li>Administrators may directly intervene to correct advice</li> <li>PMRH administrator introduces growers to local buyers</li> </ul>	<p><i>Similarities:</i></p> <ul style="list-style-type: none"> <li>Sharing of training, seminar, market and government information, pictures, and videos</li> </ul> <p><i>Mango:</i></p> <ul style="list-style-type: none"> <li>MFP administrator provides personal growing protocol</li> <li>PMRH shares list of certified mango nursery operators</li> </ul>
Private Firms	<p><i>Similarities:</i></p> <ul style="list-style-type: none"> <li>Purchase of produce</li> <li>Making specific machinery or facilities available for others to lease</li> </ul> <p><i>Rice:</i></p> <ul style="list-style-type: none"> <li>Began one of the most advanced rice processing facilities in Asia</li> <li>Markets rice produced online</li> </ul> <p><i>Mango:</i></p> <ul style="list-style-type: none"> <li>Produce must adhere to international requirements</li> <li>Provides access to export market</li> </ul>	<p><i>Similarities:</i></p> <ul style="list-style-type: none"> <li>Has agriculturists that conduct monitoring visits to partner producers</li> </ul> <p><i>Mango:</i></p> <ul style="list-style-type: none"> <li>Experts in mango and fruit exports</li> <li>Key organization in setting export standards for sizing and packaging</li> </ul>	<p><i>Similarities:</i></p> <ul style="list-style-type: none"> <li>Mediates value chain network (i.e., producers, importers, local distributors)</li> </ul> <p><i>Rice:</i></p> <ul style="list-style-type: none"> <li>Partners with farmers through Renucci Rice Program</li> </ul> <p><i>Mango:</i></p> <ul style="list-style-type: none"> <li>Coordinates with head and sister organization</li> </ul>	<p><i>Rice:</i></p> <ul style="list-style-type: none"> <li>Provision of seeds, low-interest fertilizer loans, and machinery</li> </ul> <p><i>Mango:</i></p> <ul style="list-style-type: none"> <li>Stopped providing production inputs, credit, and international training and learning opportunities to its partners</li> </ul>

(Table 7.4 Continued)



(Table 7.4 Continued)

Type	Brokerage	Consultancy	Mediation	Resource Provision
NGOs	<p><i>Similarities:</i></p> <ul style="list-style-type: none"> <li>Brokers training programs (organizational development by AgriCOOPh and organic mango farming by PDE)</li> </ul> <p><i>Rice:</i></p> <ul style="list-style-type: none"> <li>Brokers markets through matchmaking services</li> <li>Creating unified branding of products for members to supply</li> </ul> <p><i>Mango:</i></p> <ul style="list-style-type: none"> <li>Group fair-trade and organic certification</li> <li>Procures mangoes from partners</li> </ul>	<p><i>Similarities:</i></p> <ul style="list-style-type: none"> <li>Provides advice on their expertise (cooperative management for AgriCOOPh and fair-trade for PDE)</li> </ul> <p><i>Rice:</i></p> <ul style="list-style-type: none"> <li>May conduct value chain and business analysis for members</li> </ul> <p><i>Mango:</i></p> <ul style="list-style-type: none"> <li>Agriculturists monitor progress of partners</li> </ul>	<p><i>Similarities:</i></p> <ul style="list-style-type: none"> <li>Stands as representatives for members and partners</li> <li>Trade mediation (local trades by AgriCOOPh and international market by PDE)</li> </ul> <p><i>Rice:</i></p> <ul style="list-style-type: none"> <li>Mediates opportunities from international partners to members</li> </ul> <p><i>Mango:</i></p> <ul style="list-style-type: none"> <li>Mediates assistance from PREDA Foundation to partners</li> <li>Hires local inspectors in communities for constant communication</li> </ul>	<p><i>Rice:</i></p> <ul style="list-style-type: none"> <li>Provision of loans, sharing of market information, and training opportunities</li> </ul> <p><i>Mango:</i></p> <ul style="list-style-type: none"> <li>Provision of fair-trade premiums, education assistance, and other community development projects and seminars</li> </ul>

Note. The researcher summarized the information in this table based on interview data, secondary research data, and assessments made in Chapters V and VI. The absence of *Rice* or *Mango* means that the researcher did not encounter any distinct role action by an organization in their industry.

- iii. *IAs* – market mediation and brokerage; brokerage and provision of industry-related and non-industry-related training and resources; attendance in public consultations; advice on specific association and member expertise; member network orchestration; political representation
- iv. *SMGs* – performs roles solely through their nature as an online platform; consultations through member posts and private messaging; passive market mediation and brokerage by having members connect through the group; sharing of information as resource provision
- v. *Private Firms* – expert advice provided by company technicians and agriculturists; mediates between several industry actors to smoothen operations; provides partners (especially upstream actors) assured markets provided they follow requirements and choose to sell to the firm; resource provision possible
- vi. *NGOs* – brokerage and provision of training and credit opportunities; advice provision of their expertise; trade mediation; representation for members or partners

Despite performing a majority or all roles, several intermediaries would still prioritize the performance of one or two roles over others. In the case of GAs, network orchestration as mediation and resource provision of production and processing inputs appear to prioritize. SMGs are found to prioritize consultancy and market mediation, albeit passively. This finding supports Partners' (2007) findings that organizations often stick to or prioritize one or two roles. However, the findings seem to support Howells' (2006), Intarakumnerd and Chaoroenporn's (2013a; 2013b), and Go's (2019) findings more in that intermediaries perform many more roles and evolve their performance

depending on the needs of their partners. The intermediaries in the study learned to be capable of performing the four roles throughout the time of their service provision. They may have initially planned to focus on one or two roles but adapted to performing more, albeit in varying magnitudes.

Still, intermediaries can begin their services with many roles, such as AgriCOOPh and Chen Yi Agventures. As two of the youngest intermediaries, both organizations shared how they planned on providing a wide range of services from the beginning. Chen Yi Agventures exemplified this by emphasizing how performing the four roles helps them achieve their bottom lines and mission. AgriCOOPh also began similarly. However, the NGO experienced more widening of its services coming from its experience under the COVID-19 pandemic. Initially only providing market mediation and brokerage for its members, AgriCOOPh extended its marketing services to non-member cooperatives during the pandemic to support them in finding buyers for their produce.

Finding the intermediaries performing the four roles, the researcher further observes that the performance of these often overlaps with one another rather than equally performed. For example, we find that intermediaries that often perform market mediation also perform market brokerage like PDE, AgriCOOPh, and the SMGs, albeit more indirectly and passively. The same may be said for intermediaries that mediate networks for technologies and inputs brokerage like the GAs, PRIs, and IAs. Another common role overlap is brokerage and resource provision that the public sector intermediaries and Chen Yi Agventures and MFA conduct. In brokering production inputs, facilities, or farm machinery use, the mentioned intermediaries may also provide these to their stakeholders, members, or partners.

Although the findings on multiple role performance and role overlaps do not necessarily highlight how organizational type variations affect role performance, the results reveal a more general finding of how intermediaries in the Philippine rice and mango industries perform their roles.

Despite the similarities and role focus of the organization types, differences in how these organizations perform roles were also observed. Integrating the findings from the two cases, five external and internal factors were identified that might cause evolutions in intermediary role performance. The factors observed also coincide with similar factors found in previous studies: mandate, policy, vision, and mission (Intarakumnerd and Chaoroenporn, 2013a; Sutthijakra and Intarakumnerd, 2015; Go, 2019; Kivimaa et al., 2019), target audience/group (Intarakumnerd and Chaoroenporn, 2013b; Go, 2019), export likelihood or participation (Intarakumnerd and Chaoroenporn, 2013b; Vik and Kvam, 2018; Perri and Buchan, 2018), experiences successful or failed intermediation (Ramirez, Clarke, and Klerkx, 2018), and crisis as learning events (Chunhavuthiyanon and Intarakumnerd 2014). These factors may explain differences in role performance in an industry, by organization types, or within similar types. Table 7.5 briefly describes these factors and instances drawn from this study.

Table 7.5 Internal and External Factors that Affect Intermediary Role Performance

Factor	Type	Description	Examples from this Study
1. Mandate, Policy, Vision, and Mission	Mandate and policy – external Vision and mission – internal	Roles or services that may be mandated by law or focus on achieving a specified vision or mission. Adjustments to roles may be necessary when laws or relevant policies shift	<ul style="list-style-type: none"> <li>- Implementation of RCEF mandated several roles and services for ATI, PHILRICE, PHILMECH, and NRP</li> <li>- PRIs performing resource provision roles (production inputs, machinery, or equipment) as mandated, also partly mediating the distribution of these resources</li> <li>- PAKISAMA organizing communities as part of its mission</li> <li>- Several IAs performing lobbying roles</li> </ul>
2. Target audience, group, or partner needs	Internal	Needs of niche groups or differences in partners influencing roles and services	<ul style="list-style-type: none"> <li>- AgriCOOPh specifically targeting the organizational development of agricultural cooperatives in all role performances</li> <li>- PDE focused on growing its partnership with indigenous peoples and impoverished mango growers</li> <li>- SMGs' role performance for growers with social media access</li> <li>- Several IAs performing lobbying roles and acting as representatives for constituents and members</li> </ul>
3. Export likelihood, support, and participation	Internal	The decision of an intermediary to participate or support the export of products of their partners or their own.	<ul style="list-style-type: none"> <li>- Specific export-targeting training and advice brokered and provided by organizations like PDE, PMIFI, and Diamond Star</li> <li>- Operations of Chen Yi Agventures aimed at exporting in the future make their role performance target global standards</li> </ul>

*(Table 7.5 Continued)*

(Table 7.5 Continued)

4. Experiences of successful or failed intermediation	Internal	The continuation or ceasing of role performance based on an intermediary's experience	<ul style="list-style-type: none"><li>- Unsuccessful experience of Diamond Star in resource provision and training brokerage for its grower partners led to ceasing the performance of these roles</li><li>- PDE's initial success in processed mango exporting led to widening their stakeholder base and role performance</li></ul>
5. Crisis as learning events	External	Unforeseen local, national, or global crises that affect the role performance of intermediaries	<ul style="list-style-type: none"><li>- AgriCOOPh expanding its market matchmaking service to non-member cooperatives as a response to marketing requests in the agriculture sector during the COVID-19 pandemic</li><li>- Temporary cease of operations by Diamond Star as they review their operations and provide advice to growers on the stricter requirements by the Japanese government on imported mangoes</li></ul>

Note. The data for this table is drawn from the findings presented in Chapters V and VI and as summarized in Table 7.4.

The first of these factors are mandates, policies, vision, and missions. The researcher decided to collate these into a single factor as these individual concepts may also affect one another, especially policy. The enactment of laws or new policies may affect intermediaries' mandates, visions, and missions, most notably the public sector intermediaries. This collective factor shapes what roles intermediaries decide to perform and how they may perform these. As the industry and government response evolves, so do the roles of the intermediaries. The best example we can draw from this study is the institution of the RTL and the RCEF. ATI, PHILRICE, and PHILMECH gained several new resource provision and technology brokerage additions.

Moreover, they also expanded their mediation role by their search and partnership with rice farmer organizations that may benefit from the RCEF program. Conversely, policy changes may also cause the loss of roles. For example, by removing the NFA's distributive power of rice stocks to the private sector, GRECON effectively lost a part of its brokerage and mediation roles as they previously were a central funnel of NFA rice stock distribution.

We may look at the lobbying roles performed by intermediaries as an evolved role caused by the missions and visions of IAs in response to industry climate and partner needs. Although Table 7.4 only lists lobbying as an action or service conducted by the rice industry intermediaries, PMIFI also provides some political representation. This is mainly seen in the organization's attendance in public consultations or when asked to submit position papers. Conversely, GRECON and PAKISAMA are much more active in political representation. They have vied or are attempting to run for party-list representation and would often lobby against or for specific policies concerning the rice

industry or the agricultural sector in general. Even though PMIFI does not conduct political representation in the same manner as GRECON or PAKISAMA, the researcher did encounter another mango IA that performed lobbying like the rice IAs. Unfortunately, the organization declined to participate in this study. Nonetheless, the unnamed organization's lobbying role has been growing, as observed by the researcher from several interviews and in mango industry documents cited in this study. The differences in performance magnitude of lobbying roles or political representation may be due to variances in the IAs' vision, mission, or specific partner needs, as listed in Table 7.5.

From this finding, one may argue that lobbying may be a separate role from the other four roles considered in this study. Although it has been placed under the mediation role, the performance of political representation or lobbying-related work seems quite unlike that of a mediator. The intermediation is not necessarily directly performed for partners or members. Instead, lobbying-related roles target facets of the institutional environment that supports innovation and upgrading, effectively impacting industry actors.

The second factor identified is the needs of an intermediary's target audience or group. To put it simply, intermediaries respond to the everchanging needs of their partners. The decision to begin, expand, limit, or stop a role depends on partners' identified needs. Moreover, intermediaries may target a larger, more general group of partners to ensure that the organization continues to perform its roles even if its initial target community or group has attained the necessary intermediation. Examples of these are the provision of organizational development opportunities for agricultural cooperatives by AgriCOOPh, the focus of PDE on partnering with indigenous peoples, and the fostering of a



consultative online environment by the three SMGs. For evolutions in needs, we may look towards the business development consultancy and resource provision of the PRIs. For example, PHILRICE, PHILMECH, and DOST-ITDI began providing business development consultancy and feasibility studies from technology generation and diffusion. These organizations realized that they could not simply diffuse these technologies if their potential adopters had difficulties in identifying additional markets and business improvements borne of these innovations. As a result, these three PRIs instituted a separate office within their organization that supports this endeavor.

Third, the likelihood of participating or supporting the export market appears to be an internal factor that affects an intermediary's role performance. Linked to partners' needs to a certain extent, an intermediary's decision to participate or support exporting may shape its role performance, particularly in how strict they become in brokering and resource provision and how much broader they want to mediate for their partners. For example, looking at PDE and Diamond Star – the clear exporters – the training and monitoring they provide appear much stricter. They have several checks to ensure that they achieve the fair-trade or export requirements. A similar pattern is seen with Chen Yi Agventures, which is eyeing to export its milled rice products in the future. Another organization that started to expand its export market mediation in the rice industry is GRECON. Although the intermediary does not export rice, it supports its members that import rice from abroad, thereby supporting the export market. With the lack of cheaper local rice supply and cutting off stocks from the NFA, GRECON aids its members by mediating and brokering imported rice supply from importers that may or may not be members of the organization. Although the organization representatives mention that they

would instead support local farmers, mediating with importers is necessary for the time being as the needs of their members still come first.

The fourth factor is the successful and unsuccessful intermediation experiences of the organizations. Especially for private sector organizations that are not traditionally innovation intermediaries, these experiences may spell whether these organizations continue or cease performing intermediary roles. An example of these is the experiences of Diamond Star and PDE. As they could not receive their desired outcomes, Diamond Star stopped providing production and post-harvest inputs and financing to its mango partners, who claimed that these would boost the likelihood of producing export-grade mangoes. On the other hand, PDE was more successful in their initial brokerage of mangoes from impoverished growers to their partner processor, who then helped the NGO ensure that their processed products were of export quality.

The last factor identified is crisis events. In the context of this study, the most devastating that all the intermediaries faced was the COVID-19 pandemic. Operations ceased and required drastic evolutions as many intermediaries needed to abide by the physical restrictions imposed by the government. Many of their partners suffered, too, as markets shrunk due to the constraints on traveling. Events like these may push intermediaries to evolve and expand their roles. One intermediary that did was AgriCOOPh, which expanded its market matchmaking services to non-member cooperatives and expanded its mediation by linking organizations across different provinces.

Specific to the rice industry, many consider the RTL a crisis event. With the looming threat of an influx of imported rice, many participating intermediaries like

PHILRCE, PHILMECH, PAKISAMA, and GRECON, among others, are now pushing farmers to innovate faster. As a result, these intermediaries started mediating between each other more to broker the provision of seeds, training, and farm machinery to as many farmers as quickly as possible.

In the mango industry, one crisis event may be the changes in SPS requirements in high-value markets like Japan. Especially for those involved in fresh mango exports, the stricter adherence to these new standards came as a shock as not many growers can follow these, even until now. For intermediaries like Diamond Star, this crisis event required them to cease operations and reskill growers to at least catch up to the requirements. Another way the industry and intermediaries responded was by shifting the focus from fresh mangoes to processed products as these did not have as strict requirements. PRIs like PHILMECH, DOST-ITDI, and GNCRDPSC began conducting R&D on newer processed products, processing methods, and machinery. Although brokering and consultancy was generally done, an evolution towards performing these to diffuse processed product technologies was the evolutions and innovations. Currently, the mango industry faces a new crisis in the Cecid fly pest that has devastated mango growers across the country. R&D has shifted towards addressing this pest, and soon enough, consultancy and resource provision roles will likely change for intermediaries with partners mired by the pest.

To summarize this portion on organization types and role performance, the researcher finds that differences in intermediary organization types that affect role performance may likely be due to organizational characteristics. Nonetheless, similar organization types exhibit general similarities in performing intermediary roles regardless

of what industry they support. Moreover, both the rice and mango industry intermediaries show that they perform all four roles, albeit in varying degrees of magnitude, often compounding or overlapping the performance of at least two roles.

Following the last portion, we investigate the effect of organization types on intermediary key-capabilities. Table 7.6 summarizes similarities and differences in how the six organization types affect the building and application of their key-capabilities.

As with Sutthijakra and Intarakumnerd (2015) and Go (2019), the researcher finds that all intermediaries require building the four key-capabilities that may factor in greater success in intermediary role performance. Furthermore, as intermediaries build their key-capabilities, their development often overlaps with one another. In other words, the key-capabilities also build upon each other. An excellent example of this is AgriCOOPh's hiring of a knowledge management officer that eventually helped develop its key-capabilities. Although primarily hired to transform the organization's tacit knowledge into codified formats, the officer is also tasked with managing the NGO's social media accounts and communications. Doing these tasks helped solidify the organization's knowledge-building, build its external network, and sustain its current network. With its success, the process is now streamlined into the operational management of the entire organization. Experiences of intermediary key-capability building, like in the AgriCOOPh example, exhibit collective learning (Cohen and Levinthal, 1990; Sutthijakra and Intarakumnerd, 2015). Organizations develop further by integrating learning from various growth experiences.

Table 7.6 Similarities and Differences in Intermediary Key-Capability Building by Organization Type

Type	External Networking	Internal Communication	Knowledge-Building	Management
GAs	<p><i>Similarities:</i></p> <ul style="list-style-type: none"> <li>• Industrial consultations</li> <li>• Staff need to be sociable</li> <li>• ATI is active on radio, online, and physical platforms</li> <li>• Usually approached first as their offices have “known for” or assigned tags</li> <li>• Searches for private sector partners</li> <li>• May need stronger social media presence</li> </ul>	<p><i>Similarities:</i></p> <ul style="list-style-type: none"> <li>• Industrial consultations</li> <li>• Delineated tasks between similar public agencies</li> <li>• Staff need to be sociable</li> <li>• Coordination with regional counterparts</li> <li>• Has multiple private sector partners</li> </ul> <p><i>Rice:</i></p> <ul style="list-style-type: none"> <li>• Part of RCEF secretariat</li> </ul> <p><i>Mango:</i></p> <ul style="list-style-type: none"> <li>• HVCDP staff part of industry online messaging groups</li> </ul>	<p><i>Similarities:</i></p> <ul style="list-style-type: none"> <li>• Knowledgeable, trained, and professional staff as base of knowledge</li> <li>• Will offer technical and technology-specific training for staff</li> <li>• Learns from consultations and project evaluations</li> </ul> <p><i>Rice:</i></p> <ul style="list-style-type: none"> <li>• May request for secondment of staff from other rice-related agencies</li> </ul> <p><i>Mango:</i></p> <ul style="list-style-type: none"> <li>• Necessity of immersion in the crop industry assigned</li> </ul>	<p><i>Similarities:</i></p> <ul style="list-style-type: none"> <li>• Delineated tasks between similar public agencies</li> <li>• Offers technical and technology-specific training for staff</li> <li>• Program and project monitoring through evaluations and communication with implementors</li> <li>• Stable human resources will need supportive management and better job security</li> <li>• ATI has contingency budgets for unplanned programs</li> </ul> <p><i>Rice:</i></p> <ul style="list-style-type: none"> <li>• NRP as a banner program but may need more permanence</li> </ul> <p><i>Mango:</i></p> <ul style="list-style-type: none"> <li>• HVCDP prepares pre-procurement a year in advance</li> <li>• Only one staff assigned for mangoes in the HVCDP national office</li> <li>• Mandanas ruling will affect operations</li> </ul>

(Table 7.6 Continued)

(Table 7.6 Continued)

Type	External Networking	Internal Communication	Knowledge-Building	Management
PRI	<p><i>Similarities:</i></p> <ul style="list-style-type: none"> <li>• Industry consultations</li> <li>• Participation in R&amp;D networks and conferences</li> <li>• Credibility and reputation significant for R&amp;D collaboration</li> <li>• Conduct business feasibility studies for technology adopters</li> <li>• PHILMECH and DOST-ITDI host or joins technology expos, showcases, and roadshows</li> <li>• Heavy use of social media to promote research</li> <li>• Institutes have “known for” or assigned tags that aid in reputation and getting adopters and collaborators</li> </ul> <p><i>Rice:</i></p> <ul style="list-style-type: none"> <li>• PHILRICE Text Center for farmers to reach them</li> </ul> <p><i>Mango:</i></p> <ul style="list-style-type: none"> <li>• GNCRDPSC receiving more inquiries from other regions</li> </ul>	<p><i>Similarities:</i></p> <ul style="list-style-type: none"> <li>• Always share research output with collaborators, relevant offices, and partners</li> <li>• Sponsoring and continuous media support for adopters by PHILMECH and DOST-ITDI</li> <li>• Need to maintain a good working relationship between scientists and staff</li> <li>• Communication with their R&amp;D networks and co-implementers</li> </ul> <p><i>Rice:</i></p> <ul style="list-style-type: none"> <li>• Management of multiple branch stations by PHILRICE</li> <li>• PHILMECH and PHILRICE national coordination for RCEF implementation</li> </ul> <p><i>Mango:</i></p> <ul style="list-style-type: none"> <li>• GNCRDPSC coordination for planting material production and distribution</li> </ul>	<p><i>Similarities:</i></p> <ul style="list-style-type: none"> <li>• Most important key-capability</li> <li>• Knowledgeable, trained, and professional staff and scientists as base of knowledge</li> <li>• Many staff have advanced degrees</li> <li>• Active participation in academic conferences, product and technology expos, and career development opportunities</li> <li>• Staff mentoring for knowledge transfer</li> <li>• Openness to feedback for knowledge development</li> <li>• Conduct business feasibility studies for technology adopters</li> <li>• Learns from consultations and project evaluations</li> </ul> <p><i>Rice:</i></p> <ul style="list-style-type: none"> <li>• PHILRICE conducting participatory needs assessments and field visits for learning</li> </ul> <p><i>Mango:</i></p> <ul style="list-style-type: none"> <li>• GNCRDPSC conducting site visits for specific interventions and learning</li> <li>• Need for more specialized experts</li> </ul>	<p><i>Similarities:</i></p> <ul style="list-style-type: none"> <li>• Conduct of socio-economic research apart from scientific R&amp;D</li> <li>• Presence of human resource development programs</li> <li>• Importance of having a socially oriented perspective to work</li> <li>• Human resources may be limited by government hiring laws</li> <li>• Annually appropriated budgets, supplemented by research grants</li> <li>• Has office assigned to manage IPs</li> <li>• Institutes are not profit-seeking</li> </ul> <p><i>Rice:</i></p> <ul style="list-style-type: none"> <li>• PHILRICE has staff do community immersions</li> </ul> <p><i>Mango:</i></p> <ul style="list-style-type: none"> <li>• GNCRDPSC conducts several R&amp;D reviews</li> <li>• Human resource programs tied in with mother organization, DA-BPI</li> <li>• Need for more specialized experts</li> </ul>

(Table 7.6 Continued)

(Table 7.6 Continued)

Type	External Networking	Internal Communication	Knowledge-Building	Management
IAAs	<p><i>Similarities:</i></p> <ul style="list-style-type: none"> <li>• Networks with government to learn of programs and services for their members</li> <li>• Mix of national and localized presence</li> </ul> <p><i>Rice:</i></p> <ul style="list-style-type: none"> <li>• PAKISAMA hosting annual conference for networking, and organizing communities and advocacy groups</li> </ul> <p><i>Mango:</i></p> <ul style="list-style-type: none"> <li>• Actively traveling the country for mangoes to purchase for members or itself</li> <li>• Networking through National Mango Congress</li> </ul>	<p><i>Similarities:</i></p> <ul style="list-style-type: none"> <li>• Wide-ranging membership for PAKISAMA, GRECON, and PMIFI</li> </ul> <p><i>Rice:</i></p> <ul style="list-style-type: none"> <li>• Scheduled meetings between staff and board members or with general members for planning and reporting</li> <li>• Movement towards online platforms</li> <li>• PAKISAMA and GRECON part of larger rice or AFF confederations and networks</li> <li>• GRECON utilizes national network to funnel rice stocks</li> </ul> <p><i>Mango:</i></p> <ul style="list-style-type: none"> <li>• Endorsement of inquiries to local association members</li> <li>• Networking through National Mango Congress</li> </ul>	<p><i>Similarities:</i></p> <ul style="list-style-type: none"> <li>• Knowledgeable, trained, and professional staff and members as base of knowledge</li> </ul> <p><i>Rice:</i></p> <ul style="list-style-type: none"> <li>• GRECON highly astute in the consumer market</li> </ul> <p><i>Mango:</i></p> <ul style="list-style-type: none"> <li>• Knowledgeable in export and foreign markets</li> </ul>	<p><i>Similarities:</i></p> <ul style="list-style-type: none"> <li>• Formal organizational structure with (elected) officials</li> <li>• May either be operated professionally with staff or through member volunteers</li> <li>• May have membership fees but not substantial enough to operate the organization fully</li> </ul> <p><i>Rice:</i></p> <ul style="list-style-type: none"> <li>• GRECON utilizes national network to funnel rice stocks</li> <li>• PAKISAMA and MFA have set physical offices</li> </ul> <p><i>Mango:</i></p> <ul style="list-style-type: none"> <li>• Raises funds through mango sales</li> <li>• Only one permanently working staff</li> </ul>

(Table 7.6 Continued)

(Table 7.6 Continued)

Type	External Networking	Internal Communication	Knowledge-Building	Management
SMGs	<p><i>Similarities:</i></p> <ul style="list-style-type: none"> <li>• Easily searchable and accessible to interested persons</li> <li>• Thousands of members and growing</li> </ul> <p><i>Rice:</i></p> <ul style="list-style-type: none"> <li>• LMFRC noticed more OFWs joining the group</li> </ul>	<p><i>Similarities:</i></p> <ul style="list-style-type: none"> <li>• Free to share opinions and knowledge</li> <li>• Mostly free to post anything related to the groups' purpose but at times may require prior approval</li> </ul>	<p><i>Similarities:</i></p> <ul style="list-style-type: none"> <li>• Knowledgeable administrators and members as base of knowledge</li> </ul> <p><i>Rice:</i></p> <ul style="list-style-type: none"> <li>• LMFRC focused on rice equipment and machinery</li> </ul> <p><i>Mango:</i></p> <ul style="list-style-type: none"> <li>• MFP administrator shares personal growing protocol</li> <li>• PMRH administrator shares government, buyer, and supplier networks</li> </ul>	<p><i>Similarities:</i></p> <ul style="list-style-type: none"> <li>• Most operations and upkeep managed by one person</li> <li>• No membership fees or payments provided to administrators</li> <li>• Group initiators and administrators share a sense of wanting to help develop their industries</li> <li>• Time-consuming to manage</li> <li>• Rules set to help manage the group (requirement of profile pictures, reasons to remove a member, post focus and details required, application forms, and post-approvals)</li> </ul> <p><i>Mango:</i></p> <ul style="list-style-type: none"> <li>• MFP used to have more moderators and administrators, but the arrangement did not work out</li> </ul>

(Table 7.6 Continued)



(Table 7.6 Continued)

Type	External Networking	Internal Communication	Knowledge-Building	Management
Private Firms	<p><i>Rice:</i></p> <ul style="list-style-type: none"> <li>Expands partnerships with farmers through Renucci Rice Program</li> <li>Won 3<sup>rd</sup> Best Rice in the world in 2019, building their reputation</li> <li>Hoping to enter export market soon</li> </ul> <p><i>Mango:</i></p> <ul style="list-style-type: none"> <li>Vast export network that it can grow</li> <li>Staff go around the country to look for new and capable suppliers for export-grade mangoes</li> </ul>	<p><i>Similarities:</i></p> <ul style="list-style-type: none"> <li>Does not force partner farmers or growers to adopt company methods but wants their partners to learn the benefits of these for themselves</li> <li>Sends agriculturists and technicians to check and monitor their partners' progress</li> </ul> <p><i>Rice:</i></p> <ul style="list-style-type: none"> <li>Maximized international network to learn and gather rice contacts from other countries</li> <li>Coordinates with partner farmers through Renucci Rice Program</li> </ul> <p><i>Mango:</i></p> <ul style="list-style-type: none"> <li>In constant communication with head and sister offices for learning and information, especially on export requirement changes</li> <li>Vast export network</li> </ul>	<p><i>Similarities:</i></p> <ul style="list-style-type: none"> <li>Knowledgeable, trained, and professional staff as base of knowledge</li> </ul> <p><i>Rice:</i></p> <ul style="list-style-type: none"> <li>Conducted surveys and interviews before beginning their mission</li> <li>Training conducted by Japanese engineers for the first two years of operation (knowledge transfer)</li> <li>Developed own land preparation techniques suitable for the farmers in their area</li> </ul> <p><i>Mango:</i></p> <ul style="list-style-type: none"> <li>Knowledgeable of export markets and requirements</li> <li>Knowledge in mangoes may not be built more but is applied to their expansion to other fruits</li> <li>Introduced some foreign technologies into the Philippine mango industry</li> </ul>	<p><i>Similarities:</i></p> <ul style="list-style-type: none"> <li>As a firm, operations are professionally managed</li> <li>Hires agriculturists and needed professionals (e.g., engineers) for the company</li> </ul> <p><i>Rice:</i></p> <ul style="list-style-type: none"> <li>Partnered with a Japanese company in setting up their operations</li> <li>Full-value chain control perspective</li> </ul> <p><i>Mango:</i></p> <ul style="list-style-type: none"> <li>Has international staff and can send staff for training abroad</li> <li>Operates two export facilities, but the Luzon branch is the only one set for mangoes</li> </ul>

(Table 7.6 Continued)

(Table 7.6 Continued)

Type	External Networking	Internal Communication	Knowledge-Building	Management
Non-Government Organizations	<p><i>Similarities:</i></p> <ul style="list-style-type: none"> <li>Part of international networks and have several partners that they may get funding from</li> <li>Expanding network on social media and webpages</li> </ul> <p><i>Rice:</i></p> <ul style="list-style-type: none"> <li>Focused on establishing reputation and network as it is still a young organization</li> <li>Staff personal networks add to the growth of AgriCOOPh</li> </ul> <p><i>Mango:</i></p> <ul style="list-style-type: none"> <li>Shares and extends network with the PREDA Foundation</li> <li>By providing fair-trade premiums and assured markets, more growers approach them for partnerships</li> </ul>	<p><i>Similarities:</i></p> <ul style="list-style-type: none"> <li>Part of international networks and have several partners that they may get funding and sales from</li> <li>Attends programs and activities of partners</li> <li>Constantly needs to build trust with members and partners</li> </ul> <p><i>Rice:</i></p> <ul style="list-style-type: none"> <li>Hired a knowledge management officer to operate the NGO's social media platforms</li> </ul> <p><i>Mango:</i></p> <ul style="list-style-type: none"> <li>Visits partner communities several times a year and hired a local inspector to monitor production</li> <li>Shares and sustains network with the PREDA Foundation</li> </ul>	<p><i>Similarities:</i></p> <ul style="list-style-type: none"> <li>Knowledgeable, trained, and professional staff as base of knowledge</li> </ul> <p><i>Rice:</i></p> <ul style="list-style-type: none"> <li>Conducts profiling of member cooperatives to learn needs and prepare development proposals</li> <li>Focus on organizational development of cooperatives</li> </ul> <p><i>Mango:</i></p> <ul style="list-style-type: none"> <li>Focused on developing fair-trade and organic farming</li> <li>Knowledgeable of indigenous peoples' laws and culture</li> </ul>	<p><i>Similarities:</i></p> <ul style="list-style-type: none"> <li>Professionally staffed and managed organizations</li> </ul> <p><i>Rice:</i></p> <ul style="list-style-type: none"> <li>Currently reliant on some grants for funding as it builds its service fee-based business model</li> </ul> <p><i>Mango:</i></p> <ul style="list-style-type: none"> <li>Hiring of a local inspector for monitoring, especially in far rural areas</li> <li>Has fair-trade and organic certifications</li> <li>Staff have been around between ten to 20 years</li> <li>Sustainable business model through processed mango product exports</li> </ul>

Note. The researcher summarized the information in this table based on interview data, secondary research data, and assessments made in Chapters V and VI. The absence of *Rice* or *Mango* distinctions means that the researcher did not encounter any unique key-capability building instance or mechanism mentioned in the interviews or observed in an organization.

As the intermediaries build the four key-capabilities, the researcher observes that two key-capabilities are built generally in the same manner across all 18 organizations. These are their knowledge-building and management capabilities. Of the two, knowledge-building capabilities appear to act as the foundation and base for organizational learning for the intermediaries. Within this capability, three types of knowledge are commonly sought and applied. The first is knowledge of the industry and value chain they support. Understanding this allows the intermediaries to maneuver their place in the industry, assess what services they may offer, and learn whom to target.

Second, the intermediaries need extensive knowledge of their partners or constituents. With the numerous actors within the industry and distinctions even with similar actors, intermediaries need to immerse themselves in the lives of their primary partners. They can learn the specific needs and issues that their partners face. In the case of several intermediaries like the IAs and NGOs, the needs may not necessarily be industry-related but rather community development assistance needs. The third type of knowledge is learning the nature of the crop. This is different from knowing the industry or value chain, as the crop may require more scientific or technical expertise. By understanding the specifics of the crop (rice or mangoes in the case of this study), intermediaries may offer technical advice and projects that will help their partners receive the necessary resources or technologies for innovation or upgrading. Upon having a sufficient understanding of these three types of knowledge, intermediaries may better adjust to the needs of their constituents and the industry's environment. Their adjustments are further supported and built through their continuous role performance, as Sutthijakra and Intarakumnerd (2015) initially posited.

Still, an intermediary's knowledge-building must not end. These organizations need to constantly refresh, review, and relearn the knowledge necessary to keep up with changes brought by external factors or those induced by internal factors. One critical external factor is national and international policies. Although international standards or production policies are often taken as a given, intermediaries still need to monitor and adjust to these as they change. Intermediaries may take up lobbying roles for local policies to help influence changes that lead to more favorable outcomes for their partners and themselves. These policies also act as signals or signposts for intermediaries to learn what to develop for their organization, such as new knowledge necessary to keep updated with the latest industrial developments, critical networks to build for new partnerships or to continue sustaining their operations, new intermediary partners that may benefit from changes in policies, or management skills needed to qualify as a public sector partner (e.g., organizational qualifications to be a disburser of the mango rehabilitation loans, organizational and operational structure to be eligible for government-sponsored rice farm machinery).

Similar to knowledge-building capabilities, the intermediaries also emphasized three types of management capabilities that were reasonably common between all participating organizations. The first of these is operational management or implementation. This type of management capability harkens to what Go (2019) explained as project implementation capabilities which generally describes an intermediary's ability to implement and evaluate its programs, projects, and services. An essential aspect of these implementation or operational capabilities is what several private sector intermediaries and value chain actors call professionalization of operations. Several intermediaries, like PAKISAMA, AgriCOOPh, and PDE, realized the value of

hiring professional staff to operate the organization. Having them on board provides better and more sustainable organizational learning, especially for member-based organizations. Staff can better spread the learning to members and not solely to a select few. Hired staff may also be tasked to codify learned tacit knowledge that may be passed on more easily to successors. Moreover, these hired professionals are incentivized and pressured to perform as they are employees of the organization whom other professionals may replace.

The second is financial management which refers to an intermediary's capability to source, sustain, and manage its assets. Public sector intermediaries do not have much of an issue with funding as they all receive an annually appropriated budget. Although an annual budget is present, the intermediaries may receive will still vary depending on administration priorities or the need to share the funding with other non-rice or non-mango projects and programs for some intermediaries. Nonetheless, the possible greater challenge faced by public sector organizations is ensuring the proper and transparent allocation and use of these funds. On the other hand, private sector intermediaries need to build their ability to sustain their finances. Many of the intermediaries are membership fees or grant-based organizations that may be unsustainable in the long run. Another possible issue for financial sustainability is faced by the SMGs that do not manage any funds. Sustaining the drive and work required to keep the online group will be challenging once group administrators or moderators do not find the time to perform the upkeep necessary. As one representative from an IA exclaimed several times, private sector intermediaries must veer away from grant-reliance or doing things for free. It may be a viable option at the beginning of operations, but it cannot be a sustainable option. Thus,

private sector intermediaries need to shift towards more financially sustainable business models that allow the organizations to earn enough revenue to keep their operations afloat.

The third facet of management capabilities is human resource management. Different human resources capability instances are often mixed between the four capabilities in the literature (Sutthijakra and Intarakumnerd, 2015; Go, 2019). From this study, the researcher finds the intermediaries from both industries homing in on the significance of their human resources, often emphasizing how foundational they are to building the other four key-capabilities. Although the public sector intermediaries underscore their importance much more, the private sector intermediaries still exclaim their significance. Apart from hiring appropriate staff required, the primary way of building human resources is through human resource development programs managed by the intermediaries. Experienced most by the public sector, especially the PRIs, these programs allow their staff to develop their professional and personal lives and often lead to enhanced productivity.

Another critical facet of human resource development is leadership. The leaders – elected, chosen, or hired, depending on the organization type – may spell expansion or rigidity for an organization. These persons hold the vision and direction the organization takes and decide on programs, services, and funding. Leaders direct what the organization needs to do, and most leaders act as the face of the intermediary. Therefore, they will need to be approachable and know how to network.

Moreover, they also affect employee-management dynamics vital to operations, as alluded to in some way by Sutthijakra and Intarakumnerd (2015) in their discussion on underlying strategic capabilities. Sudden leadership changes, especially mentioned by

public sector intermediaries, create risks of program loss or changes in target recipients, which may hamper an intermediary's reputation and role performance. Leaders may also affect network building and sustainability as these persons may bring in their network and may cease ties with those that do not exhibit favorable relationships. Thus, besides ensuring staff development, intermediaries also have a vital task in selecting the appropriate leaders to run the organization.

Forms of leadership in intermediaries may be mixed. In the case of the SMGs, how the group moves forward and is controlled is very much set by the administrator acting as the group's de facto leader. For firms, the experiences of the two participating show differences in leadership styles. Chen Yi Agventures has the corporate leadership of its owners, who are driven by their desire to uplift the plight of the farmers affected by Typhoon Yolanda. On the other hand, Diamond Star follows the leadership and goals of its mother organization while still giving autonomy on how to proceed in the Philippines. The experiences of these firms also reveal how their organizations learned and changed based on their leaders' experiences and decisions. Chen Yi Agventures strove for advanced technology and did not allow that vision to alter as they understood the need for that advanced facility. Diamond Star adjusted its roles, services, and approaches when changes in international SPS rules applied. It ceased operations to review its operations and inform its suppliers of the drastic changes, especially with Japan's standards. As many of their mango producer partners could not keep up with the more stringent requirements, Diamond Star decided to expand its products further, began exporting new fruits, and opened new markets that still accepted SPS that their current suppliers could already achieve.

IAs and NGOs had various experiences, but they still followed a similar approach to how leadership directed and changed their role performance and key-capability building. Although some similarities are there, more differences may be seen. Some IAs were led by their community of members and had leaders elected like GRECON and MFA. Others like PAKISAMA and AgricCOOPh have an elected board of officers that direct the organization's vision and monitor the implementation by their hired professional staff. Daily operations were left to executive directors for these two organizations, where decisions to participate in the study came from these persons too. Additionally, the networks and rapport they have built are evident in the experiences of PAKISAMA and AgriCOOPh. The leaders also bring these networks when they partner with other intermediaries or are newly hired by their organization, like AgriCOOPh.

Still, although leadership does play a role in the success of an intermediary, having the appropriate human resources may matter as much. Looking at PMIFI, we find that it is now run almost entirely by one person. Although her leadership skills and credentials are exceptional, the association has slowly lost its edge as one person could not sustainably conduct all its activities and services.

With the significance placed on human resource development, the researcher proposes that this may be a fifth key-capability separate from the four identified. The researcher finds that there is enough merit to consider it as an independent capability given the specificity of its manifestation and importance in developing intermediaries. Compared to implementation and financial management capabilities, human resource development considers the particular development of staff, while the two other capabilities focus on intermediary operations. Considering human resource development



as a separate key-capability may also alleviate some overlaps between key-capabilities. If taken as unique, management may focus solely on operations, and knowledge-building considers the codified knowledge of the organization. For the time being, further research will be needed to assess better and fully claim human resource development as a separate intermediary key-capability.

From similarities in how the participating intermediaries generally built and applied their knowledge-building and management capabilities, the researcher finds more apparent distinctions in how different organization types develop and utilize their external networking and internal communication capabilities. One may observe that the differences are likely due to the nature of their organization and influenced further by their role performance. Specifically, the researcher finds the intermediary types employing the two capabilities in the following ways:

- i. *GAs* – for expansion and sustaining government service and provision networks
- ii. *PRIs* – for expansion and sustaining R&D networks for collaboration and reputation building, and expansion and sustaining adopter networks for diffusion, research, feedback, and promotion
- iii. *IAs* – for expansion and sustaining membership and finding new and providing opportunities for members (market, information, credit, development assistance)
- iv. *SMGs* – for expansion and sustaining membership, fostering a consultative environment, and sharing of experiences between members

- v. *Private Firms* – for market and supplier expansion and sustainment, and learning and adoption of new or required technologies, practices, standards, and certifications
- vi. *NGOs* – a mix of how industry associations and private firms build and apply their external networking and internal communication capabilities. The mixture may be more due to the participating NGOs having a solid social enterprise perspective and approach to their work

Nonetheless, clear from the comparisons and the discussions in the previous chapters on these two capabilities is the common need for all intermediaries to build trust and social capital (Adler and Kwon, 2002; Sieg, Wallin, and von Krogh, 2010). As building external networking requires relationship-building and internal communication needs to sustain relationships, intermediaries must ensure that these key-capabilities are grounded on trust.

Although organization type difference effects are more clearly shown in the building and applying external networking and internal communication capabilities, intermediaries may still build their key-capabilities in specific ways. Drawing from the experiences of the participating intermediaries, the researcher finds four factors that may impact intermediary key-capability building: policies, learning and crisis events, leadership styles and changes, and funding sustainability. A summary of these factors is provided in Table 7.7.

Table 7.7 Internal and External Factors that Affect Intermediary Key-Capability Building

Factor	Type	Description	Examples from this Study
1. Policies, national and international	External	Global standards and requirements impact an intermediary's needed network, knowledge, and operations. National policies that affect the operations and networks of intermediaries.	<ul style="list-style-type: none"> <li>- Specialized operations for fair-trade certification and operations by PDE</li> <li>- Mandanas Ruling as a policy that will drastically affect the management capabilities of HVCDP and other DA-related agencies</li> <li>- Knowledge and network expansion of Diamond Star to gain export-grade mangoes</li> <li>- Creation of new offices within PHILRICE, PHILMECH, and ATI for RCEF implementation</li> </ul>
2. Learning events and crisis events	Internal and External	Critical events or milestones that cause evolutions in an intermediary's key-capabilities. These may also be crisis events that may cause evolutions too.	<ul style="list-style-type: none"> <li>- The physical restrictions of COVID-19 led to the shift towards online platforms and communication for intermediaries and their partners</li> <li>- Adjustments to knowledge and management capabilities of Diamond Star and its partners while ceasing operations due to the strict requirements of the Japanese market</li> <li>- PHILRICE investing in the more active promotion and use of various research-focused social media platforms to expand their R&amp;D network</li> </ul>

*(Table 7.7 Continued)*

(Table 7.7 Continued)

3. Leadership and changes in leadership	Internal	The leadership styles and changes that affect the overall operations and development of an intermediary	<ul style="list-style-type: none"> <li>- The decision of AgriCOOPh to take a well-known champion in the agriculture sector, thereby greatly expanding their external network</li> <li>- The leadership style of PDE through the experience of their leader in running an NGO and providing community development assistance on top of a sustainable business</li> <li>- The risk of loss of funding or operations of a government program as leaders change</li> </ul>
4. Funding sustainability	Internal	The ability of an intermediary to sustainably fund itself and continue its operations. Included is the ability of an intermediary to also invest in its development	<ul style="list-style-type: none"> <li>- Investment of public sector intermediaries in their human resources, ensuring that they grow professionally through a variety of skills and education opportunities</li> <li>- Shift from grant-reliance towards service fee-based operations, like that of PAKISAMA and AgriCOOPh</li> <li>- Membership fee-based or volunteer-based operations by GRECON, MFA, or the SMGs</li> </ul>

Note. The data for this table is drawn from the findings presented in Chapters V and VI and as summarized in Table 7.6.

The first are laws or public policies on a national and international level. These policies may affect intermediaries by signaling to them the needed network, knowledge, and operations to abide by new policies or requirements. Especially on an international level, these are the standards, regulations, and agreements that often restrict the use of certain chemicals, require specific processes and packaging for produce and products, or impose limits on quantities or tariffs. An example of an intermediary affected by international policies is seen in the developments in knowledge-building, management, and internal communication capabilities by PDE as they developed their organization to abide by the rules set by their fair-trade and organic certifiers.

We find more effects on public sector intermediaries on a national policy level. From the interviews, three Philippine laws or policies stand out: procurement, operations (i.e., Mandanas ruling), and hiring. When providing resources, procurement laws in the Philippines often create limitations on purchasing and distributing inputs or other resources. PRIs and GAs alter their management capabilities, specifically operational management, to deliver these resources effectively and efficiently. As in the experience of PHILMECH with RCEF implementation, it needs to undergo the procurement process as it purchases and distributes farm machinery. As a PRI, PHILMECH is not allowed by its mandate to manufacture the farm machinery, thus needing to look for a capable and qualified supplier.

Likewise, the Mandanas ruling also impacts the operational management of intermediaries. Again, taking HVCDP as an example, several of its powers and programs may be devolved to the local government units. Once effective, the intermediary will likely need to adjust its management and networking capabilities.

Finally, hiring practices and laws often create losses for the key-capabilities of the public sector, especially in their human resource development. With much promising staff working under contractual, coterminous, or job-order arrangements, the intermediaries tend to lose out on individuals with high service potential. Positive changes or adjustments to these laws may allow intermediaries to build their key-capabilities more effectively, resulting in improved role performance.

The second factor that affects key-capabilities is what Chunhavuthiyanon and Intarakumnerd (2014) call learning events in their study of intermediary roles. Learning events are “important milestones in the capability formation process” (p. 20). All the participating intermediaries have undergone unique experiences that help build their key-capabilities. Similarly, crises that intermediaries undergo may provide learning for an intermediary. Nonetheless, the opposite is also possible where crises hamper key-capabilities. Through these experiences, intermediaries respond by building their key-capabilities in various ways. Several examples of these are:

- i. Chen Yi Agventures conducted heavy consultations with rice-producing countries as they were establishing the most advanced rice processing facility in Southeast Asia
- ii. PMIFI’s changes in management and operation style led to the need to shift towards a more mango export-oriented business to sustain the organization
- iii. Diamond Star faced stricter chemical growing protocols by the Japanese government, leading to a temporary halt in their operations as they tried to adjust their and their partners’ capabilities

- iv. PHILRICE investing in the more active promotion and use of various research-focused social media platforms to expand their R&D network
- v. The physical restrictions of COVID-19 led to the temporary loss of internal communication capabilities within current networks, especially for those that required physical communication. Still, many intermediaries also grew by learning and shifting to online operations and communication modes, even teaching their partners how to use these. Through this shift, many intermediaries expanded their networks, gained better and more constant communication with their partners, and operated smoother as the physical boundaries for an office were made more temporarily needed.

A third factor we find essential in building key-capabilities is the leaders of the intermediaries. As mentioned in the previous chapters, these persons dictate the vision and direction of the organization. Although decisions to perform a role are informed by several factors, leaders may still have the final say on whether these roles are performed and to what extent and how they are done. In the context of key-capabilities, leaders, as part of an intermediary's human resources, may influence the development of specific key-capabilities. For example, by hiring a well-known champion in Philippine agriculture, AgriCOOPh greatly expanded its external networking capabilities through the network of its director alone. Similarly, the owners of Chen Yi Agventures bring their international network and professional operational management skills into their business and in the intermediation they perform.

Another aspect of this factor is leadership changes. These persons may prioritize roles and key-capabilities that they deem important. Thus, leadership changes may cause

tensions or risks for an intermediary's key-capabilities. One often-cited instance of this by several intermediaries is seen in the public sector. Several have reported the effect a leader has on the rapport and morale of staff. At times, programs or their beneficiaries may cease or receive less priority over others depending on the preferences of the new leadership. Therefore, it would be wise for intermediaries and their leaders to be wary of the risks and benefits a leader or set of leaders would have on the key-capability building of their organization.

The final factor we identified is funding sustainability. This is mainly found as a major factor for private sector intermediaries. Nonetheless, public sector intermediaries have their struggles to face when it comes to keeping or raising their budgets as these require annual public hearings and an almost two-year lead time to prepare. On the other hand, private sector intermediaries have a greater risk of ending as finding a more sustainable funding source is often a challenge observed in many intermediaries. Having funding allows an intermediary to continue its role performance and invest in its development. These investments include hiring and developing human resources, the costs of acquiring new knowledge and maintaining physical infrastructures and common-use items, and the costs of keeping international memberships and certifications. Private sector organizations employ several common funding methods: grants, membership fees, service fees, and volunteer-based operations. Within organization types, the ones that follow similar trends are the SMGs that are purely voluntary work and the private firms that are active players in a value chain. The IAs and NGOs all acquire funding in various ways like those mentioned. This is not to say that one method is better than the other. However, organizations that showed a mix of grants and service-fee-based or being an active value chain player appear to have better key-capability building mechanisms.



Grants, especially given by international partners, allow organizations like PAKISAMA, AgriCOOPh, and PDE to hire key persons, pay for operations, or invest in programs that may bring future financial sustainability. Although requiring annual or entry membership fees may appear viable, the fees that IAs need are not all that significant, with one not even requiring any. Intermediaries must realize that generating a sustainable source of funding for the organization is necessary to consider if they hope to continue their role performance and build their key-capabilities effectively.

Despite these factors and different impacts of organization types, the researcher also finds an interesting underlying capability that may further build on the initial two found by Sutthijakra and Intarakumnerd (2015). Stemming primarily from the public sector intermediaries, the researcher finds specific capabilities or characteristics more akin to what may be considered motivational capabilities. This underlying capability looks at the perspective and outlook of an organization toward the process of intermediation (Ramirez, Clarke, and Klerkx, 2018). The study found anecdotes of passion for work, a service-oriented mindset, and the need to conduct immersions as evidence for the proposed third underlying capability. In the private sector, the intermediation perspective is also found in the experiences of Chen Yi Agventures and the SMGs in their desire to aid farmers and growers.

Nonetheless, as in the Ramirez, Clarke, and Klerkx (2018) study, an intermediary's perspective may not necessarily emanate a positive tone. Not all possible intermediaries may be willing to provide intermediation, while others' perspectives may be affected by the lack of response from their partners. As in the case of Diamond Star, the lack of positive outcomes from their resource provision to mango growers led to a

change in operational management capabilities by ceasing to provide inputs further. Still, the evidence provided demonstrates evidence for the third underlying capability, and future studies may help establish motivational capabilities.

The researcher finds that organizational types influence how intermediaries build their key-capabilities, most exemplified in the external networking and internal communication capabilities. Moreover, several factors add to the key-capability building and application variations, like the effect of laws and learning events. We find knowledge-building and management capabilities as common foundations for the participating intermediaries despite differences in types. In addition to these general findings, the researcher proposes two critical additions or changes to the overall key-capability framework of Sutthijakra and Intarakumnerd (2015). These are the addition of human resource management as a fifth key-capability and the recognition of motivational capabilities as a third underlying capability.

## **Section 7.5 Cross Case Comparison by Value Chain Participation and Support**

Succeeding the effect of organization types, we look at the impact of innovation intermediaries' value chain support and participation. This section attempts to answer the second sub-question that asks how differences in *value chain segment* support affect the roles and key-capabilities of intermediary organizations? Like the previous segment, the researcher discusses its effect on role performance and intermediary key-capabilities.

Table 7.8 presents the number of innovation intermediaries performing one of the roles in every rice and mango value chain segment. Several general findings on the effect of value chains on roles are found. First, a critical difference that needs to be mentioned

is the more abundant appearance and participation of mango intermediaries in their value chain than their rice industry counterparts. As discussed in Chapter VI, this is likely due to the mango industry's more tightly bound value chain, possibly owing to the very sensitive nature of the fruit. Moreover, more monitoring of distinct inputs and processes is required for growers or companies that plan to enter or are already engaged in the export market. As discussed and mentioned by several research participants, growing export quality mangoes has several crucial steps that last from the beginning to the point of import. Thus, intermediaries in this industry may be required to perform roles throughout the chain rather than specializing in one or two segments.

Conversely, most rice organizations provide more specialized role performances in certain segments even if several intermediaries in the rice industry also perform roles encompassing the entire value chain. For example, organizations like PHILRICE and PHILMECH specialize in the upstream or more technology-heavy portions of the value chain. At the same time, GRECON mediates trades, especially in the milled rice and marketing segments.

Table 7.8 Innovation Intermediary Role Performances in the Rice or Mango Value Chain Segments

<i>Rice</i>							
	Input Supply	Production	Aggregation	Milling	Milled Rice / Rice Processing	Marketing	Global Market / Import
No. of innovation intermediaries (out of 11) performing a role:							
Broker	8		1	5	7	4	1
Consultant	9	9	3	8	8	5	1
Mediator	8	3	1	6	7	6	1
Resource Provider	7	4	1	5	6	3	
<i>Mango</i>							
	Input Supply	Production	Post-Harvest	Assembly and Trade	Fresh Mangoes / Processing	Marketing	Global Market / Export
No. of organizations (out of 10) performing a role:							
Broker	7		3	3	8	3	4
Consultant	9	9	9	3	8	2	2
Mediator	6	4	5	5	7	8	1
Resource Provider	8	4	6		7		

Note. The data for this table is summarized from tables 5.10 (Chapter 5) and 6.10 (Chapter 6).

Second, the researcher finds that, in both value chains, intermediaries perform roles most in the input supply, milling (rice) or post-harvest (mango), and milled rice, fresh mangoes, or processed products segments. These segments exhibited the heaviest needs of hard and soft technologies and resources in both industries. Moreover, both industries show that the roles required in these segments are performed more by the public sector than the private sector. With a more stable source of financial resources, public sector intermediaries may be taking on more investment risks associated with production, especially for small-scale growers and processors. Nevertheless, value chain segments that need more significant capital inputs associated with the main production processes require more brokerage and resource provision roles.

Common again between the two value chains is the performance of fewer roles in the production segment. However, this segment exhibits one of the highest incidences of consultancy. The lack of brokerage and resource provision in this segment is that the required inputs should have been completed in the previous input supply segment. In addition, as the production segment entails farmers or growers raising the primary crops, more consultancy is needed to receive the advice to address issues. Moreover, as shown by the experiences of Diamond Star, PDE, and Chen Yi Adventures, intermediaries may perform resource provision roles by fielding staff to monitor the growth of crops, provide technical advice, and ensure that growers and farmers can abide by required standards.

Next, discounting the global market segments first, the researcher finds that roles are least performed in the rice and mango value chains' aggregation, assembly, and trade segments. In addition, we find that more private sector intermediaries are present as public sector intermediaries do not intervene much in trade mediations and product aggregation,

which are the primary processes in these segments. Comparing industries, we find that mango intermediaries have a slight edge in performing roles, likely due to the earlier integrated chain explanation. Moreover, with more upstream actors present and fewer contract growing arrangements observed in the mango industry compared to the rice industry, mango intermediaries appear to perform more roles that mediate trades and linkages in the assembly and trade segment.

The researcher observes more intermediation performed in the rice value chain's marketing segments. The industry seems to be strewn with more competition between wholesalers and retailers. Apart from those actors, cooperatives or farmer's groups also try getting into the market as straight-chain operators. Intermediaries performed a mix of the four roles to provide the learning and support for those entering or competing in the market. On the other hand, the mango value chain exhibits more intermediaries performing mediation roles. The interviews found that these mediation roles primarily revolve around market linkages and less so of other mediation services like price mediation. With less differentiation in fresh mango products, prices vary less than rice products. The researcher further observed that price mediation is done more in the upstream segments as farmers and growers as a greater range of price variations occur there.

It is not surprising to find very few intermediaries in the global market segment. However, with the mango industry aiming for export revitalization, the researcher expected a more substantial presence of intermediaries in this segment. The lack of incidence in the global market could be due to many of the participating intermediaries choosing to target domestic issues first rather than immediately supporting export.

Another possibility is the presence of foreign firms or organizations performing intermediary roles that may not be as known or seen by many actors in the industries. Nonetheless, because several organizations are involved in export, it is predictable that the mango industry would exhibit more intermediaries in the global market segment than the rice industry, which has only one. Although the rice chain is affected by the worldwide market with the entrance of imported rice, these products are brought in primarily by wholesalers. The increase in market supply comes in at the tail end of the chain and affects the previous segments. Thus, more intermediation is done in the earlier segments as many try to keep up with cheaper imported rice.

Finally, as mentioned at the end of both segments' value chain and role discussion, the researcher finds that several intermediation services are left unseen when conducting a value chain analysis of innovation intermediaries. As the value chain primarily showcases market or production processes, other pertinent role performances or services may be unnoticed. Programs or roles such as lobbying or policy negotiations, R&D, industrial consultations, network orchestration, or organizational and managerial development of firms or farms are examples of activities outside of the production processes that may likely aid actors in upgrading or innovating in their value chain. Therefore, it would be wise for future researchers studying innovation intermediaries in value chains to always consider the institutional environment and intermediary services that a commodity's production process cannot capture.

Taking a more in-depth look at each intermediary role, the researcher finds several similarities with how these are performed in a value chain. Beginning with mediation, the researcher finds this role performed in the value chain in three ways. First is through input

and technology mediation, where intermediaries connect value chain actors to possible sources of required items. Second, intermediaries mediate the value chain by connecting the segments. For example, the organizations may perform market mediation to have actors from different segments purchase intermediate goods from the previous segment to link the segments. Connecting segments in this manner harken to Fernandez-Stark, Bamber, and Gereffi's (2014) and Gereffi's (2018) backward linkage upgrading trajectory.

Moreover, intermediaries may join segments by clustering processes together, as in the experience of Chen Yi Agventures. Third, some intermediaries may perform price mediation like HVCDP and PMIFI. With much fewer intermediaries performing this third form of mediation, an additional caveat to price mediation is that it often acts as a standard but not necessarily a hard rule or price for actors to follow.

Following mediation, we find that the brokerage role is primarily executed through the successful negotiations and acquisitions of needed hard and soft technologies or inputs in the input supply, milling or post-harvest, and milled rice, fresh mangoes, or processed product segments. As mentioned, these are input or technology-heavy segments. However, in addition to brokering these, innovation intermediaries also performed market brokerage in the other segments of either chain that are not input-heavy.

Similar to brokerage, intermediaries perform resource provision roles in a value chain by providing hard technologies or production inputs. These are often in the form of organic material inputs, chemicals, machinery for farming or processing, the use or establishment of facilities, and other equipment. Moreover, intermediaries also provide a gamut of soft technologies that are not necessarily captured in value chain processes.



These soft inputs may take the form of training provisions or even an intermediary's human resources. Of course, providing these resources entails utilizing an intermediary's financial resources.

Connected to the provision of human resources, many intermediaries perform consultancy roles through their staff. Value chain actors often request chain advice on technologies, practices, techniques, problems, and market information. Thus, consultancy is performed most in both value chains and is hardly absent in any segment. The researcher posits that consultancy roles are most performed due to the necessity of advice in any part of the production process. Before requiring brokerage, mediation, or resource provision, value chain actors may first request advice, especially if they are unsure how to proceed. Thus, consultancy may be the indispensable role that all intermediaries need to provide, especially when taking a value chain approach to intermediation.

From these findings and discussions, we find that value chain segments primarily affect intermediary role performance through the need to address value chain actors' requests, targeting individual value chain segment processes, integrating succeeding value chain segments, and adapting to international market effects and demands. However, certain aspects of intermediation may not be immediately evident by simply looking at a value chain. Thus, the researcher proposes another method of evaluating intermediation in agricultural value chains. Incorporating the findings from this study with the upgrading trajectories of Humphrey and Schmitz (2002), Fernandez-Stark, Bamber, and Gereffi (2014), and Gereffi (2018) and the specificities of agricultural value chains posited by Ponte and Ewert (2009), the researcher suggests four kinds of

intermediation that hopefully captures the essences of innovation intermediaries and value chains:

1. *Horizontal intermediation* – services or role performance that targets upgrading or innovation in a production process of a segment. Examples of these may be the provision of quality planting materials and brokering HWT or VHT systems in the mango value chain)
2. *Vertical intermediation* – roles performance that bridge or integrate markets, production processes, or segments. Instances of vertical intermediation are market mediation, the establishment of production tramlines or multi-process facilities, and chain aggregation
3. *Intersectoral intermediation* – programs or role performance that offer partners opportunities to enter or integrate with other value chains. Possibilities for this are crop diversification programs, the biomass fuel powerplant in the rice industry, or beekeeping alongside mango production
4. *Chain-encompassing intermediation* – intermediary roles or services that target the institutional environment or innovation facets outside the production process. Intermediary roles that fall under this category may be the conduct of R&D, lobbying, organizational innovation (e.g., hiring of professional managers or managerial training), or attainment of certifications

To the researcher's knowledge, there have not been any previous studies that attempted to analyze and integrate innovation intermediation with the value chain approach. Thus, the proposed four types of value chain intermediation will require more follow-up work to materialize the proposition. Nonetheless, the researcher posits that the

suggested intermediation types are common and extensive enough to cover innovation intermediary performance in other agricultural and non-agricultural value chains.

Following the discussion on how intermediary roles are affected by the value chain, we move towards comparing the effect of the value chain on intermediary key-capability building. Generally, the findings between the rice and mango cases are similar in that individual value chain segments do not seem to affect key-capabilities directly. Instead, the researcher finds that support and participation overall affect the building and application of these. Moreover, findings and analysis from both cases further support Sutthijakra and Intarakumnerd's (2015) original theory of intermediary key-capabilities having a synchronous relationship with role performance where an intermediary's required roles signal what key-capabilities are needed and built, and once built, roles will be performed more successfully. The way the value chain influences key-capability building may be through role performance. By examining each key-capability, the relationship becomes much clearer. Table 7.9 summarizes commonalities in how the rice and mango innovation intermediaries build and apply their key-capabilities in their respective value chains.

As discussed in both chapters, knowledge-building capabilities appear to be most elementary to build when supporting or participating in a value chain. However, like most actors, it is vital that intermediaries understand the value chain processes and how their partners participate in the chain. By learning these, intermediaries may assess what roles they need to perform and networks to build to aid their partners' greater participation and integration.

Table 7.9 Intermediary Key-Capability Building and Applications in the Rice and Mango Value Chains

Knowledge-Building
<ul style="list-style-type: none"> <li>- To learn the state, issues, and hindrances partners and actors face</li> <li>- Need to learn and understand the entire value chain, the intricacies of each segment, and how these connect</li> <li>- By knowing these, intermediaries may be informed of what roles or services are required of them</li> </ul>
Management
<ul style="list-style-type: none"> <li>- Built depending more on how intermediaries perform their roles by their organization type and the purpose or mission of the organization</li> <li>- Implementation skills may be built and applied to target programs in individual segments, take a whole-chain approach, or a mix of both (as seen in many mango industry intermediaries)</li> <li>- Activeness in the export market affects building this capability, as evidenced by stricter controls and compliance with international standards and certifications in several mango industry intermediaries</li> <li>- Being an active player in the value chain helps build business aspects of management capabilities</li> <li>- It may be limited by human resource capability and capacity</li> </ul>
External Networking and Internal Communication
<ul style="list-style-type: none"> <li>- Within the confines of value chain processes: to widen and sustain networks for technology and knowledge diffusion and provision, mediation of trades, and linkage of segments and actors</li> <li>- Outside of the confines of value chain processes: to widen and sustain networks for non-value chain activities like R&amp;D collaborations by PRIs, community development assistance and aid opportunities by IAs and NGOs, or large intersectoral upgrading leaps</li> </ul>

Note. The data for this table is summarized from the findings from Chapter 5, Section 5.5.2. and Chapter 6, Section 6.5.2.

Following knowledge-building capabilities, management capabilities act as a baseline for innovation intermediaries. However, management capabilities appear to be more fluid and influenced by other factors than knowledge-building capabilities. The researcher finds that organization type and their respective purpose or mission also affect how intermediaries build their management capabilities. From the previous chapters, we saw how organizations like PHILRICE, DOST-ITDI, GNCRDPSC, and GRECON would

specialize in specific segments or processes as emphasized by their organization's type or purpose. Related to segment concentration, another factor that may influence the management capabilities of an intermediary is their value chain perspective or approach. Most participating intermediaries target specific segments or processes and perform intermediary roles that aid the actors involved. However, several intermediaries like Chen Yi Agventures and AgriCOOPh take a whole-chain approach to their operations. These two organizations strategically perform roles that target the entire value chain or ensure that their role performance overlaps between segments to link the chain tighter. At times, intermediaries may also employ a mix of these two approaches, as shown by several intermediaries in the mango industry. Moreover, we find that those engaged in the export market seem to build their management capabilities by adjusting to the requirements of the international market. Those that engage or plan to enter, like PDE, Diamond Star, and Chen Yi Agventures, have been observed to build their management capabilities towards being firmer with standard controls and monitoring.

However, the stricter adherence to international standards may be caused by their activeness as value chain players. Compared to the other participating intermediaries, Chen Yi Agventures, Diamond Star, PMIFI, and PDE earn revenue by participating as value chain actors to sustain their operations and continue their intermediation. The researcher finds that participation in individual segments may then influence their key-capabilities, like how conventional value chain actors would grow in their capabilities as they participate in their value chain (Humphrey and Schmitz, 2002; Lema, Rabellotti, and Sampath, 2018; Lema, Pietrobelli, and Rabellotti, 2018). Apart from building intermediary key-capabilities, the four organizations also innovate and upgrade their operations to develop their technological capabilities (Lall, 1992; Bell and Pavitt, 1993;

Morrison, Pietrobelli, and Rabellotti, 2018). This experience is most evident in the experiences of the private firms that perform intermediary roles and employ intermediary key-capabilities reinforced by their technological capabilities. For example, Chen Yi Agventures and Diamond Star utilize their technical expertise, machinery, facilities, and international networks to build their business and support their farmer and grower partners. Similarly, PMIFI and PDE also employ their technical expertise and networks to develop their enterprises.

Like the previous section, the researcher also finds human resource development necessary for management capabilities. Given its significance, intermediaries need to consider developing their staff to address the needs of their partners in the value chain. The proposal for human resource development as a separate key-capability still stands in the context of intermediation in a value chain.

For external networking and internal communication capabilities, the researcher finds that these two capabilities are also affected by an intermediary's role requirements, organization type, and purpose. Unlike the previous, these two capabilities seem to be more responsive than as part of the baseline key-capabilities for the value chain. Nonetheless, both are vital to intermediating in a value chain. Building and applying these allows intermediaries to broaden and maintain the networks necessary for technology and knowledge diffusion and provision, mediation of trades, and linkage of segments and actors. In addition, these two capabilities allow intermediaries to identify and provide for their partners' needs properly. More than working within the value chain, an interesting finding is that external networking and internal communication capabilities are built and employed outside the value chain. Although the networks involve non-value chain

processes, the results of their capability building may still influence the value chain they support. For example, instances of non-value chain process networking expansion and maintenance would be fostering R&D collaborations and work by PRIs, or community development assistance opportunities granted by international partners of IAs and NGOs. Moreover, in expanding their network, they may also learn of opportunities for intersectoral upgrading for themselves or their partners.

We find that value chain support and participation influence intermediary key-capability but not directly. In addition, both cases show that individual value chain segments appear not to influence key-capability building. Instead, the value chain in its entirety has some influence. Knowledge-building and management capabilities form the foundation for innovation intermediaries that hope to participate in a value chain as these capabilities appear to require the development of the four. On the other hand, external networking and internal communication capabilities are applied as they are built. By building their key-capabilities, intermediaries learn what roles are required of them and how they need to perform these in the value chain.

Furthermore, the researcher finds that Sutthijakra and Intarakumnerd's (2015) original findings on roles and key-capabilities hold still. However, the individual and cross analysis reveal that other factors may affect key-capability building. Similar to the previous section, we find that organization type and their mission or purpose also affect the key-capability building of intermediaries in the value chain. Moreover, with several intermediaries actively participating as value chain players, the researcher finds that those directly involved in the value chain, especially those participating in export, build technological capabilities (Lall, 1992; Bell and Pavitt, 1993) to supplement their

intermediary key-capabilities and role performance. By understanding the different factors that build key-capabilities, intermediaries may build these more efficiently and better apply them to their roles.

## **Section 7.6 Intermediation in Domestic and Export Market-Oriented Industries**

From organization type and value chain differences, we move towards the distinct effects of market orientations on intermediary roles and key-capabilities. As with the previous sections, this section first peers into intermediary roles followed by key-capabilities. Finally, this section responds to the third sub-question: how do differences in their partners' *primary market orientation* (export- or domestic-market) affect the roles and key-capabilities of intermediary organizations?

To provide a general outlook on the likely goals of innovation intermediation in both industries, the researcher offers Figure 7.2. The figure compares the goal or impact of intermediation on both case industries. Both cases show the interaction between international markets and the local industry, where the impact from the global market is directed towards the rice industry, and the reverse is shown for the mango industry. Similarly, the impact in both industries takes a shift with intermediation that hopes to lessen the impact felt by the local rice industry and increase that of the mango industry. The graphic also shows the need to consider the global market in the analysis.

Nonetheless, as the previous chapters discussed and Section 7.2 of this chapter recapped, both industries commonly face several domestic production issues that influence the innovation intermediation required. For example, developing the local industry helps to compete with imported rice for the rice industry. For the mango industry,



development means increased bargaining power (Dallas, Ponte, and Sturgeon, 2019) in the international market for the local mango industry. Although the mango industry’s goal is toward export revitalization, we find that addressing domestic production issues, especially in the upstream production processes of the value chain, is a common challenge that both industries need to face.

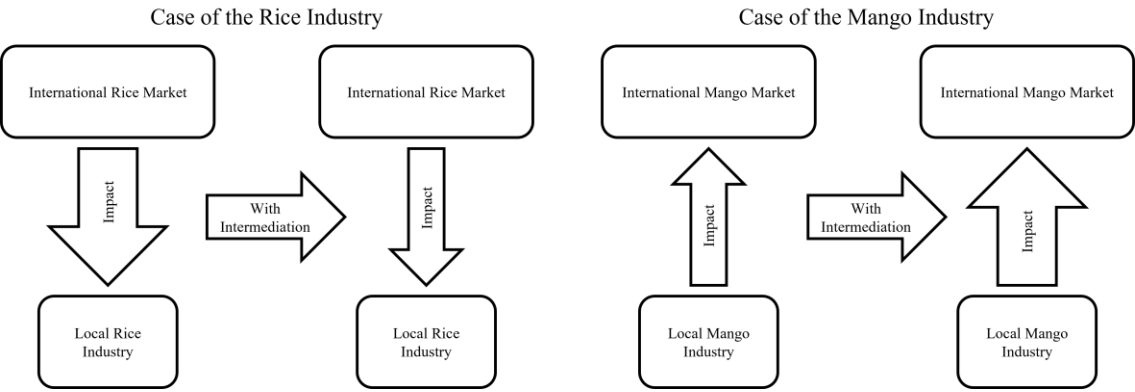


Figure 7.2. The desired impact of innovation intermediation for the rice and mango industries of the Philippines.

Note. The researcher crafted this figure based on the discussions and comparisons from Chapters V and VI.

With this knowledge, we move towards specifically looking at the roles and services that public and private sector intermediaries may perform or undertake to develop their respective industries in domestic and export markets. Table 7.10 summarizes the intermediary roles, services, and domestic and export market-oriented intermediation requirements.

Table 7.10 Similarities and Differences in Intermediary Role Performances in Domestic (Rice) and Export (Mango) Market-Oriented Industries

	Rice (Domestic Market-Oriented)	Mango (Export Market-Oriented)
	Public Sector Intermediaries	
Priority Roles	<ul style="list-style-type: none"> <li>• <b>Broker</b></li> <li>• <b>Consultant</b></li> <li>• Mediator</li> <li>• <b>Resource Provider</b></li> </ul>	<ul style="list-style-type: none"> <li>• <b>Broker</b></li> <li>• Consultant</li> <li>• <b>Mediator</b></li> <li>• <b>Resource Provider</b></li> </ul>
Priority Services	<ul style="list-style-type: none"> <li>• Standards and certification monitoring, promotion, and acquisition support</li> <li>• Technology generation (for PRIs)</li> <li>• Facility, inputs, and machinery funding</li> <li>• Industrial and support policies</li> <li>• Technology adoption advice and training</li> <li>• Extension service provision</li> <li>• Network orchestration (for GAs)</li> <li>• Clustering promotion and development</li> <li>• Price mediation</li> </ul>	<ul style="list-style-type: none"> <li>• Standards and certification monitoring, promotion, and acquisition support</li> <li>• Technology generation (for PRIs)</li> <li>• Facility, inputs, and machinery funding</li> <li>• Industrial and support policies</li> <li>• Technology adoption advice and training</li> <li>• Extension service provision</li> <li>• Network orchestration (For GAs)</li> <li>• Clustering promotion and development</li> <li>• Price mediation</li> <li>• Export advise and promotion</li> </ul>
Requirements to Work Properly	<ul style="list-style-type: none"> <li>• Clear government mandate</li> <li>• Consistent public funding</li> </ul>	<ul style="list-style-type: none"> <li>• Clear government mandate</li> <li>• Consistent public funding</li> <li>• Raise R&amp;D funding for more urgent production issues</li> </ul>

(Table 7.10 Continued)

(Table 7.10 Continued)

	Rice (Domestic Market-Oriented)	Mango (Export Market-Oriented)
	Private Sector Intermediaries	
Priority Roles	<ul style="list-style-type: none"> <li>• Broker</li> <li>• <i>Consultant</i></li> <li>• <i>Mediator</i></li> </ul>	<ul style="list-style-type: none"> <li>• Broker</li> <li>• <i>Consultant</i></li> <li>• <i>Mediator</i></li> </ul>
Priority Services	<ul style="list-style-type: none"> <li>• Standards and technology promotion and acquisition</li> <li>• Technology diffusion and advice</li> <li>• Extension service provision</li> <li>• Market network linkage</li> <li>• Demand articulation and sourcing</li> <li>• Financial management support</li> <li>• Organizational development support</li> </ul>	<ul style="list-style-type: none"> <li>• Standards and technology promotion and acquisition</li> <li>• Technology diffusion and advice</li> <li>• Extension service provision</li> <li>• Market network linkage</li> <li>• Demand articulation and sourcing</li> <li>• Financial management support</li> <li>• Organizational development support</li> <li>• Export requirement advice and promotion</li> </ul>
Requirements to Work Properly	<ul style="list-style-type: none"> <li>• Sustainable funding source</li> <li>• Professional organizational management</li> <li>• Adequate human resources</li> </ul>	<ul style="list-style-type: none"> <li>• Sustainable funding source</li> <li>• Professional organizational management</li> <li>• Adequate human resources</li> <li>• Industry response and cohesion</li> </ul>
	Requirements for Industry	
	<ul style="list-style-type: none"> <li>• Professionalized organization management and development</li> <li>• Extension services shift towards clustered organization development</li> <li>• Recipients of machinery need to manage these properly</li> <li>• Willingness to invest in machinery</li> </ul>	<ul style="list-style-type: none"> <li>• Professionalized organization management and development</li> <li>• Having and adherence to common goals for the industry</li> <li>• Willingness to invest to achieve certifications and standards</li> <li>• Export market-oriented mindset</li> <li>• Further developing industrial clusters and strengthening existing ones</li> </ul>

Note. The content for this table is directly lifted from tables 5.11 (Chapter 5) and 6.11 (Chapter 6).

Beginning with the role of the public sector intermediaries, the researcher finds brokerage and resource provision as vital roles that are heavily performed and required of the public sector in both industries. Public sector intermediaries perform these roles as needed and mandated by law with more resources available. Furthermore, both need to develop domestic production, brokerage, and resource provision roles to help value chain actors' possible innovation and upgrading. From the table, we also find consultancy and mediation present as priority roles for these intermediaries; however, each intermediary has one highlighted over the other. We find that consultancy is better prioritized for the rice industry as more resources for an individual consultation are available.

Moreover, with more local machinery and other technologies developed by the public sector, specific consultation and advice on these may be provided by public sector proponents better. Conversely, although consultation may still be provided in the mango industry, mediation seems more appropriately prioritized. As discussed, the main reason for this is the seeming lack of industry cohesion within the industry, leading to the need for more network orchestration for policy and value chain linkage. In addition, with export as a goal, it may help that more value chain actors are bridged together to support the standardization of mango growing in the country.

Regarding their priority services, the researcher finds similar services that the intermediaries in either industry may provide. One reason for this may be this study's organization sampling, where three of the seven intermediaries from the public sector are shared between both industries. Moreover, the remaining four are also industry counterparts (i.e., industry-specific GAs NRP and HVCDP and industry-specific PRI PHILRICE and GNCRDPSC). Nonetheless, the researcher finds the difference in the

export requirement advice provision and promotion that several public sector intermediaries provide. All other services mentioned target the development of the domestic industry, but a difference in export goals may influence how these services are carried out. For instance, coupling export promotion and requirements to industry standards and demand articulation will differ from following the domestic market standard and demand. The export commodity may require increased monitoring, mediation, and financial support by the public sector.

For their requirements to work properly, a similar pattern is found in having clear government mandates and consistent public funding. The previous chapters find that the public sector intermediaries attain these two requirements fairly. These are essential as these provide the intermediaries the authority and resources to perform their roles. However, a difference lies in the mango industry, where the researcher finds the need for more R&D funding to address urgent issues. Compared to the mango industry, the rice industry exhibits a more mature R&D network and progress, with the industry receiving high development prioritization in every government administration. Though technologies are available in agricultural commodities, rice value chain actors are blessed with quantitatively more resilient seed varieties, machinery, equipment, and other inputs. Therefore, if the mango industry deems to revitalize its export prowess, it needs increased R&D investments. Apart from increased R&D expenditure, the mango industry may emulate the rice industry experience by establishing more PRIs in high-yielding and growth areas. A possible setup may be expanding the reach of GNCRDPSC by creating sub-stations or branches in areas like the Ilocos and Zamboanga regions.

The researcher finds a similar pattern for prioritized roles in both industries for the private sector intermediaries. Based on the data gathered, we find that private sector organizations seem better suited to performing brokerage, consultancy, and mediation roles. However, the brokerage role may be less prioritized than the other two of the three roles. Compared to Intarakumnerd and Chaoroenporn's (2013a) findings, we find that public sector intermediaries perform brokerage roles more than their private sector counterparts. Nonetheless, it would benefit value chain actors greatly for both types to engage in brokerage as its performance is greatly needed in the agricultural industries. As described at the beginning of this section, the apparent difference in role performance between the two industries would be the participation in export. Suppose they or their intermediation partners are involved in exporting, like the mango industry. In that case, brokerage will manifest in market brokerage, where the intermediaries would transact with international players and provide innovations that allow their partners to attain export standards.

For consultancy, the researcher finds this a critical role that the private sector needs to perform as they can provide more individualized advice to their members or partners. Unlike the public sector, which often needs to cater to a broader set of value chain actors, private sector intermediaries always work directly with specific actors, allowing them to provide tailor-fit advice. Consultancy may take a higher plane for those involved in the export market. The intermediaries providing market advice have the specialized knowledge and skills that many other intermediaries may not possess or prioritize.

Moreover, the researcher observed that many of the growers and farmers interviewed said they prefer to listen to or consult their fellow growers or farmers over non-fellows. The main reason provided for this line of thinking is a belief that non-fellows only possess book or research knowledge and not actual growing or farming experience and expertise. Thus, private sector intermediaries with leaders and members who identify with one another may be better suited for consultancy.

In the same way, private sector intermediaries may prioritize mediation. As trust appears to be greater through being able to identify with one another, orchestrating member cohesion – and, possibly industry cohesion – would be best performed by the private sector. Through mediation, private sector intermediaries may also begin performing lobbying and political representation roles on behalf of their constituency or sector. Moreover, the findings from the previous chapters show that they are also better suited to performing the more specific market mediation role necessitated by many upstream actors. Although the work appears very similar in both industries, performing roles that include export-related material changes the content, delivery, and partner response required.

Like the public sector intermediaries, the prioritized services for the private sector are similar in both industries, with the one difference again being export requirement advice and promotion. Admittedly, the priority services are quite generic to what innovation intermediaries provide for industrial development (van Lente et al., 2003; Howells, 2006; Klerk and Leeuwis, 2009; Intarakumnerd and Chaoroenporn, 2013b; Sutthijakra and Intarakumnerd, 2015), however, given the issues presented and the current state of both industries, more specific services may not yet be required. Still,

variations in how these services are provided and the roles are performed may occur when exporting is incorporated into the equation. For several intermediaries in the mango industry, the inclusion of such is already a given. Integrating an export mindset may also aid in developing the rice industry as having such a perspective would enhance production, especially in terms of quality (Gereffi and Korzeniewicz, 1990; Sonobe, Hu, Otsuka, 2004; Mottaleb and Sonobe, 2014).

Likewise, their requirements to work properly exhibit a similar pattern of intermediaries needing sustainable funding, professional management, and adequate human resources. As discussed in previous chapters and earlier sections, these three are deemed essential for success by the intermediary representatives. One additional requirement found for the mango industry is the necessity of industry cohesion, which, more than being a requirement for intermediaries, is a requirement for the greater mango industry. Nonetheless, an addition is the response provided by partners. Coming from the experience of several private sector intermediaries, positive partner response helps in allowing intermediaries to continue performing their roles. Suppose partners do not receive and respond well to the services and resources offered by the private sector intermediaries. There may be a tendency to veer away from performing those roles in the future.

Following Intarakumnerd and Chaoroenporn (2013a), requirements for the industries are also analyzed and compared. For intermediaries to perform their roles, their industries will also need to develop and possess several characteristics to support intermediation. One common factor the researcher finds in both industries is the need to develop the managerial capital (Mano, Iddrisu, Yoshino, and Sonobe, 2012; Bloom et al.,



2013; Higuchi, Mhede, and Sonobe, 2019) of MSMEs and those of clustered or organized farmer or grower groups (Sonobe and Otsuka, 2006, 2011; Ballesteros and Ancheta, 2020). Notably, management of resources appears to be a priority in the rice industry as many capital-intensive pieces of machinery are often mismanaged or unmaintained. On the other hand, although less machinery is required in the mango industry, the management and discipline for standard and certification adherence are much higher. Moreover, for both industries, a willingness to invest by the value chain actors is necessary too. Finally, less reliance on the public sector and other intermediaries for freely provided resources is required.

Another requirement for the industry is sectoral cohesion, especially in the mango industry. This may be attained by having unified goals or causes. The researcher observes that one cause for unification in the rice industry is the RTL and the influx of imported rice. In contrast, the mango industry appears not to have such an industry-wide issue. One may argue that the current concerns caused by the rampant destruction of the Cecid fly may help in unifying the industry. However, research observations show that even growers disagree on its symptoms, and many have different images of the pest.

Furthermore, the problem is not as widespread as in the rice industry, and downstream actors interviewed do not appear to mention it as an issue they face. Export revitalization may be a goal that the industry may take together. However, observations and interviews reveal that not everyone favors exporting because of the investments and effort required and that the rewards for such appear in the long term. The researcher perceives that the government and downstream actors may desire the export revitalization

plan and goal more than upstream actors. Thus, more work is needed and can be provided by intermediaries in persuading upstream actors to work towards export-grade produce.

The researcher finds that involvement in the export market generates the greatest effect on intermediary role performance. In addition, industrial unity caused by industrywide goals or challenges also creates changes in intermediary role performance. Distinguishing between public and private sector intermediaries, the study finds that each has priority roles, services, and requirements that will allow them to work properly. Both types display more similarities for services and requirements than the differences caused by the abovementioned factors. For roles, we find that public sector organizations would perform the four roles extensively, with more priority given to brokerage and resource provision.

Moreover, the two industries vary in whether they prioritize consultancy, as in the rice industry, or mediation, as in the mango industry, more than other. Nonetheless, the performance of both is still necessary. We find that the private sector prioritizes brokerage, consultancy, and mediation, with the latter two more than the first. Resource provision is absent as a priority because of the financial resources required to provide for the primary needs of industry actors, as discussed in the previous chapters. Generally, with these findings, we may say that public sector intermediaries take a greater hand in performing innovation intermediation in agricultural industries and value chains. Still, this does not mean that the private sector may loosen its work. Instead, private sector intermediaries may require greater investments in knowledge, time, and resources as striking a balance in role performance are needed for industries (Intarakumnerd and Chaoroenporn, 2013a).

From the last portion on the requirements to work properly, one may notice that these allude to or coincide with the key-capabilities, as discussed in other parts of this dissertation. Of the four key-capabilities, management capabilities seem to be most alluded to as a requirement, with mandates, funding, professional management, and human resources mentioned in Table 7.9. Moreover, knowledge-building and internal communication capabilities appear as requirements from the same table but specifically for the mango industry. These are seen in the need for more R&D and industry cohesion. As these requirements act as baselines for innovation intermediaries, we may say that these are part of the key-capabilities necessary for successful innovation intermediation (Intarakumnerd and Chaoroenporn, 2013a; Sutthijakra and Intarakumnerd, 2015). However, analyzing these further reveals that the wide-ranging public and private typologies share many similar key-capability building experiences and applications. Table 7.11 summarizes the similarities and differences in key-capability building and application of public and private sector intermediaries.

Table 7.11 Similarities and Differences in Intermediary Key-Capability Building and Needs in Domestic (Rice) and Export (Mango) Market-Oriented Industries

	Public Sector Intermediaries	Private Sector Intermediaries
External Networking	<p><i>Shared:</i></p> <ul style="list-style-type: none"> <li>- Open avenues for industrial consultation and contact</li> <li>- Adopt and continue using new lines of communication (social media, video streaming platforms, online platforms, R&amp;D online groups)</li> </ul>	<p><i>Shared:</i></p> <ul style="list-style-type: none"> <li>- Adopt and continue using new lines of communication (social media, video streaming platforms, online platform)</li> </ul> <p><i>Rice:</i></p> <ul style="list-style-type: none"> <li>- Openness for collaboration and membership</li> <li>- Maximize membership in national and global networks</li> <li>- Confidence to introduce themselves</li> </ul> <p><i>Mango:</i></p> <ul style="list-style-type: none"> <li>- Searches for and builds relationships in export markets and growers from other mango-exporting countries</li> <li>- Open to interacting with local and foreign growers, traders, and processors</li> </ul>
Internal Communication	<p><i>Shared:</i></p> <ul style="list-style-type: none"> <li>- Harmonize and coordinate policies, plans, and directives with regional/local counterparts, other agencies, and industry</li> <li>- Continue relationship with technology adopters</li> <li>- Build communication skills of staff</li> </ul>	<p><i>Shared:</i></p> <ul style="list-style-type: none"> <li>- Build communication skills of staff</li> </ul> <p><i>Rice:</i></p> <ul style="list-style-type: none"> <li>- Encourage replication, mentoring, and demonstration between members</li> <li>- Communicate services and purpose of the organization</li> </ul> <p><i>Mango:</i></p> <ul style="list-style-type: none"> <li>- Several tend toward supply competition</li> <li>- Need for actual demonstrations</li> <li>- Need to communicate global demand</li> </ul>

(Table 7.11 Continued)

(Table 7.11 Continued)

	Public Sector Intermediaries	Private Sector Intermediaries
Knowledge-Building	<p><i>Shared:</i></p> <ul style="list-style-type: none"> <li>- Experts come from various fields</li> <li>- Learn and communicate end-market demands</li> <li>- Learn from national and global networks, and share knowledge</li> </ul> <p><i>Rice:</i></p> <ul style="list-style-type: none"> <li>- Creation and sharing of technology banks and libraries</li> </ul> <p><i>Mango:</i></p> <ul style="list-style-type: none"> <li>- May need more specialized staff (especially in R&amp;D)</li> <li>- Promotes innovations and upgrading that provide export opportunities</li> <li>- Share exporting knowledge and network more</li> </ul>	
Management	<p><i>Shared:</i></p> <ul style="list-style-type: none"> <li>- Clear mandates and a sustainable budget</li> <li>- Human resource development and management are vital</li> <li>- Passion for service of the country</li> <li>- Encourage employment permanency</li> </ul> <p><i>Mango:</i></p> <ul style="list-style-type: none"> <li>- Adjusts to client needs (i.e., specific export countries or non-export)</li> <li>- Make export a target</li> </ul>	<p><i>Shared:</i></p> <ul style="list-style-type: none"> <li>- Professionalize organizational management</li> <li>- Creating or training in business management and sustainable business modeling</li> </ul> <p><i>Rice:</i></p> <ul style="list-style-type: none"> <li>- Scale services to current capabilities/delivery capacity</li> </ul> <p><i>Mango:</i></p> <ul style="list-style-type: none"> <li>- Shifts toward processed products or other fruits for value-added or and to ease global trade restrictions</li> <li>- Make export a target</li> </ul>

Note. The content for this table is summarized from tables 5.12 (Chapter 5) and 6.12 (Chapter 6).

From the table, we find that the public sector, most especially, shares many of these mechanisms with one another, regardless of the organization being a GA or PRI. Comparing the findings from the individual cases, the researcher finds that public sector intermediaries share similar building and application modes in their external networking, internal communication, and management capabilities. Regardless of market orientation, these intermediaries will still conduct industrial consultations, adopt innovative ways of communication to widen and sustain their networks and harmonize policies, plans, and directives within their networks. Moreover, they all share an additional similarity in underscoring the significance of their human resources, which act as the driving force of their work. These similarities may show that the public sector organizations learn from and share best practices. With six of the seven under the DA banner, it is also not surprising that they similarly build and apply these key-capabilities.

Despite a difference in market orientation, the many similarities between the public sector organizations may be due to the current state and direction of both industries that seek to develop local industry capabilities more, as seen in the respective industry roadmaps and the more recent experiences of the public sector intermediaries. Even in the mango industry, the current focus seems to be on building a strong and resilient local industry that will eventually lead to export revitalization. Nonetheless, a difference lies in their management capabilities. The researcher observes that those in the mango industry can adjust more to their client's needs when exporting. Nevertheless, market orientation, especially export participation, still plays a role in creating some differentiation. The variations caused by market orientations are also evident in their knowledge-building capabilities, which the public sector shares with the private sector.

The primary difference in knowledge-building capabilities linked to the export market orientation is the possession of export knowledge that mango industry intermediaries may share and promote. Although an additional need for more specialized experts was also found, this knowledge may be more connected to addressing industry-specific issues than its export market orientation. For the rice industry, intermediaries need to create and share more technology banks and libraries, owing to the wealth of technological opportunities in the rice industry.

Despite these differences, similarities are found more. The most significant of these commonalities is that knowledge-building and its application appear to be shared between the public and private sectors regardless of specific organization type. Coming from the value chain discussion, we find that knowledge-building is foundational. Similarly, regardless of market orientation, knowledge-building remains essential. This may be because clients shared knowledge within an industry are broadly similar across all innovation intermediaries. In other words, there appears to be a baseline of knowledge and understanding necessary for all intermediaries.

Moreover, applications of their knowledge may be generalized too. These organizations all learn from their respective networks, may share end-market demands with their partners (especially in the upstream production processes), and all highlight the significance of the expertise of their staff or members. Although industry-specific knowledge may vary, the process by which they build and apply this capability seems similar.

As with their knowledge-building capabilities, the private sector also shares several facets of key-capability building and application with one another. These mainly

involve operational capabilities like communication modes, staff skills, and organization management improvements. The most significant of the similar key-capabilities may be developing a sustainable business or financial mechanism, which falls under management capabilities.

Despite these similarities, the researcher finds that private sector intermediaries exhibit more differences based on their primary market orientation. Clearer is the mango intermediaries that build unique key-capabilities related to exporting. Their external networking capabilities relate to the need to build export market relationships for learning and marketing and expand local partner networks for their intermediation. The lack of industry cohesion in internal communication capabilities is highlighted as the researcher finds intermediaries competing for fresh mango supply. A connective force or organization is truly needed, especially in the private sector, as the absence of one may make setting export as an industrial goal difficult. Related to this point, one management capability that intermediaries in export market-oriented industries may need to develop is their export prioritization. By incorporating the goal of exporting in their intermediary roles and operations, they may help build the export mindset that their partners would require.

Shifting towards the domestic market-oriented industry, intermediaries in the rice industry appear to be building more unique capabilities that point towards deeper industry cohesion. Their external networking capabilities allude to network expansions that build their membership. The internal communication capabilities observed seem to focus on clarifying services and modeling technology adopters. Moreover, their management



capabilities highlight the need to develop their operations to scale their service delivery capacity.

Drawing from these differences, the researcher posits that both types of capability-building styles are essential as different models allow each to learn from one another (Fujita, 2013). Despite market orientation differences, intermediaries from both sides may need to learn from one another to develop their organizations better. For example, mango intermediaries may learn how to promote industry cohesion and modeling from the rice industry, while rice intermediaries may learn the skills necessary for the export competition from the mango industry. Although the Philippines cannot export rice currently, learning to develop the crop into an exportable commodity will benefit value chain actors and consumers greatly. This would improve the final products and may have the ability to better compete with other rice-producing countries even in the future local Philippine market. If not aiming for the export market, making products or crops of export quality may be an achievable target that intermediaries may assist in attaining.

Additionally, this discussion has shown that certain key-capability building and application mechanisms may be considered essential regardless of organization type. Several of these facets are the significance of human resources as an integral part of key-capability building, developing operational, financial, and business management skills, especially for private sector intermediaries, and adopting new modes of communication that helps expand and sustain intermediary networks.

In a more overarching and general context, it is also essential to consider how government policies that promote either market orientation increase or retain opportunities for intermediaries to expand their roles and develop key-capabilities.

Through the experiences of the rice industry under RCEF implementation and the mango industry's general roadmap, we find several critical findings for intermediaries.

First, under the RCEF implementation, we find that this local industrial development policy offers opportunities for intermediaries to support based on the various components the program offers. Although these forms of support are not explicitly stated, the researcher finds that both public and private intermediaries learn new roles through the RCEF. Public sector intermediaries like PHILMECH, PHILRICE, and ATI, continue their usual roles of technology generation and diffusion but are also given the additional tasks of providing particular distribution of inputs, machinery, and training to rice farmers under the listed beneficiary areas of the RCEF program. Moreover, they are tasked with managing the funds used in procuring the necessary items for their components. Apart from developing the rice industry, ATI is also charged with retraining or reskilling farmers by offering them skills and opportunities to enter other forms of work or sectors. In addition to these roles, the institution of the RCEF also removed intermediary roles from other organizations. The NFA, which managed the importation and licensing of rice imports, is a case in point. Now, the agency is tasked with maintaining rice stocks and procuring paddy rice from local farmers. As a result, the organization's role has become more streamlined and less prone to corruption allegations – as most of these stems from the NFA's import controls previously.

For the private sector, the RCEF may also present opportunities. However, as it currently stands, these intermediaries may need to be creative in their approaches. For example, PAKISAMA, as an IA, cleverly approached PHILMECH to support farm machinery distribution to their rice farmer member organizations. For these local industry

policies to be more effective, policymakers may be more explicit and concrete with ways the private sector may support the implementation of industrial development programs and not simply remain as beneficiaries.

A more explicit export promotion policy may be necessary for the mango industry. The current government policy appears to be developing local production capabilities with the hope of exporting in the future. If export were the true goal, it would benefit the industry to have a policy that directly targets exporting. To do so, roadmap development or future evaluations of its current form may require the presence of exporters and foreign importers to join these meetings. As this study shows, private firms and NGOs that conduct exporting and their partners that perform the importing may also perform intermediary roles that affect the quality of products in the mango value chain. This is not to say that no export promotion policies exist. However, throughout the conduct of the study, the researcher could not find nor receive information on relevant or key policies related to export promotion except for two critical R&D breakthroughs that provided greater export opportunities. Currently, we find that the Philippine mango industry appears to be an import policy taker. By this, we mean that the industry needs to abide by requirements set by other countries for these countries to import mangoes from the Philippines. As mentioned, supply-side production capability programs are available, but no program that targets specific export markets still exists, at least to the researcher's knowledge. Having such a program may aid in further informing intermediaries of roles they may take to promote mango exports.

Specific roles that the public and private sector intermediaries may take are similar to those found in the rice industry, such as the introduction of new roles, the emphasis on

current roles, removal of services, and opportunities for private sector support. Like the RCEF implementation, creating explicit and concrete actions for intermediaries may be helpful when crafting export promotion policies. However, specific to the mango industry, these export promotion policies may indicate champion organizations or firms or assign public sector leaders to implement its export promotion programs. Leadership in both sectors is essential, especially when the entire industry is not yet united in its desire to reclaim the Philippines' export place.

Regarding key-capability building, government policies and regulations may also aid in signaling intermediaries of necessary capabilities. In RCEF implementation, beneficiaries and private sector intermediaries learn what organizations they need to network with to receive the opportunities stated in the program, possibly extending a private sector intermediary's external networking capability. Similarly, public sector intermediaries tasked with RCEF components may tap their currently available network of rice-related organizations to communicate the opportunities and requirements of the RCEF program. Recipient intermediaries like IAs or cooperatives and support intermediaries like NGOs and SMGs may learn of the knowledge they need to build to participate and distribute components of the RCEF effectively. Additionally, by learning about organizational requirements, intermediaries may shift roles to provide organizational and process innovation that RCEF beneficiary organizations to qualify for the benefits. Moreover, intermediaries may increase their knowledge and managerial capabilities to be effective providers or partners of RCEF components.

Many general key-capability building processes remain similar for innovation intermediaries. Nonetheless, some industry-specific characteristics may affect the export

promotion policy process. For example, external networking may benefit from including more downstream actors, especially exporters and foreign importers, in creating the export promotion programs. By having both large sides of the value chain meet and discuss ways to promote more export-grade mangoes, better industry unity may be achieved, and both sides may better understand the needs, requirements, and limits of each other. In the conduct of these policy consultations, it would also do well to invite pertinent intermediaries to begin learning and strategizing how they may build the capabilities necessary to perform roles that target the facets and decisions on export promotion. Intermediaries may also broadcast their network, knowledge, and management capability needs outside of their currently available network through this process.

## **Section 7.7 Chapter Summary**

To provide more robust responses to the questions posed by this study, the researcher conducted a cross-case analysis based on the findings of the case studies on innovation intermediaries in the Philippine rice and mango industries found in Chapters V and VI respectively. Therefore, in addition to the comparisons of the participating innovation intermediaries, this chapter began by providing a more in-depth comparison of the issues, policy responses, and value chains of the respective industries. Doing so provides the researcher and readers with a better background for the comparisons made in this study.

The chapter was structured so that the cross-case analysis sections address each sub-question posed at the beginning and in Chapter III of this dissertation. From the investigation and discussion, we learned the following. First, similar organization types

perform roles similarly, but role performance may vary based on various internal and external factors. These factors also contribute to the evolutions and differences in the role performance of intermediaries. Next, the value chain affects role performance in several ways but may still be unable to capture all pertinent intermediary roles and services. The researcher proposes a method for capturing intermediation in value chains by identifying role performance as *horizontal*, *vertical*, *intersectoral*, or *chain-encompassing*. On the other hand, primary market orientation creates greater variations the more involved an intermediary or industry is in the export market. Nonetheless, the researcher identified priority roles that private and public sector intermediaries may perform to support development in domestic and export market-oriented industries.

For intermediary key-capabilities, the researcher finds that knowledge-building and management capabilities are foundational capabilities that intermediaries must focus on developing first. This finding is common even as organizational types, value chain support, and primary market orientations vary. Moreover, we find that external networking and internal communication capabilities are more applied and built as the intermediaries perform their roles. In addition to these, we further find that, like role performance, intermediary key-capability building and application may be affected by a variety of internal and external factors such as organizational characteristics, their participation as an active value chain player, their involvement and support of exporting, shifts in national and global policies, and crises like the COVID-19 pandemic.

Several highlighted facets of key-capability were also found. First, intermediaries need to invest in their organizational, business, and financial management skills to better perform their roles and services. Second, rice and mango industries may learn from one

another despite differences in market orientation in addressing industrial issues that either face. Third, the researcher proposes two theoretical contributions for future studies on intermediary key-capabilities: human resource development as a key-capability separate from the four described, and motivational capabilities as the third underlying capability besides learning and strategic capabilities, as identified by Sutthijakra and Intarakumnerd (2015).

Chapter VIII ends this dissertation by presenting its most pertinent findings and implications for theory, management, policy, and future research prospects.

## **CHAPTER VIII**

### **CONCLUSION**

#### **Section 8.1 Introduction**

The main objective of this study was to develop a richer understanding of how innovation intermediaries perform their roles and build their key-capabilities to support the participation and integration of AFB chain actors in their value chains. Moreover, the thesis aimed to integrate the literature on innovation intermediaries from the innovation system and GVC perspectives. Finally, the researcher hopes to provide apt policy and management implications to better embrace and support innovation intermediation in the Philippines.

To achieve these objectives, the researcher conducted a multiple case-study on innovation intermediaries in the rice and mango industries of the Philippines. Under the analytical guidance of Partners' (2007) four roles of intermediaries and an adapted version of Sutthijarka and Intarakumnerd's (2015) and Go's (2019) key-capabilities to enhance networks and resources, this study explains how variations in organization types, value chain segment support and participation, and primary market orientation affect intermediary role performance and key-capability building. The study consists of two cases – innovation intermediaries in the Philippine rice and mango industries – and enclosed in each case are embedded units-of-analysis or the participating intermediary organizations. Eighteen organizations participated in this study, with eight unique



organizations in the rice industry, seven in the mango industry, and three shared between both.

As the final chapter of this dissertation, the conclusions and implications drawn from the study are divided into five more sections. First, section 8.2 answers the main research question by presenting the primary findings of this study. Next, sections 8.3, 8.4, and 8.5 offers this study's theoretical, policy, and management implications. Finally, Section 8.6 provides recommendations for further research.

## **Section 8.2 Main Conclusions**

Throughout this study, the researcher has been attempting to answer the question: how do intermediary organizations perform their roles and build necessary key-capabilities to support the inclusion and further participation and upgrading of various players in AFB GVCs? To provide an ample response, the researcher considered three variables – organization type, value chain support and participation, and primary market orientation – as factors that affect an intermediary's role performance and key-capability building and application. Table 8.1 presents a summary of these effects. Moreover, this section offers the main analytical generalizations drawn from this study.

Table 8.1 Summary of Effects on Intermediary Role Performance and Key-capability Building and Application

	Role Performance	Key-capability Building and Application
Organization Type	<ul style="list-style-type: none"> <li>• All four roles performed regardless of the type</li> <li>• Same types perform roles similarly</li> <li>• Types prioritize performing one or two roles</li> <li>• Four roles often overlap with one another</li> <li>• Internal and external factors found that affect role performance: <ul style="list-style-type: none"> <li>○ Mandate, policy, vision, and mission</li> <li>○ Target partners</li> <li>○ Export likelihood and participation</li> <li>○ Experiences of successful or failed intermediation</li> <li>○ Crisis as learning events</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Require all four key-capabilities</li> <li>• Capability development overlaps with one another</li> <li>• Knowledge-building and management capabilities built similarly across organization types</li> <li>• External networking and internal communication capabilities have distinctions between types</li> <li>• Trust and social capital remain essential to developing and sustaining these</li> <li>• Other factors found that affect key-capability building and application: <ul style="list-style-type: none"> <li>○ Policies, national and international</li> <li>○ Learning events and crisis events</li> <li>○ Leadership and changes in leadership</li> <li>○ Funding sustainability</li> </ul> </li> </ul>
Value Chain Segment Support and Participation	<ul style="list-style-type: none"> <li>• Roles are performed similarly in segments of different value chains that exhibit similar production processes</li> <li>• Consultancy and mediation are most performed in value chains</li> <li>• Roles are most performed in segments that require more technologies, resources, and linkages</li> <li>• Mangoes value chain intermediaries participate in more segments, possibly due to the sensitive nature of the fruit requiring heavily integrated processes</li> <li>• More rice value chain intermediaries specialized in specific segments</li> <li>• Private sector intermediaries are more present in segments that require trade mediation and product aggregation</li> <li>• Lack of role performance in global market segments, especially in the mango value chain; possibly due to both chains needing domestic industry development despite aiming for export revitalization for mangoes</li> <li>• Some intermediary roles and services are left unseen if focused on the value chain processes</li> </ul>	<ul style="list-style-type: none"> <li>• Overall support and participation in the value chain may affect capability building but not individual segments</li> <li>• Does not affect key-capability building and application directly but indirectly through role performance</li> <li>• Still, knowledge-building and management capabilities remain important as intermediaries need to learn about their value chain and how to operate it effectively</li> <li>• Organizational mandate or purpose affects key-capability building and application in value chains</li> <li>• Intermediaries that participate as value chain actors also build their capabilities as firms (i.e., technological capabilities)</li> <li>• External networking and internal communication capabilities are applied in performing roles that directly influence value chain processes and operations outside of the value chain (e.g., R&amp;D, organizational development, community development assistance, lobbying)</li> </ul>

(Table 8.1 Continued)

(Table 8.1 Continued)

	Role Performance	Key-capability Building and Application
Primary Market Orientation	<ul style="list-style-type: none"><li>• Global market (GVC) affects local industry (IS), and intermediation goals vary depending on market orientation<ul style="list-style-type: none"><li>○ Domestic market focus: lessen impact of global market</li><li>○ Export market focus: strengthen impact on the international market</li></ul></li><li>• Public sector intermediaries need to perform brokerage and resource provision regardless of market orientation</li><li>• Shifts in prioritizing consultancy or mediation for the public sector may depend on market orientation, but it is unclear whether the change is caused by distinct industry status instead of primary market focus</li><li>• Private sector intermediary roles are commonly brokerage, consultancy, and mediation regardless of market orientation</li><li>• Having an export orientation appears to affect changes as it creates several changes in how intermediaries decide to perform roles (e.g., stricter adherence to and push for standards, greater investment in machinery and facilities)</li><li>• Common industry goals and cohesion may be necessary for more successful role performance</li></ul>	<ul style="list-style-type: none"><li>• Public sector intermediaries share key-capability building and applications mechanisms in both domestic and export market focused industries; may be due to the need to develop local industry in both cases</li><li>• Private sector intermediaries exhibit more market orientation differences in their key-capability building and application mechanisms</li><li>• Knowledge-building mechanisms are the same across types and market orientation</li><li>• Management capabilities appear to be the most alluded to as a development requirement for intermediaries to work properly<ul style="list-style-type: none"><li>○ Human resource development</li><li>○ Operational, financial, and business management skills</li><li>○ Adoption of new communication modes</li></ul></li><li>• Export participation and support affect key-capability development</li><li>• Domestic orientation seems to focus on industry cohesion</li><li>• Both industries may learn from each other (for industry cohesion and product improvement)</li></ul>

Note. The contents of this table were summarized from the discussions in Chapters V, VI, and VII.

Of all the learnings drawn from this study, the most significant contribution is integrating the innovation intermediary concept and phenomenon to the GVC-IS co-evolutionary relationship concept (Lema, Pietrobelli, and Rabellotti, 2018; Lema, Rabellotti, and Sampath, 2018). Through the application and mixture of the three variables of organization type, value chain segment support, and market orientation, the researcher presents how intermediaries transcend the boundaries of the IS or GVC level and move towards performing roles and building key-capabilities that aid in the inclusion of new and the further participation and upgrading of value chain actors, especially MSMEs, on both levels. Moreover, this study significantly contributes to the innovation intermediary literature by providing role performance delineations of public and private sector intermediaries in AFB industries and proposing a novel framework to assess intermediation in value chains, further deepening the claim of integration between innovation intermediation and GVC-IS co-evolution. These main contributions are supported further by other theoretical contributions.

Beginning with intermediary role performance, like Howells (2006), the participating innovation intermediaries provide a broad and growing range of services. These services change or are added on to depending primarily on the needs of their constituency or intermediation partners. Moreover, various internal and external factors contribute to the evolution and distinct role performances of intermediaries over time. Nonetheless, the four roles framework designed by Partners (2007) appears to remain apt as it still captures the most necessary of these services. In line with the four roles framework, intermediaries support the inclusion and participation of various AFB sector players by:

1. Generating and diffusing hard and soft technologies and resources
2. Providing production inputs, human resources, training, machinery, equipment, and other necessary resources
3. Various kinds of expert advice in varying degrees
4. Market mediation and brokerage
5. Linkage with a variety of network actors (production, finance, technology, community development, among others)
6. Lobbying for industry-favorable policies

The intermediaries perform these in the ever-evolving relationship between the IS and GVC. As with Lema, Rabellotti, and Sampath (2018) and Lema, Pietrobelli, and Sampath (2018), the researcher finds that it is difficult to separate or distinguish between developments in the IS and GVC as these mutually affect each other and are deeply connected.

Furthermore, we find that public and private sector intermediaries may delineate role performance, with one specializing in particular roles and services. This study finds that public sector intermediaries perform all four roles, with brokerage and resource provision as commonly highlighted roles. On the other hand, consultancy and mediation may have shifting prioritization depending on the needs of the industry. In this study, we find that the public sector intermediaries in the rice industry may focus more on consultancy, while the mango industry prioritizes mediation. Conversely, the private sector intermediaries in both AFB industries have quite common roles of brokerage, consultancy, and mediation. Given these differences, we find that the public sector performs more roles than the private sector. Thus, there may be an overreliance on what

the government may provide and perform. More investment in intermediation may be needed from the private sector to counter this phenomenon. Taking another perspective, the public sector may also be overcrowding the intermediation space. Thus, the public sector may take the lead in certain aspects but partner with the private sector to implement or deliver several intermediary services to balance the required work.

Third, to perform these roles successfully, the intermediaries build and apply their key-capabilities, as is found in the seminal work of Sutthijakra and Intarakumnerd (2015) and followed by Go (2019). Using the adapted version of the two studies' intermediary key-capability framework, the main four still capture the most pertinent facets of key-capability building and application mechanisms. Moreover, apart from an intermediary's role performance and partners, several internal and external factors also contribute to developing their key-capabilities over the course of their existence. The researcher discovers several critical observations based on the analysis and comparisons made in the two cases and three variables. First, it appears that innovation intermediaries in the AFB industries consider knowledge-building and management capabilities as the foundations necessary to perform their services and roles. These two capabilities form the basis for the possible roles that intermediaries may perform as these involve learning gaps they can resolve and the operation necessary to address these successfully. Next, upon building these, innovation intermediaries apply and build their external networking and internal communication capabilities. Factoring in their partners' needs, intermediation goals, and organizational mandates, the innovation intermediaries may expand their networks, especially in the international arena, for technology, R&D, finance, development opportunities, training, and markets. Finally, intermediaries sustain their networks

through the practice of orchestrating their current network and uniting their members, partners, constituency, and the greater industry.

Despite the applicability of the four key-capabilities, the researcher further observes that management capabilities may be further split to qualify and assess an intermediary's key-capability building and application better. We find human resources management as a highly underlined part of an intermediary's success from the results. From the two previous studies on intermediary key-capabilities, human resources are often mixed among the four, but this development is listed under management capabilities. As stated several times in previous chapters, this study proposes that this be a separate key-capability. In addition to this, we propose that management capabilities may be further split between operational (i.e., implementation) and administrative management (e.g., finances, internal controls) in an organization. Doing such a split may provide future researchers with a more streamlined method of qualifying management capabilities.

Finally, although not fully assessed, the underlying learning and strategic capabilities that Sutthijakra and Intarakumnerd (2015) referred to in their studies were also observed in the participating intermediaries, and these remain relatively stable. However, the researcher builds their concept by finding an additional underlying capability in motivational capabilities. The researcher finds motivation as an underlying capability as it refers to innate characteristics or a priori drive to performing intermediation and building the capabilities necessary for it.

### Section 8.3 Theoretical Implications

This study makes several theoretical contributions by addressing the five literature gaps mentioned in Chapter I and discussed further in Chapter II. Table 8.2 summarizes how this dissertation tackles each of the gaps.

The following are the most significant contributions that respond to the gaps. First, this study provides an integrated and more modern study of the roles and key-capabilities of innovation intermediaries following the IS-GVC co-evolutionary relationship (Lema, Pietrobelli, and Rabellotti, 2018; Lema, Rabellotti, Sampath, 2018), which, to the knowledge of the researcher, has not been done before this study. By providing an understanding of innovation intermediaries under the IS-GVC co-evolutionary relationship, the researcher shows how intermediation occurs not just on the IS level but also transcends its boundaries by extending to value chain segment interactions within the GVC perspective.

Furthermore, this study provides additional evidence for the IS-GVC co-evolutionary relationship by showing how co-evolution of the two systems occurred in the Philippine rice and mango industries. We find that both industries appear to exhibit an *aborted* GVC-IS trajectory where the local industries cannot cope with the pressures created by their global industry counterparts. The findings of this study present how innovation intermediaries may aid in the movement of these industries towards a path of *maturity* by addressing the systemic gaps present.



Table 8.2 Literature Gaps and How this Dissertation Addressed Each

Literature Gaps	This Dissertation's Response
1. Lack of integrated research on intermediaries in the GVC-IS literature and need for research on newer types of innovation intermediaries	<ul style="list-style-type: none"> <li>• Applied a GVC-IS co-evolutionary relationship perspective to a study on intermediary roles and key-capabilities</li> <li>• Addition of social media groups and private firms as embedded units-of-analysis case organizations and compared these with other intermediary organizations</li> </ul>
2. Lack of comparative work on intermediary role performance in different parts of the same value chain	<ul style="list-style-type: none"> <li>• Compared intermediary role performance and key-capability building within and across two value chains</li> <li>• Constructed a proposed framework for identifying innovation intermediation in GVCs</li> </ul>
3. Lack of demand conditions discussion in SIS literature	<ul style="list-style-type: none"> <li>• Analyzed intermediary role performance and key-capability building under two different primary market orientations: domestic and export focus</li> <li>• Found role performance priorities for public and private sector intermediaries under differing industry market orientations</li> </ul>
4. Applicability of key-capability framework (Sutthijakra and Intarakumnerd, 2015) in GVCs	<ul style="list-style-type: none"> <li>• Studied and applied the framework in the context of GVCs</li> <li>• Found the foundational nature of knowledge-building and management capabilities</li> </ul>
5. Intermediary key-capability framework limited to findings in the manufacturing and service sectors	<ul style="list-style-type: none"> <li>• Chose intermediaries in the Philippine rice and mango industries as cases to represent the AFB sector and resource-based industries</li> </ul>

Note. The author compiled the contents of this table based on the overall conduct of the study.

Additionally, this study adds to the ‘functions of innovation systems’ approach (Hekkert et al., 2007; Bergek et al., 2008; Iizuka and Gebreeyesus, 2016) by providing evidence on how innovation intermediaries may assist in the transition of technological ISs, primarily through their support towards the functions of *knowledge development and diffusion* and *influence on the direction and search* exhibited by the GAs and PRIs, *market formation* by the NGOs, and the processes of *legitimation*, *resource mobilization*, and *development of positive externalities* by most if not all participating intermediary organizations.

Second, additional input and knowledge on newer types of intermediary organizations, namely SMGs and private firms, has been found through this study. As this study shows, SMGs are a good avenue for actor-to-actor consultancy. At the same time, private firms have the possibility of performing multiple roles that directly develop their partners, assuming the partners respond positively. Moreover, as innovation ecosystems develop, organizations that may perform intermediation may increase. It would be apt for scholars to observe these additions and conduct further studies to add to prospective intermediary organizations.

Third, this contributes further to the innovation intermediary literature by blending three independent concepts pertinent to innovation and upgrading in the AFB sector, particularly further integration and participation by SMEs, farmers, and micro or informal enterprises. The study also shows how variances in organization type, value chain segment support and participation, and primary market orientation affect the role performance and key-capability building and application of innovation intermediaries.

Fourth, the study delineates roles for public and private sector intermediaries in the rice and mango industries, which may apply to other domestic or export market-oriented AFB industries. Although additional studies will strengthen the delineation, the common prioritized roles performed by either the public or private sector intermediaries may be starting points for industries that seek to identify and develop their innovation intermediaries.

Fifth, this research contributes to intermediation in value chains by offering a framework for studying intermediary role performance. By qualifying role performances as horizontal, vertical, intersectoral, or chain-encompassing, the researcher finds that roles or services not part of the production process are better identified. An example is the lobbying role that private sector intermediaries perform, especially industry associations. The performance of this role seems critical to influencing the innovation ecosystem and environment where its members participate. Table 8.3 summarizes this taxonomy and examples drawn from this study.

Finally, this study contributes to intermediary key-capabilities by finding the separation of human resource management as a fifth key-capability and further delineating management capabilities to operational and administrative management capabilities. Moreover, the research introduces a third underlying capability, motivational capabilities.

Table 8.3 Proposed Innovation Intermediation Value Chain Performance Framework

Type	Definition	Examples
Horizontal	Roles or services aimed toward upgrading or innovation in a production process of a segment	<ul style="list-style-type: none"> <li>• Provision of machinery and planting materials</li> <li>• Brokering of technologies like HWT or VHT machinery or use</li> <li>• Training to improve or learn a new production process</li> </ul>
Vertical	Roles or services that connect or mediate markets, production processes, or segments	<ul style="list-style-type: none"> <li>• Market mediation</li> <li>• Chain aggregation through community organizing or clustering</li> <li>• Establishment of production tramlines</li> </ul>
Intersectoral	Roles or services that create opportunities to enter or integrate with other value chains	<ul style="list-style-type: none"> <li>• Crop diversification or rotation</li> <li>• Beekeeping with mango farming</li> <li>• Biomass fuel powerplant establishment using rice husks as fuel</li> <li>• Pectin production from mango peels</li> </ul>
Chain encompassing	Roles or services that target the institutional environment or facets of innovation outside of the production process	<ul style="list-style-type: none"> <li>• Conduct of R&amp;D</li> <li>• Policy lobbying</li> <li>• Organizational innovation</li> <li>• Attainment of certifications</li> <li>• Provision of community development assistance</li> </ul>

Note. The contents of this table are summarized from Section 7.5 of this dissertation.

## Section 8.4 Policy Implications

For implications on policy, this study provides five that range from more general policy responses to specific suggestions.

First, the results of this study suggest that government policies and programs start including innovation intermediaries in their responses. It would help if government policies identify the innovation intermediaries and indicate what roles these organizations may perform using the four roles framework (Partners, 2007) or additions to the roles explicitly and specifically. Moreover, listing potential private sector intermediaries' potential opportunities may encourage greater participation.

For the rice industry, identifying possible intermediary-to-intermediary partnerships like that of PHILMECH and PAKISAMA may quicken the implementation of the RCEF. The programs included in the RCEF target the perennial problems of the rice industry, such as high production costs and low uptake of modern technologies. These issues may be resolved with the packages provided by intermediaries under the RCEF. Moreover, by providing avenues for private sector intermediaries to support its implementation, the development of the industry may hasten, especially if clustered farmer organizations are adequately managed.

In the mango industry, additions or future roadmaps may benefit from clearly identifying the public sector intermediaries that will take the lead in addressing institutional and interaction gaps in the industry. For example, like the rice industry, the industry-assigned GA (HVCDP) or PRI (GNCRDPSC) may take the lead in forming coalitions, alliances, and shared goal setting. Although recognizing an association as the industry champion may work in promoting industry cohesion, it is suggested that the public sector still take the lead as it may provide a more objective and industry-encompassing perspective to developing the industry. In addition, by doing so, the

industry may address the coordination issues that previous studies have found (Fernandez-Stark, Couto, and Gereffi, 2017).

Second, in preparation for applying the DA's 'no cluster, no assistance' policy, it is suggested that the government start providing opportunities for new or already clustered and organized farmer groups to develop their managerial and business capabilities. As other studies have shown, simply providing resources (i.e., funding, capital, inputs) is not enough for farmer organizations and other types of MSMEs to be sustainable (Mano, Iddrisu, Yoshino, and Sonobe, 2011; McKenzie and Woodruff, 2014; Ballesteros and Ancheta, 2020). These organizations will need to develop their managerial capabilities too. Public sector institutions like the CDA and DA may need to have these organizations realize the need for them to learn how to manage their organizations and aggregated production properly. Apart from having public sector institutions like ATI providing these training services, allow or partner with training organizations like AgriCOOPh to provide these development programs. Doing so may also help in boosting private sector intermediary engagement. Moreover, developing the managerial capability of these producer organizations may aid in hastening the creation of scale economies as these groups may properly manage and communicate the need for similar growing techniques and schedules.

Related to managerial capability development, a possible sustainable agricultural development program may be to subsidize professionals to serve as staff or managers of agricultural organizations and associations, like the *doctor to the barrios* program of the DOH.

Third, human resource hiring policies and laws may need amendments to promote job security and not lose out on persons with great potential, especially for PRIs. As several of the public sector respondents exclaimed, the lack of job security and the contractual nature of many workers in the government is slowly preventing more qualified and needed persons from applying. Additional permanent positions will aid in developing the capabilities and implementation that innovation intermediaries may provide, especially for PRIs that require highly specialized persons.

Fourth, specifically for the mango industry, the government may consider establishing PRIs in high growth areas for mangoes, which may also apply to other crop industries. Coming from the experience of PHILRICE, GNCRDPSC, and other studies on cluster development (Sonobe and Otsuka, 2006, 2011), the presence of specialized PRIs in an area aid in the development of the industry they support. Currently, the Ilocos region and several Mindanao provinces provide the country with the most supply of mangoes. Setting up mango-specialized PRIs in these areas will help address many of the issues that growers face, like newer pests, the effects of climate change, improper chemical use, and low uptake of several post-harvest processes. Addressing these issues in high-growth areas will likely improve production and quality further. In addition, as these developments are done in large clusters, the diffusion of knowledge may be easier spread to other mango growing areas.

Fifth, for industries vying for the export market, like the mango industry, the DA, in coordination with the DTI, may create an export-quality and market track for AFB commodities. Coming from the experience of the Philippine mango industry, not many growers and MSMEs are interested in entering the export market due to the stringent

standards and certifications and investment needed to maintain these. Thus, creating an export track for those interested may be the better policy. Public sector intermediaries may work within the RIICs framework and collaborate with private sector intermediaries in helping growers and MSMEs maintain the requirements. Additionally, intermediaries may emulate the mechanism done by PDE where they apply for the organic and fair-trade certifications on behalf of their grower partners and extend its reach to them by ensuring and supporting adherence to these. With a collaborated export track and partnering with a private sector intermediary for standard and certification monitoring and sharing, export-oriented industries, like the Philippine mango industry, may more quickly resolve the issues surrounding poor standard compliance and revitalize their place in the export market.

### **Section 8.5 Management Implications**

This study makes five management implications. First, findings from this study and supported by other studies (Intarakumnerd and Chaoroenporn, 2013a, 2013b; Sutthijakra and Intarakumnerd, 2015; Go, 2019) show that identifying and developing services under the four roles framework (Partners, 2007) provides a clearer understanding of what intermediaries may do and for what primary purpose. When identifying an organization as an intermediary, it is suggested that organizations use the roles framework as a backdrop to learn their current performance and develop further services and programs. To aid in distinguishing roles and services further, intermediaries may also be guided by their organization type, the value chain segments they hope to support or participate in, and the primary market orientation of their partners or industry.



Second, intermediaries may either take a segment-specific or whole-chain approach to their role performance when supporting value chain development and upgrading. Aside from identifying programs based on roles, the researcher suggests applying the proposed value chain intermediation framework to better understand and identify their place in the value chain and how their programs affect the innovation or upgrading of their partners.

Third, the findings show that private sector intermediaries exhibit striking differences in how their operations are managed, with some working with one or two staff or under volunteer arrangements. Several are still grant-reliant but are developing business models to keep them financially sustainable. Like farmer groups and MSMEs, innovation intermediaries require management and business development training to sustain their operations. As part of their key-capability development, these organizations need to operate their resources, staff, programs, knowledge, and networks efficiently and sustainably. Organizations may take a dynamic capabilities perspective (Teece, 2019) to develop their key-capabilities to ensure they consistently build these.

Fourth and related to the previous, it is suggested that innovation intermediaries also house human resource development programs. The staff is one of the most significant factors in an intermediary's success. The researcher also found that organizations investing in their employees' professional and personal development stayed longer. Moreover, those that provided opportunities for career advancement or further studies, even if not sponsored by the intermediary, appeared to have more motivated and passionate staff members. Presenting opportunities like these also develop the network of their staff, thereby extending the intermediary's network too. Thus, investing in a human

resource development program targets management capabilities and the development of other key-capabilities.

Fifth, for AFB sector intermediaries, the cross-case analysis suggests that taking and applying an export-oriented mindset, although complex and requiring investment, bears valuable and long-term benefits. However, this implication does not call for intermediaries to push to compete in the export market. Instead, taking an export mindset means performing roles that provide their partners with the skills and resources necessary to raise the quality of products and processes to an export-competitive level. By producing with such fervor, local exporters or foreign importers may first approach the intermediaries or their partners. Moreover, when more growers, farmers, or MSMEs see those that take the export-market-oriented approach start reaping more benefits, they may follow suit, eventually raising the product quality level across the industry.

## **Section 8.6 Prospects for Future Research**

Given the qualitative methodology used to conduct the study, the analytical generalizations from the case studies may be limited to the Philippine rice and mango industries. Nonetheless, as the study considered several issues faced by other AFB industries, and with the encompassing variables of organization type, value chain support, and market orientation, the results of this study may apply to other AFB industries. Still, as the findings are limited to two case studies, further qualitative or quantitative studies on innovation intermediaries in other AFB industries or additional cases on organizations that had single-type representation in this study will benefit our more profound understanding of innovation intermediation in the AFB sector, and these will also build on the external validity of this study. Specifically for export market-oriented AFBs, a

suggested line of research focuses on innovation intermediaries that directly provide or are more inclined towards export-related intermediation, such as the DTI – Center for International Trade Expositions and Missions.

Another methodological limitation to the study was attempting a longitudinal approach or design that may be developed further with additional interviews and longer-term observations. Further research that focuses on the long-term evolution of individual intermediaries may benefit in developing our understanding of the factors that affect role performance and key-capability building changes. Moreover, aggregated embedded cases, as in this study, done over a much more extended period will also help build validity to this study's findings.

Moreover, this study presented several findings that require more academic and theoretical examination. For example, on role performance, future researchers may assess the lobbying role and how innovation intermediaries serve in policy-related work. Furthermore, in the key-capability sphere, further research on the separability of human resource development as a fifth key-capability and a deeper look into motivational capabilities as an underlying capability may be done. In addition to these, a study on the adaptability of the proposed GVC intermediation framework is a viable next step in developing knowledge on how innovation intermediaries support innovation and upgrading in value chains.

As this study focused primarily on the innovation and upgrading side of the IS and GVC approaches, the governance concept in the GVC literature was only touched on lightly. Although the governance structures were described briefly in Chapters V and VI, it would benefit the literature to develop an understanding of how innovation

intermediation affects changes in governance structures and power relations, following Dallas et al. (2019). The study may look into the roles intermediaries perform to provide their partners with a preferable governance structure, and it may study the key-capabilities necessary to effect these changes.

Finally, future researchers may also focus on particular issues raised in this study that would benefit from more concentrated research. One such topic is the effect of protectionist policies on the roles and key-capabilities of innovation intermediaries. Although this study has touched on the impacts of industry protection, a more focused investigation may reveal deeper nuances.

## REFERENCES

- Adler, P.S., and Kwon, S.W. (2002). Social Capital: Prospects for a New Concept. *The Academy of Management Review*, 27(1), 17-40.
- AgriCOOPH Foundation. (2020, December 12). *The biggest “matchmaking” in the supply & marketing of rice ever accomplished during the COVID-19 pandemic by the AgriCOOPh Federation* [Status update]. Facebook. Retrieved April 14, 2021, from <https://www.facebook.com/agricooph.federation812/posts/184805626688394>.
- AgriCOOPh Foundation. (n.d.). *Home* [Facebook page]. Retrieved April 14, 2021, from <https://www.facebook.com/agricooph.federation812/>.
- Alabastro, E. (2006). National innovation system: prospects and challenges. *Philippines Sociological Review*, 54(January-December 2016), pp. 8-10.
- Albert, J.R.G., Quimba, F.M.A., Serafica, R.B., Llanto, G.M., Vizmanos, J.F.V. and Bairan, J.C.A.C. (2017). *Measuring and Examining Innovation in Philippine Business and Industry* (PIDS Discussion Paper Series No. 2017-28). Quezon City, Philippines: Philippine Institute for Development Studies.
- Aldaba, R.M. (2018). *Industry 4.0: Are We There Yet? i<sup>3</sup>S inclusive innovation industrial strategy*. Retrieved February 25, 2021, from [https://pidswebs.pids.gov.ph/CDN/EVENTS/industrialstrategy\\_aldaba.pdf](https://pidswebs.pids.gov.ph/CDN/EVENTS/industrialstrategy_aldaba.pdf).
- Altenburg, T. (2007). *Donor approaches to supporting pro-poor value chains*. Report prepared for the Donor Committee for Enterprise Development, Working Group on Linkages and Value Chain. Retrieved from

<http://bdsknowledge.org/dyn/bds/docs/568/DonorApproachestoPro-PoorValueChains.pdf>.

- Arcalas, J.Y. (2020, March 5). Award-winning PHL rice eyes export market soon. *Business Mirror*. Retrieved March 11, 2021, from <https://businessmirror.com.ph/2020/03/05/award-winning-phl-rice-eyes-export-market-soon/>.
- Arceo-Dumlao, T. (2020, November 8). Bruised, battered, but unbowed. *Inquirer.net*. Retrieved March 11, 2021, from <https://business.inquirer.net/311352/bruised-battered-but-unbowed>.
- Asha, V.T. and Raju, M.S. (2019). Marketing and exchange of farm products in Facebook groups: A case study. *Indian Journal of Marketing*, 49(10), pp. 58-68.
- Ballesteros, M.M. and Ancheta, J.A. (2020). *The Role of Agrarian Reform Beneficiaries Organizations (ARBOs) in Agriculture Value Chain* (PIDS Discussion Paper Series 2020-24). Quezon City, Philippines: Philippine Institute for Development Studies.
- Barrientos, S. (2001). Gender, Flexibility and Global Value Chains. *IDS Bulletin*, 32(3), pp. 83-93.
- Barrientos, S., Gereffi, G., and Rossi, A. (2011). Economic and social upgrading in global production networks: A new paradigm for a changing world. *International Labor Review*, 159(3-4), pp. 319-340.
- Batterink, M.H., Wubben, E.F.M., Klerkx, L., and Omta, S.W.F. (Onno). (2010). Orchestrating innovation networks: The case of innovation brokers in the agri-food sector. *Entrepreneurship and Regional Development*, 22(1), pp. 47-76.

- BBC News. (2019, June 10). Philippines face two million kilogram mango surplus. *BBC*. Retrieved February 2, 2020, from <https://www.bbc.com/news/world-asia-48581857>.
- Bell, M. and Pavitt, K. (1993). Technological accumulation and industrial growth: contrasts between developed and developing countries. *Industrial and Corporate Change*, 2(2), pp. 157-210.
- Bergek, A., Jacobsson, S., Carlsson, B., Lindmark, S., and Rickne, A. (2008). Analyzing the functional dynamics of technological innovation systems: a scheme of analysis. *Research Policy*, 37(3), pp. 407-429.
- Bloom, N., Eifert, B., Mahajan, A., McKenzie, D., and Roberts, J. (2013). Does management matter? Evidence from India. *The Quarterly Journal of Economics*, 128(1), pp. 1-51.
- Bordey, F.H., Moya, P.F., Beltran, J.C., and Dawe, D.C. (Eds.) (2016). *Competitiveness of Philippine Rice in Asia*. Nueva Ecija, Philippines: Philippine Rice Research Institute, and Los Baños, Laguna, Philippines: International Rice Research Institute.
- Breschi, S. and Malerba, F. (2005). Cluster, Networks, and Innovation: Research Results and New Directions. In Breschi, S. and Malerba, F. (Eds.). *Clusters, Networks and Innovation* (pp. 1-26). Oxford, New York: Oxford University Press.
- Briones, R.M. (2013). *Market Structure and Distribution of Benefits from Agricultural Exports: the Case of the Philippine Mango Industry* (PIDS Discussion Paper Series No. 2013-16). Quezon City, Philippines: Philippine Institute for Development Studies.

- Briones, R.M. (2014a) *Small Farmers in High Value Chains: Binding or Relaxing Constraints to Inclusive Growth?* (PIDS Discussion Paper Series No 2014-13). Quezon City, Philippines: Philippine Institute for Development Studies.
- Briones, R.M. (2019). *Welfare Impact of Rice Tariffication* (PIDS Discussion Paper Series No. 2019-16). Quezon City, Philippines: Philippine Institute for Development Studies.
- Briones, R.M. (2020). *Did the Opening Up of Rice Importation in the Philippines Worsen Income Poverty and Inequality? A General Equilibrium with Microsimulation Approach* (PIDS Discussion Paper Series No. 2020-43). Quezon City, Philippines: Philippine Institute for Development Studies.
- Briones, R.M. and dela Peña, B. (2015). *Competition Reform in the Philippine Rice Sector* (PIDS Discussion Paper Series No. 2015-04). Quezon City, Philippines: Philippine Institute for Development Studies.
- Cain, J. and Policastri, A. (2011). Using Facebook as an informal learning environment. *American Journal of Pharmaceutical Education*, 75(10), pp. 1-8.
- Calzado, M.L.S. (2018, July 31). *Convergence of DOST-PCAARRD and DA-BAR roadmap discussed*. Retrieved February 22, 2021, from <http://www.pcaarrd.dost.gov.ph/home/portal/index.php/quick-information-dispatch/3256-convergence-of-dost-pcaarrd-and-da-bar-roadmap-discussed/>.
- Cardamone, P., Pupo, V., and Ricotta, F. (2015). University technology transfer and manufacturing innovation; The case of Italy. *Review of Policy Research*, 32(3), pp. 297-322.
- Caucus of Development NGO Networks. (n.d.). *Philippine Partnership for the Development of Human Resources in Rural Areas (PHILDHARRA)*. Retrieved April



- 12, 2021, from <https://code-ngo.org/philippine-partnership-for-the-development-of-human-resources-in-rural-areas-phildhrra/>.
- Chang, Y.C. and Chen, M.H. (2004). Comparing approaches to systems of innovation: the knowledge perspective. *Technology in Society* 26(1), pp. 17-37.
- Chen Yi Agventures Inc. (2018a, June 20). *Philippine Rice Revolution by Chen Yi Agventures Inc.* YouTube. Retrieved March 11, 2021, from <https://www.youtube.com/watch?v=oWKXsgqOGxA&t=197s>.
- Chen Yi Agventures Inc. (2018b, November 23). *Chen Yi Agventures Inc. / AVP 2018* [Video]. YouTube. Retrieved March 11, 2021, from <https://www.youtube.com/watch?v=0Y3nZCIsM10>.
- Chunhavuthiyanon, M. and Intarakumnerd, P. (2014). The role of intermediaries in sectoral innovation system: The case of Thailand's food industry. *International Journal of Technology Management & Sustainable Development*, 13(1), pp. 15-36.
- Clapano, J.R., Punay, E. Echeminada, P., Verzonilla, K., Macairan, E., Sapnu, R., Gonzales, I., Flores, H., and Calica, A. (2008, April 12). Corruption behind P2-B loss in NFA rice – ex-chief. *ABS-CBN News*. Retrieved February 24, 2021, from <https://news.abs-cbn.com/nation/04/11/08/corruption-behind-p2-b-loss-nfa-rice-%E2%80%94-ex-chief>.
- Cohen, W. and Levinthal, D. (1990). Absorptive capacity: A new perspective on learning and innovation. *Administrative Science Quarterly*, 35(1), pp. 128-152.
- Cooke, P. (2001). Regional innovation systems, clusters, and the knowledge economy. *Industrial and Corporate Change*, 10(4), pp. 945-974.
- Coombs, R., Harvey, M., and Tether, B.S. (2003). Analysing distributed processes of provision and innovation. *Industrial and Corporate Change* 12(6), pp. 1125-1155.

- Cornett, A.P. (2009). Aims and strategies in regional innovation and growth policy: A Danish perspective. *Entrepreneurship and Regional Development*, 21(4), pp. 399-420.
- Cororaton, C. B. (2003). *Research and Development and Technology in the Philippines* (PIDS Perspective Paper Series No. 10). Quezon City, Philippines: Philippine Institute for Development Studies.
- Corpuz, P. (2020). *Philippine government launches Plant, Plant, Plant Program* (USDA Foreign Agricultural Service Report No. RP2020-0043). Retrieved January 21, 2021, from [https://apps.fas.usda.gov/newgainapi/api/Report/DownloadReportByFileName?fileName=Philippine%20Government%20Launches%20Plant%20Plant%20Plant%20Program\\_Manila\\_Philippines\\_04-07-2020](https://apps.fas.usda.gov/newgainapi/api/Report/DownloadReportByFileName?fileName=Philippine%20Government%20Launches%20Plant%20Plant%20Plant%20Program_Manila_Philippines_04-07-2020).
- Crespi, G., Katz, J., and Olivari, J. (2018). Innovation, natural resource-based activities and growth in emerging economies: the formation and role of knowledge intensive service firms. *Innovation and Development*, 8(1), pp. 79-101.
- Creswell, J.W. (2014). *Research Design* (4th ed.). Thousand Oaks, CA: Sage.
- Creswell, J.W., and Creswell, J. D. (2015). *Research Design* (5th ed.). Thousand Oaks, CA: Sage.
- Dallas, M.P., Ponte, S., and Sturgeon, T.J. (2019). Power in global value chains. *Review of International Political Economy*, 26(4), pp. 666-694.
- Dar, W.D. (2021). *One DA: A Holistic Approach to Agriculture & Fisheries Transformation*. Retrieved February 22, 2021, from <https://www.da.gov.ph/wp-content/uploads/2021/01/ONE-DA-Powerpoint.pdf>.

- Dawe, D.C. (2006a). The Philippines imports rice because it is an island nation. In Dawe, D.C., Moya, P.F., and Casiwan, C.B. (Eds.). *Why Does the Philippines Import Rice? Meeting the challenge of trade liberalization* (pp. 3-8). Los Baños, Laguna, Philippines: International Rice Research Institute.
- Dawe, D.C. (2006b). Farm laborers, not palay farmers, do the bulk of the work producing the nation's rice. In Dawe, D.C., Moya, P.F., and Casiwan, C.B. (Eds.). *Why Does the Philippines Import Rice? Meeting the challenges of trade liberalization* (pp. 23-25). Los Baños, Laguna, Philippines: International Rice Research Institute.
- De Backer, K. and Miroudot, S. (2013). Mapping global value chains, *OECD Trade Policy Papers 159*. OECD Publishing, Paris.
- de Janvry, A., and Sadoulet, E. (2016). *Development Economics: Theory and Practice*. New York, New York: Routledge.
- De Leon, S.G. (2018). *DTI, DOST ink MOU to promote Filipino innovation*. Retrieved December 13, 2019, from <https://pia.gov.ph/news/articles/1006710>.
- de Vera, B.O. (2021, February 2). Duterte EO transferring national gov't functions to LGUs out this year. *Inquirer.net*. Retrieved March 9, 2021, from <https://business.inquirer.net/316885/duterte-eo-transferring-national-govt-functions-to-lgus-out-this-year>.
- Dela Cruz, A.M. (2007). *Contractual arrangements in agriculture (Northern and Central Luzon component)* (PIDS Discussion Paper Series No. 2007-21). Quezon City, Philippines: Philippine Institute for Development Studies.
- de la Peña, B. (2014). *Rapid Appraisal of the State of Competition in the Rice Value Chain* (PIDS Discussion Paper Series No. 2014-25). Quezon City, Philippines: Philippine Institute for Development Studies.

Department of Agriculture – Agricultural Training Institute. (n.d.a.). *Timeline of ATI*.

Retrieved March 29, 2021, from <https://ati.da.gov.ph/ati-main/timeline-ati>.

Department of Agriculture – Agricultural Training Institute. (n.d.b.). *Organizational Structure*. Retrieved March 29, 2021, from <https://ati.da.gov.ph/ati-main/content/organizational-structure>.

Department of Agriculture – Agricultural Training Institute. (n.d.c.). *Information Services*. Retrieved March 29, 2021, from <https://ati.da.gov.ph/ati-main/programs/information-services>.

Department of Agriculture – Agricultural Training Institute. (n.d.d.). *Training Programs*. Retrieved March 29, 2021, from <https://ati.da.gov.ph/ati-main/programs/training-programs>

Department of Agriculture – Agricultural Training Institute. (n.d.e.). *Rice Competitiveness Enhancement Fund (RCEF)*. Retrieved March 29, 2021, from <https://ati.da.gov.ph/ati-main/PROGRAMS/RCEF>.

Department of Agriculture – Agricultural Training Institute. (n.d.f.). *RCEF*. Retrieved January 25, 2022, from <https://www.da.gov.ph/wp-content/uploads/2020/07/RCEF.pdf>.

Department of Agriculture – Agriculture and Fisheries Information Division. (2020). *DA's "Plant, Plant, Plant Program" to benefit all farmers, fishers, consumers nationwide*. Retrieved January 21, 2021, from <https://www.da.gov.ph/das-plant-plant-plant-program-to-benefit-all-farmers-fishers-consumers-nationwide/>.

Department of Agriculture – Bureau of Agricultural Research. (n.d.). *Research and Development, and Extension Agenda and Programs 2016-2022*. Retrieved

February 5, 2022, from <https://bar.gov.ph/downloadables/rdeap/RDEAP%202016-2022.pdf>.

Department of Agriculture – High-Value Crops Development Program. (2018). *Mango Industry Roadmap 2017-2022*. Retrieved February 3, 2021, from <https://www.da.gov.ph/wp-content/uploads/2019/06/Philippine-Mango-Industry-Roadmap-2017-2022.pdf>.

Department of Agriculture – Philippine Rural Development Project. (2017). *Value chain analysis of mangoes in the North Luzon Cluster*. Quezon City, Philippines: Department of Agriculture.

Department of Agriculture Communications Group. (2020). *Farm clustering, consolidation needed to level up agri sector*. Retrieved January 21, 2021, from <https://www.da.gov.ph/farm-clustering-consolidation-needed-to-level-up-agri-sector/>.

Department of Agriculture, National Economic and Development Authority, and Department of Budget and Management. (2019). *The Implementing Rules and Regulations of Republic Act No. 11203, “An act liberalizing the importation, exportation and trading of rice, lifting for the purpose the quantitative import restriction on rice, and for other purposes”* (Joint Memorandum Circular No. 01-2019). Philippines.

Department of Agriculture. (2018). *The Philippine Rice Industry Roadmap 2030*. Retrieved from <https://www.philrice.gov.ph/wp-content/uploads/2018/09/The-Philippine-Rice-Industry-Roadmap-2030.pdf>.

Department of Agriculture. (n.d.). *Ang Bagong Pananaw sa Agrikultura: 8 Paradigms to Level Up Agriculture*. Retrieved January 21, 2021, from

<https://www.da.gov.ph/ang-bagong-pananaw-sa-agrikultura-8-paradigms-to-level-up-agriculture/>.

Department of Budget and Management. (2016). *General Appropriations Act 2016 (Vol 1A & 1B)*. Retrieved February 15, 2021, from <https://dbm.gov.ph/index.php/budget-documents/2016/general-appropriations-act-fy-2016/general-appropriations-act-2016-vol-1a-1b>.

Department of Budget and Management. (2017). *General Appropriations Act 2017 (Volume 1A & 1B)*. Retrieved February 15, 2021, from <https://www.dbm.gov.ph/index.php/budget-documents/2017/republic-act-10924-general-appropriations-act-fy-2017/general-appropriations-act-volume-ia-ib>.

Department of Budget and Management. (2018a). *General Appropriations Act 2018- Volume 1A*. Retrieved February 15, 2021, from <https://www.dbm.gov.ph/index.php/budget-documents/2018/general-appropriations-act-fy-2018/gaa-volume-ia-ib>.

Department of Budget and Management. (2018b). *General Appropriations Act 2018- Volume 1B*. Retrieved February 15, 2021, from <https://www.dbm.gov.ph/index.php/budget-documents/2018/general-appropriations-act-fy-2018/gaa-volume-ib>.

Department of Budget and Management. (2019). *General Appropriations Act 2019- Volume 1B*. Retrieved February 15, 2021, from <https://www.dbm.gov.ph/index.php/budget-documents/2019/general-appropriations-act-fy-2019/gaa-volume-ib-2019>.

Department of Budget and Management. (2020). *General Appropriations Act 2019- Volume 1A*. Retrieved February 15, 2021, from

<https://www.dbm.gov.ph/index.php/budget-documents/2019/general-appropriations-act-fy-2019/gaa-volume-ia-2019>.

Department of Science and Technology – Industrial Technology Development Institute.  
(n.d.a.). *About ITDI*. Retrieved April 5, 2021, from <https://itdi.dost.gov.ph/index.php/transparency/about-itdi>.

Department of Science and Technology – Industrial Technology Development Institute.  
(n.d.b.). *History*. Retrieved April 5, 2021, from <https://itdi.dost.gov.ph/index.php/transparency/about-itdi/history>.

Department of Science and Technology – Industrial Technology Development Institute.  
(n.d.c.). *Functions*. Retrieved April 5, 2021, from <https://itdi.dost.gov.ph/index.php/functions>.

Department of Science and Technology – Industrial Technology Development Institute.  
(n.d.d.). *TSD FAQ*. Retrieved April 5, 2021, from <https://itdi.dost.gov.ph/index.php/tsd-faq>.

Department of Science and Technology – Industrial Technology Development Institute.  
(n.d.e.). *FPD Services*. Retrieved April 5, 2021, from <https://itdi.dost.gov.ph/index.php/services-3>.

Department of Science and Technology. (2017b). *Harmonized R&D Agenda (HNRDA) 2017-2022*. Retrieved December 11, 2019 from <https://dost.gov.ph/>.

Department of Trade and Industry – Bureau of Product Standards. (2009). *Code of good agricultural practices (GAP) for mango*. Retrieved February 3, 2020, from <http://spsissuances.da.gov.ph/attachments/article/797/PNS-BAFPS%2045-2009%20-%20Code%20of%20GAP%20for%20Mango.pdf>.

- Department of Trade and Industry. (2017). *Philippine Inclusive Innovation Strategy (i<sup>3</sup>S)* (Policy Brief Series No. 2017-05). Retrieved from <http://industry.gov.ph/wp-content/uploads/2017/11/DTI-Policy-Brief-2017-05-Philippine-Inclusive-Innovation-Industrial-Strategy.pdf>.
- Department of Trade and Industry. (2018). *The Philippine Inclusive Filipinnovation and Entrepreneurship Roadmap: Bridging the Gaps, Setting the Milestones* (Policy Briefs Special Issue October 2018). Retrieved December 12, 2019 from <https://industry.gov.ph/>.
- Desiderio, L. (2020, March 6). Local rice producer eyes export of ultra premium brand. *PhilStar*. Retrieved March 11, 2021, from <https://www.philstar.com/business/2020/03/06/1998424/local-rice-producer-eyes-export-ultra-premium-brand>.
- Devaux, A., Horton, D., Velasco, C., Thiele, G., López, G., Bernet, T., Reinoso, I., and Ordinola, M. (2009). Collection action for market chain innovation in the Andes. *Food Policy*, 34(1), pp. 31-38.
- Devaux, A., Torero, M., Donovan, J., and Horton, D. (2018). Agricultural innovation and inclusive value-chain development: a review. *Journal of Agribusiness in Developing and Emerging Economies*, 8(1), pp. 99-123.
- Diamond Star Agroproducts, Inc. (2021). *Philippine mango, pineapple, papaya, durian, banana and other Philippine agriculture products*. Retrieved March 16, 2021, from <https://www.diamondstar.com.ph/>.
- Diamond Star Agroproducts, Inc. (2021). *Products*. Retrieved March 16, 2021, from <https://www.diamondstar.com.ph/products/>.



- Diamond Star Agroproducts, Inc. (2021). *VHT*. Retrieved March 16, 2021, from <https://www.diamondstar.com.ph/vht/>.
- DiamondStar. (2010). *Company Development*. Retrieved March 16, 2021, from [http://www.diamondstar.co.jp/business/history\\_en.html](http://www.diamondstar.co.jp/business/history_en.html).
- Dolan, C. and Humphrey, J. (2000). Governance and trade in fresh vegetables: the impact of UK supermarkets on the African horticulture industry. *The Journal of Development Studies*, 37(2), pp. 147-176.
- Doloreux, D. and Parto, S. (2004). Regional innovation systems: a critical review. *Maastricht, Merit*, 190(1), pp. 1-26.
- Edillon, R.G. (2010). Social capital and the decision to adopt new technology among rice farmers in the Philippines. *Philippine Journal of Development*, 68(1), pp. 1-13.
- Edquist, C. (2005). Systems of innovation: perspectives and challenges. In Fagerberg, J., Mowery, D.C., and Nelson, R.R. (Eds.). *The Oxford Handbook of Innovation* (pp. 181-208). Oxford, New York: Oxford University Press.
- Elemia, C. (2018, September 25). ‘Rice tara-ffication?’ Hontiveros bares Jason Aquino’s corruption in NFA. *Rappler*. Retrieved February 24, 2021, from <https://www.rappler.com/nation/risa-hontiveros-bares-jason-aquino-corruption-nfa>.
- Enright, M.J. (2003). Regional cluster: what we know and what we should know. In Bröcker, J., Donse, D., and Soltwedel, R. (Eds.). *Innovation Clusters and Interregional Competitiveness* (pp. 99-129). Heidelberg, Germany: Springer.
- Fagerberg, J. (2005). Innovation: a guide to the literature. In Fagerberg, J., Mowery, D.C., and Nelson, R.R. (Eds.). *The Oxford Handbook of Innovation* (pp. 1-26). Oxford, New York: Oxford University Press.

- Fang, C.Y. (2015). *Innovation in the Construction Sector in Malaysia: A Sectoral Innovation Systems Perspective* (Unpublished doctoral dissertation). University of Malaysia, Kuala Lumpur, Malaysia.
- Fernandez-Stark, K., Bamber, P., and Gereffi, G. (2012). *Inclusion of Small- and Medium-sized Producers in High-value Agro-food Value Chains*. Center on Globalization, Governance, & Competitiveness, Duke University.
- Fernandez-Stark, K., Bamber, P., and Gereffi, G. (2014). Global value chains in Latin America: A development perspective for upgrading. In Hernández R., Martínez-Piva, J.M., and Mulder, N. (Eds.). *Global value chains and world trade: Prospects and challenges for Latin America* (pp. 79-106). Santiago, Chile: Economic Commission for Latin America and the Caribbean.
- Fernandez-Stark, K., Couto, V., and Gereffi, G. (2017). *The Philippines in the Mango Global Value Chain*. Center on Globalization, Governance, & Competitiveness, Duke University.
- Food and Agriculture Organization of the United Nations. (2013). *Family Farming Definition*. Retrieved June 9, 2021, from [http://www.fao.org/fileadmin/templates/gender/docs/FAO\\_FAMILYFARMING\\_DEFINITION\\_ENGLISH.pdf](http://www.fao.org/fileadmin/templates/gender/docs/FAO_FAMILYFARMING_DEFINITION_ENGLISH.pdf).
- Food and Agriculture Organization of the United Nations. (2021). *Rice, milled import quantity, export quantity for the Philippines, 1961-2019* [Data file]. Retrieved November 24, 2021, from <http://www.fao.org/faostat/en/#data/TCL>, updated February 9, 2021.
- Food and Agriculture Organization of the United Nations. (2021). *Rice, paddy area harvested, yield, and production quantity for the Philippines, 1961-2019* [Data file].

Retrieved November 24, 2021, from <http://www.fao.org/faostat/en/#data/QCL>, updated September 15, 2021.

Food and Agriculture Organization of the United Nations. (2021). *Rice, paddy area harvested, yield, and production quantity for the Philippines, Thailand, and Viet Nam, 2019* [Data file]. Retrieved November 24, 2021, from <http://www.fao.org/faostat/en/#data/QCL>, updated September 15, 2021.

Food and Agriculture Organization of the United Nations. (2021). *Rice, paddy producer price (LCU/tonne) for the Philippines, 1991-2019* [Data file]. Retrieved November 24, 2021, from <http://www.fao.org/faostat/en/#data/PP>, updated June 21, 2021.

Food and Agriculture Organization of the United Nations. (2021). *Export value of mangoes, mangosteens, and guavas for Brazil, Ghana, India, Mexico, Netherlands, Pakistan, Peru, Philippines, Spain, Thailand, and Viet Nam, 2000 to 2019* [Data file]. Retrieved November 24, 2021, from <http://www.fao.org/faostat/en/#data/TP>.

Food and Agriculture Organization of the United Nations. (2021). *Export quantity of mangoes, mangosteens, and guavas for Brazil, Ecuador, India, Mexico, Netherlands, Pakistan, Peru, Philippines, Spain, Thailand, and Viet Nam, 2000 to 2019* [Data file]. Retrieved November 24, 2021, from <http://www.fao.org/faostat/en/#data/TP>.

Food and Agriculture Organization of the United Nations. (2021). *Area harvested and production quantity of mangoes, mangosteens, and guavas for Bangladesh, Brazil, China, mainland, Egypt, India, Indonesia, Malawi, Mexico, Pakistan, Philippines, and Thailand, 2019* [Data file]. Retrieved November 24, 2021, from <http://www.fao.org/faostat/en/#data/TP>.

- Foster, P.C. and Ocejo, R.E. (2015). Brokerage, mediation, and social networks in the creative industries. In Jones, C., Lorenzen, M., and Sapsed, J. (Eds.). *The Oxford Handbook of Creative Industries* (pp. 405-420). Oxford, UK: Oxford University Press.
- Frederick, S. (2016). *Concept & Tools*. Retrieved from <https://globalvaluechains.org/concept-tools>.
- Friedman, J. and Silberman, J. (2003). University technology transfer: Do incentives, management and location matter?. *Journal of Technology Transfer*, 28(1), pp. 17-30.
- Fujita, M. (1998). Industrial policies and trade liberalization: The automotive industry in Thailand and Malaysia. In Omura, K. (Ed.). *The Deepening Economic Interdependence in the APEC Region* (pp. 149-187). Tokyo, Japan: APEC Study Center, Institute of Developing Economies.
- Fujita, M. (2008). *Value Chain Dynamics and Growth of Local Firms: The Case of Motorcycle Industry in Vietnam* (IDE Discussion Paper 161). Tokyo, Japan: Institute of Developing Economies, Japan External Trade Organization.
- Fujita, M. (2010). *The Diversity and Dynamics of Industrial Organisation: Transformation of Local Assemblers in the Vietnamese Motorcycle Industry* (IDE Discussion Paper 230). Tokyo, Japan: Institute of Developing Economies, Japan External Trade Organization.
- Fujita, M. (2013). *The Japanese and Chinese Models of Industrial Organization: Fighting for Supremacy in the Vietnamese Motorcycle Industry* (IDE Discussion Paper 420). Japan: Institute of Developing Economies, Japan External Trade Organization.

- Gereffi G. and Bair, J. (2018). Local clusters in global chains: The causes and consequences of export dynamism in Torreon's blue jeans industry. In Gereffi, G. (Ed.). *Global Value Chains and Development: Redefining the Contours of 21<sup>st</sup> Century Capitalism* (pp. 176-204). Cambridge, UK: Cambridge University Press.
- Gereffi, G. (1994). The International Economy and Economic Development. In Smelser, N. J. and Swedberg, R. (Eds.). *The Handbook of Economic Sociology* (pp. 206-233). Princeton, New Jersey: Princeton University Press.
- Gereffi, G. (1999). *A Commodity Chains Framework for Analyzing Global Industries*. Retrieved from <http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.608.812&rep=rep1&type=pdf>.
- Gereffi, G. (2001). Beyond the producer-driven/buyer-driven dichotomy: the evolution of global value chains in the internet era. *IDS Bulletin*, 32(3), pp. 30-40.
- Gereffi, G. (2005). The global economy: Organization, governance, and development. In Smelser, N. J. and Swedberg, R. (Eds.). *The Handbook of Economic Sociology* (2<sup>nd</sup> ed., pp. 160-182). Princeton, New Jersey: Princeton University Press.
- Gereffi, G. (2018a). The emergence of global value chains: ideas, institutions, and research communities. In Gereffi, G. (Ed.). *Global Value Chains and Development: Redefining the Contours of 21<sup>st</sup> Century Capitalism* (pp. 1-39). Cambridge, UK: Cambridge University Press.
- Gereffi, G. (2018b). International trade and industrial upgrading in the apparel commodity chain. In Gereffi, G. (Ed.). *Global Value Chains and Development: Redefining the Contours of 21<sup>st</sup> Century Capitalism* (pp. 72-107). Cambridge, UK: Cambridge University Press.

- Gereffi, G. and Fernandez-Stark, K. (2018) Global Value Chain Analysis: A Primer Second Edition. In Gereffi, G. (Ed.). *Global Value Chains and Development: Redefining the Contours of 21<sup>st</sup> Century Capitalism* (pp. 305-342). Cambridge, UK: Cambridge University Press.
- Gereffi, G. and Korzeniewicz, M. (1990). Commodity chains and footwear exports in the semiperiphery. In Martin, W.G. (Ed.). *Semiperipheral States in the World-Economy* (pp. 45-68). New York: Greenwood Press.
- Gereffi, G., Humphrey, J., and Sturgeon, T. (2005). The governance of global value chains. *Review of International Political Economy*, 12(1), pp. 78-104.
- Gereffi, G., Humphrey, J., Kaplinsky, R., and Sturgeon, T.J. (2001). Introduction: globalisation, value chains and development. *IDS Bulletin*, 32(3), pp. 1-8.
- Go, K.C.L. (2019). The role and capabilities of urban-based cooperatives as intermediary organizations: A multiple case-study on university partnerships. *International Journal of Technology Management & Sustainable Development*, 18(2), pp. 175-195.
- Gonzales, I. (2019, November 24). One of world's best rice varieties grows in Leyte. *PhilStar*. Retrieved March 11, 2021, from <https://www.philstar.com/business/agriculture/2019/11/24/1971248/one-worlds-best-rice-varieties-grows-leyte>.
- Gregorio, G.B., Vicerra, R.V., Ancog, R.C., Billedo, N.M.P., Paller, R.A., Corales, M.C.G., Batangantang, I.L. (2020). *Agricultural Clusters Approach to Enhance Competitiveness of Smallholder Farms in Southeast Asia* (SEARCA Policy Paper 2020-2). Los Baños, Laguna, Philippines: South East Asian Regional Center for Graduate Study and Research in Agriculture.

- Hayami Y. and Kikuchi, M. (1981). *Asian Village Economy at the Crossroads*. Tokyo, Japan: University of Tokyo Press.
- Hayami, Y. (2001). Ecology, history, and development: a perspective from rural Southeast Asia. *The World Bank Research Observer*, 16(2), pp. 169-198.
- Hekkert, M.P., Suurs, R.A.A., Negro, S.O., Kuhlmann, S., and Smits, R.E.H.M. (2007). Functions of innovation systems: a new approach for analysing technological change. *Technological Forecasting and Social Change*, 74(4), pp. 413-432.
- Higuchi, Y., Mhede, E.P., and Sonobe, T. (2019). Short- and medium-run impacts of management training: An experiment in Tanzania. *World Development* 114, pp. 220-236.
- Howells, J. (2006), Intermediation and the role of intermediaries in innovation. *Research Policy*, 35(5), pp. 715-728.
- Humphrey, J. and Memdovic, O. (2006). *Global Value Chains in the Agrifood Sector* (United Nations International Development Organization Working Papers). Vienna, Austria.
- Humphrey, J. and Schmitz, H. (2001). Governance in global value chains. *IDS Bulletin*, 32(3), pp. 19-29.
- Humphrey, J. and Schmitz, H. (2002). How does insertion in global value chains affect upgrading in industrial clusters?. *Regional Studies*, 36(9), pp. 1017-1027.
- Humphrey, J., Ding, K., Fujita, M., Hioki, S., and Kimura, K. (2018). Platforms, innovation and capability development in the Chinese domestic market. *The European Journal of Development Research* 30(3), pp. 408-423.
- Iizuka, M. (2009). 'Low-tech' industry: a new path for development? The case of the salmon farming industry in Chile. In Malerba, F. and Mani, S. (Eds.). *Sectoral*

*Systems of Innovation and Production in Developing Countries* (pp. 232-258).

Cheltenham, UK: Edward Elgar.

Iizuka, M. and Gebreeyesus, M. (2016). Using functions of innovation systems to understand the successful emergence of non-traditional agricultural export industries in developing countries: cases from Ethiopia and Chile. *The European Journal of Development Research*, 29(2), pp. 384-403.

Intarakumnerd, P. (2017). Thai automotive industry: International trade, production networks, and technology capability development. In Ing, L.Y. and Kimura, F. (Eds.). *Production Networks in Southeast Asia* (pp. 161-182). New York, New York: Routledge.

Intarakumnerd, P. and Fujita, M. (2008). Coping with a giant: Challenges and opportunities for Thai and Vietnamese motorcycle industry from China. *Science, Technology, and Society*, 13(1), pp. 35-60.

Intarakumnerd, P. and Goto, A. (2018). Role of public research institutes in national innovation systems in industrialized countries: The cases of Fraunhofer, NIST, CSIRO, AIST, and ITRI. *Research Policy*, 47(7), pp. 1309-1320.

Intarakumnerd, P., and Chaminade, C. (2011). Innovation policies in Thailand: towards a system of innovation approach?. *Asia Pacific Business Review*, 17(3), pp. 57-72.

Intarakumnerd, P., and Chaoroenporn, P. (2013a). The role of intermediaries in sectoral innovation system in developing countries: Public organizations versus private organizations. *Asian Journal of Technology Innovation*, 21(1), pp. 108–119.

Intarakumnerd, P., and Chaoroenporn, P. (2013b). The role of intermediaries and the development of their capabilities in sectoral innovation systems: A case study of Thailand. *Asian Journal of Technology Innovation*, 21(sup2), pp. 99-114.



- Israel, D. C. (1999). *Research and Development in the Philippine Fisheries Sector* (PIDS Discussion Paper Series No. 99-17). Quezon City, Philippines: Philippine Institute for Development Studies.
- Kivimaa, P. (2014). Government-affiliated intermediary organisations as actors in system-level transitions. *Research Policy*, 43(8), pp. 1370-1380.
- Kivimaa, P., Boon, W., Hyysalo, S., and Klerkx, L. (2019). Towards a typology of intermediaries in sustainability transitions: a systemic review and a research agenda. *Research Policy*, 48(4), pp. 1062-1075.
- Klerkx, L., and Leeuwis, C. (2008). Balancing multiple interests: embedding innovation intermediation in the agricultural knowledge infrastructure. *Technovation*, 28(6), pp. 364-378.
- Klerkx, L., and Leeuwis, C. (2009). Establishment and embedding of innovation brokers at different innovation system levels: Insights from the Dutch agricultural sector. *Technological Forecasting & Social Change*, 76(6), pp. 849-860.
- Kogut, B. (1985). Designing global strategies: Comparative and competitive value-added chains. *Sloan Management Review*, 26(4), pp. 15-28.
- Laforga, B.M. (2021, February 3). National Government may cut workforce in 2022. *Business World*. Retrieved March 9, 2021, from <https://www.bworldonline.com/national-government-may-cut-workforce-in-2022/>.
- Lall, S. (1992). Technological capabilities and industrialization. *World Development*, 20(2), pp. 165-186.
- Launio, C.C., Redondo, G.O., Tabalno, R.F., Bordey, F.H., and Moya, P.F. (2015). *Is the Philippine's Leading Rice-Producing Province Doing Good Enough? The Case of*

- Rice Farming in Nueva Ecija*. Nueva Ecija, Philippines: Philippine Rice Research Institute, and Los Baños, Philippines: International Rice Research Institute.
- Lee, J., Gereffi, G., and Barrientos, S. (2011). *Global Value Chains, Upgrading and Poverty Reduction* (Capturing the Gains: Economic and Social Upgrading Briefing Note 3).
- Lee, K., Szapiro, M., and Mao Z. (2018). From Global Value Chains (GVC) to Innovation Systems for Local Value Chains and Knowledge Creation. *The European Journal of Development Research*, 30(3), pp. 424-441.
- Lema, R. (2012). Outsourcing and supplier learning: insights from the Indian software industry. *International Journal of Technology and Globalization*, 6(4), pp. 285-311.
- Lema, R., Pietrobelli, C., and Rabellotti, R. (2018). *Innovation in Global Value Chains* (UNU-MERIT Working Paper Series 2018-038).
- Lema, R., Rabellotti, R., and Sampath, P.G. (2018). Innovation trajectories in developing countries: Co-evolution of global value chains and innovation systems. *The European Journal of Development Research*, 30(3), pp. 345-363.
- Lim, M.K. (2018). *Philippine Cinema and the Cultural Economy of Distribution*. Cham, Switzerland: Springer.
- Lindberg, M., Lindgren, M., and Packendorff, J. (2014). Quadruple Helix as a Way to Bridge the Gender Gap in Entrepreneurship: The Case of an Innovation System Project in the Baltic Sea Region. *Journal of Knowledge Economy*, 5, pp. 94-113.
- Lundvall, B. (Ed.) (1992). *National Systems of Innovation: Toward a Theory of Innovation and Interactive Learning*. London, England: Pinter Publishing

- Lundvall, B., Johnson, B., Anderson, E.S., and Dalum, B. (2002). National systems of production, innovation and competence building. *Research Policy*, 32(2), pp. 213-231.
- Lynn, L.H., Reddy, N.M., and Aram, J.D. (1996). Linking technology and institutions: The innovation community framework. *Research Policy*, 25(2), pp. 91-106.
- Mairesse, J. and Monhen, P. (2010). *Using innovation surveys for econometric analysis* (NBER Working Paper No. 15857). Retrieved January 21, 2021, from [https://www.nber.org/system/files/working\\_papers/w15857/w15857.pdf](https://www.nber.org/system/files/working_papers/w15857/w15857.pdf).
- Malerba, F. (2002). Sectoral systems of innovation and production. *Research Policy*, 31(2), pp. 247-264.
- Malerba, F. and Mani, S. (2009). Sectoral systems of innovation and production in developing countries: an introduction. In Malerba, F. and Mani, S. (Eds.). *Sectoral Systems of Innovation and Production in Developing Countries: Actors, Structure and Evolution* (pp. 3-24). Cheltenham, UK: Edward Elgar Publishing Limited.
- Manalo, J. A., Balmeo, K.P., Berto, J.C., and Saludez, F.M. (2016). *Youth & Agriculture: The Infomediary Campaign in the Philippines*. Nueva Ecija, Philippines: Philippine Rice Research Institute.
- Manalo, J.A., Pasiona, S.P., Bautista, A.M.F., Villaflor, J.D., Corpuz, D.C.P., and Biag-Manalo, H.H.M. (2019). Exploring youth engagement in agricultural development: The case of farmers' children in the Philippines as rice crop manager infomediaries. *The Journal of Agricultural Education and Extension*, 25(4), pp. 361-377.
- Mano, Y., Iddrisu, A., Yoshino, Y., and Sonobe, T. (2012). How can micro and small enterprises in Sub-Saharan Africa become more productive? The impacts of experimental basic managerial training. *World Development*, 40(3), pp. 458-468.

- Manzano, G. and Prado, S.A. (2014). The Philippines: Distributional impact of the 2008 rice crisis in the Philippines. *Trade Policies, Household Welfare and Poverty Alleviation: Case Studies from the Virtual Institute Academic Network* (pp. 29-76). New York: United Nations, and Geneva, Switzerland: United Nations. Retrieved February 24, 2022, from [https://unctad.org/system/files/official-document/gds2014d3\\_en.pdf](https://unctad.org/system/files/official-document/gds2014d3_en.pdf).
- Mataia, A.B., Beltran, J.C., Manalili, R.G., Catudan, B.M., Francisco, N.M., and Flores, A.C. (2019). *Rice Value Chain Analysis in the Philippines*. Nueva Ecija, Philippines: Philippine Rice Research Institute.
- Mataia, A.B., Malasa, R.B., Beltran, J.C., Bordey, F.H., Launio, C.C., Litonjua, A.C., Manalili, R.G., and Moya, P.G. (2016). Labor and mechanization. In Bordey, F.H., Moya, P.F., Beltran, J.C., and Dawe, D.C. (Eds.). *Competitiveness of Philippine Rice in Asia* (pp. 75-86). Nueva Ecija, Philippines: Philippine Rice Research Institute, and Los Baños, Philippines: International Rice Research Institute.
- McKenzie, D. and Woodruff, C. (2014). What are we learning from business training and entrepreneurship evaluations around the developing world? *World Bank Researcher Observer*, 29(1), pp. 48-82.
- Miraflor, M.B. (2020, June 10). 'No cluster, no assistance' policy pushed. *Manila Bulletin*. Retrieved January 21, 2021 from <https://mb.com.ph/2020/06/10/no-cluster-no-assistance-policy-pushed/>.
- Morrison, A., Pietrobelli, C., and Rabellotti, R. (2008). Global Value Chains and Technological Capabilities: A Framework to Study Learning and Innovation in Developing Countries. *Oxford Development Studies*, 36(1), pp. 39-58.

- Mottaleb, K.A. and Sonobe, T. (2011). An inquiry into the rapid growth of the garment industry in Bangladesh. *Economic Development and Cultural Change*, 60(1), pp. 67-89.
- Moya, P.F., Bordey, F.H., Beltran, J.C., Manalili, R.G., Launio, C.C., Mataia, A.B., Litonjua, A.C., and Dawe, D.C. (2016). Costs of rice production. In Bordey, F.H., Moya, P.F., Beltran, J.C., and Dawe, D.C. (Eds.). *Competitiveness of Philippine Rice in Asia* (pp. 99-118). Nueva Ecija, Philippines: Philippine Rice Research Institute, and Los Baños, Philippines: International Rice Research Institute.
- Mudambi, R. (2008). Location, control and innovation in knowledge-intensive industries. *Journal of Economic Geography*, 8(5), pp. 699-725.
- Nadvi, K. and Barrientos, S. (2004). *Industrial Clusters and Poverty Reduction: Towards a methodology for poverty and social impact assessment of cluster development initiatives*. Vienna, Austria: United Nations Industrial Development Organization.
- Nakwa, K. (2013). *Innovation intermediaries and triple helix networks in developing countries with particular reference to the case of Thailand* (Unpublished doctoral dissertation). University of Strathclyde, Glasgow, Scotland.
- Narro, C., Roy, D., Okello, J., Avendaño, B., Rich, K., and Thorat, A. (2009). Public-private partnerships and collective action in high value fruit and vegetable supply chains. *Food Policy*, 34(1), pp. 8-15.
- National Economic and Development Authority, Department of Science and Technology, and Department of Trade and Industry. (2020). *Promulgating the Implementing Rules and Regulations of Republic Act No. 11293 otherwise known as the Philippine Innovation Act* (Joint NEDA-DOST-DTI Administrative Order No 01 series of 2020). Philippines.

- National Economic and Development Authority. (2017). *Philippine Development Plan 2017-2022*. Retrieved January 21, 2021, from <http://pdp.neda.gov.ph/wp-content/uploads/2017/01/PDP-2017-2022-07-20-2017.pdf>.
- National Irrigation Administration. (2017). *2017 Annual Report Ushering 2017: A New Beginning*. Retrieved February 25, 2021, from <https://www.nia.gov.ph/?q=content/2017-annual-report>.
- Ocampo, K.R. (2020a, February 14). PH still world's biggest rice importer. *Inquirer.net*. Retrieved January 7, 2021, from <https://business.inquirer.net/290438/ph-still-worlds-biggest-rice-importer>.
- Ocampo, K.R. (2020b, March 4). Rice tariff law a year later: Prices down but farmers lose. *Inquirer.net*. Retrieved January 22, 2021, from <https://newsinfo.inquirer.net/1236530/rice-tariff-law-a-year-later-prices-down-but-farmers-lose>.
- Ocampo, K.R. (2020c, June 5). DA implements 'no cluster, no assistance' policy in farm sector. *Inquirer.net*. Retrieved January 21, 2021, from <https://business.inquirer.net/299102/da-implements-no-cluster-no-assistance-policy-in-farm-sector>.
- Ocampo, K.R. (2020d, November 27). Dar: Senate-approved agri budget OK for 'Plant, Plant, Plant'. *Inquirer.net*. Retrieved January 21, 2021, from <https://newsinfo.inquirer.net/1365402/dar-senate-approved-agri-budget-ok-for-plant-plant-plant>.
- Ochave, R.M. (2020, March 9). Chen Yi Agventures says good farming practices lead to higher income, yield. *Business World*. Retrieved March 11, 2021, from

<https://www.bworldonline.com/chen-yi-agventures-says-good-farming-practices-lead-to-higher-income-yield/>.

Ochave, R.M.D. (2020, August 25). Rice farmer incomes, yields improve due to RCEF – study. *Business World*. Retrieved January 22, 2021, from <https://www.bworldonline.com/rice-farmer-incomes-yields-improve-due-to-rcef-study/>.

Ohta, S. (2014). *Overview of tropical fruit in Japan*. Retrieved December 12, 2020, from [https://www.creativehousecorp.com/wp-content/uploads/2017/10/overview\\_v2.pdf](https://www.creativehousecorp.com/wp-content/uploads/2017/10/overview_v2.pdf).

oneStore.ph. (n.d.). *oneStore.ph – Bringing quality products to your doorsteps*. Retrieved February 22, 2021, from <http://onestore.ph/>.

Organization for Economic Cooperation and Development. (2005). *Oslo Manual* (3<sup>rd</sup> ed.). Paris, France: OECD Publishing.

Pablico, S.M. (2001, December 23). Too much flower inducer spraying bad for mangoes. *Philippine Star*. Retrieved February 25, 2021, from <https://www.philstar.com/business/agriculture/2001/12/23/144612/too-much-flower-inducer-spraying-bad-mangoes#:~:text=BATAC%2C%20Ilocos%20Norte%20%E2%80%93%20Fruit%20experts,of%20the%20Philippine%20mango%20industry>.

PAKISAMA. (n.d.a.). *Partners*. Retrieved April 12, 2021, from <http://www.pakisama.com/about/partners/>.

PAKISAMA. (n.d.b.). *Our History*. Retrieved April 12, 2021, from <http://www.pakisama.com/about/our-history/>.

- PAKISAMA. (n.d.c.). *About PAKISAMA*. Retrieved April 12, 2021, from <http://www.pakisama.com/about/aboutpakisama/>.
- PAKISAMA. (n.d.d.). *Strategies, Programs, Core Values and Principles*. Retrieved April 12, 2021, from <http://www.pakisama.com/about/strategies/>.
- Pardey, P.G., Alston, J.M., and Ruttan, V.W. (2010). The economics of innovation and technical change in agriculture. In Hall, B.H. and Rosenberg, N. (Eds.). *Handbook of the Economics of Innovation, Volume 2* (pp. 939-984).
- Partners, H. (2007). *Study of the Role of Intermediaries in Support of Innovation*. Canberra, Australia: Department of Industry, Tourism, and Resources.
- Patalinghug, E. E. (2003). *The Philippine Innovation System: Structure and Characteristics* (PIDS Research Paper Series No. 2003-04). Quezon City, Philippines: Philippine Institute for Development Studies.
- Pavitt, K. (1984). Sectoral patterns of technical change: Towards a taxonomy and a theory. *Research Policy*, 13(6), pp. 343-373. Amsterdam, The Netherlands: North-Holland.
- Penunia, E.A. (2011). *The Role of Farmers' Organizations in Empowering and Promoting the Leadership of Rural Women* (EGM/RW/2011/EP.12). Retrieved April 12, 2021, from <https://www.un.org/womenwatch/daw/csw/csw56/egm/Penunia-EP-12-EGM-RW-Oct-2011.pdf>.
- Perez Perdomo, S.A., Klerkx, L., and Leeuwis, C. (2010, June). Innovation brokers and their roles in value chain-network innovation: Preliminary findings and a research agenda. Proceedings from *Innovation and Sustainable Development in Agriculture and Food 2010*. Montpellier, France.



- Perri, A. and Buchan, N. R. (2018). Trust in Global Value Chains and the role of intermediaries. In Zhang, M.W. (Ed.). *Trust Building and Boundary Spanning in Cross-border Management* (pp. 107-132). New York, NY: Routledge.
- Philippine Center for Postharvest Development and Mechanization. (n.d.a.). [Page providing an overview of PHILMECH]. Retrieved April 9, 2021, from [https://www.philmech.gov.ph/?page=about\\_us-philmech\\_](https://www.philmech.gov.ph/?page=about_us-philmech_)
- Philippine Center for Postharvest Development and Mechanization. (n.d.b.). [Page providing the history of PHILMECH]. Retrieved April 9, 2021, from [https://www.philmech.gov.ph/?page=about\\_us-history\\_](https://www.philmech.gov.ph/?page=about_us-history_)
- Philippine Center for Postharvest Development and Mechanization. (n.d.c.). [Page listing the offices and divisions of PHILMECH]. Retrieved April 9, 2021, from [https://www.philmech.gov.ph/?page=about\\_us-organization\\_](https://www.philmech.gov.ph/?page=about_us-organization_)
- Philippine Center for Postharvest Development and Mechanization. (n.d.d.). [Page describing the programs of PHILMECH]. Retrieved April 9, 2021, from [https://www.philmech.gov.ph/?page=about\\_us-program\\_](https://www.philmech.gov.ph/?page=about_us-program_)
- Philippine Center for Postharvest Development and Mechanization. (n.d.e.). [Page about PHILMECH's IMS policy]. Retrieved April 9, 2021, from [https://www.philmech.gov.ph/?page=about\\_us-ims\\_](https://www.philmech.gov.ph/?page=about_us-ims_)
- Philippine Center for Postharvest Development and Mechanization. (n.d.f.). [Page showcasing several of PHILMECH's technologies]. Retrieved April 9, 2021, from [https://www.philmech.gov.ph/?page=technology-postharvest\\_](https://www.philmech.gov.ph/?page=technology-postharvest_)
- Philippine Center for Postharvest Development and Mechanization. (n.d.g.). [Page describing the RCEF and PHILMECH's role]. Retrieved April 9, 2021, from [https://www.philmech.gov.ph/mvc/?page=rcef\\_](https://www.philmech.gov.ph/mvc/?page=rcef_)

Philippine Center for Postharvest Development and Mechanization. (2019). *Responding to Tougher Challenges Ahead: PHILMECH Annual Report 2019*. Retrieved April 9, 2021, from <https://www.philmech.gov.ph/assets/publication/Annual%20Report/PHilMech%20Annual%20Report%202019.pdf>.

Philippine Rice Research Institute. (2015). *PhilRice & Power Plants: From Research to Industries* [Video file]. Retrieved April 27, 2021, from <https://www.philrice.gov.ph/philrice-power-plants-research-industries/>.

Philippine Rice Research Institute. (2018). *Milestones 2018*. Retrieved April 1, 2021, from <https://www.philrice.gov.ph/databases/milestones/>.

Philippine Rice Research Institute. (n.d.a.). *History*. Retrieved April 1, 2021, from <https://www.philrice.gov.ph/about-us/history/>.

Philippine Rice Research Institute. (n.d.b.). *National*. Retrieved April 1, 2021, from <https://www.philrice.gov.ph/about-us/partners/national/>.

Philippine Rice Research Institute. (n.d.c.). *International*. Retrieved April 1, 2021, from <https://www.philrice.gov.ph/about-us/partners/international/>.

Philippine Rice Research Institute. (n.d.d.). *Divisions*. Retrieved April 1, 2021, from <https://www.philrice.gov.ph/about-us/organization/divisions/>.

Philippine Rice Research Institute. (n.d.e.). *Locations*. Retrieved April 1, 2021, from <https://www.philrice.gov.ph/about-us/organization/locations/>. 197.

Philippine Statistics Authority. (2020). Farmers, Fisherfolks, Individuals Residing in Rural Areas and Children Posted the Highest Poverty Incidences Among the Basic Sectors in 2018. Retrieved November 25, 2021, from <https://psa.gov.ph/poverty-press-releases/nid/162541>.

- Philippine Statistics Authority. (2021). *Employment by branch of economic activity and sex, % distribution* [Data file]. Retrieved November 25, 2021, from <https://openstat.psa.gov.ph/database>, updated October 25, 2019.
- Philippine Statistics Authority. (2021). *Exports of goods of the Philippines* [Data file]. Retrieved November 24, 2021, from <https://openstat.psa.gov.ph/database>, updated April 8, 2021.
- Philippine Statistics Authority. (2021). *Fruits: supply utilization accounts by commodity, year and item* [Data file]. Retrieved November 24, 2021, from <https://openstat.psa.gov.ph/database>, updated November 13, 2020.
- Philippine Statistics Authority. (2021). *Gross national income and gross domestic product, by industry, at current prices* [Data file]. Retrieved November 24, 2021, from <https://openstat.psa.gov.ph/database>, updated April 8, 2021.
- Philippine Statistics Authority. (2021). *Gross value added in agriculture, forestry and fishing, at current prices* [Data file]. Retrieved November 24, 2021, from <https://openstat.psa.gov.ph/database>, updated April 8, 2021.
- Philippine Statistics Authority. (2021). *Gross value added in agriculture, forestry and fishing, percent share* [Data file]. Retrieved November 24, 2021, from <https://openstat.psa.gov.ph/database>, updated April 30, 2020.
- Philippine Statistics Authority. (2021). *Gross value added in manufacturing, by industry, at current prices* [Data file]. Retrieved November 24, 2021, from <https://openstat.psa.gov.ph/database>, updated April 8, 2021.
- Philippine Statistics Authority. (2021). *Other crops: Area planted/harvested, by region and by province, by semester, 1990-2021* [Data file]. Retrieved November 24, 2021, from <https://openstat.psa.gov.ph/database>, updated December 30, 2020.

Philippine Statistics Authority. (2021). *Other crops: Number of bearing trees/hills/vines, by region and by province, by semester, 1990-2021* [Data file]. Retrieved November 24, 2021, from <https://openstat.psa.gov.ph/database>, updated December 30, 2020.

Philippine Statistics Authority. (2021). *Other crops: Volume of production, by region and by province, by quarter and semester, 1990-2021* [Data file]. Retrieved November 24, 2021, from <https://openstat.psa.gov.ph/database>, updated December 30, 2020.

Philippine Statistics Authority. (2021). *Palay and corn: Area harvested by ecosystem/croptype, by quarter, by semester, by region and by province, 1987-2021 by ecosystem/croptype, geolocation, year and period* [Data file]. Retrieved November 24, 2021, from <https://openstat.psa.gov.ph/database>, updated November 12, 2021.

Philippine Statistics Authority. (2021). *Palay and corn: Volume of production by ecosystem/croptype, by quarter, by semester, by region and by province, 1987-2021 by ecosystem/croptype, geolocation, year and period* [Data file]. Retrieved November 24, 2021, from <https://openstat.psa.gov.ph/database>, updated November 12, 2021.

Philippine Statistics Authority. (2021). *Research and development expenditure as a proportion of GDP* [Data file]. Retrieved November 25, 2021, from <https://openstat.psa.gov.ph/database>, updated March 26, 2021.

Philippine Statistics Authority. (2021). *Rice and corn: supply utilization accounts by commodity, year and item* [Data file]. Retrieved November 24, 2021, from <https://openstat.psa.gov.ph/database>, updated November 15, 2021.

- Philippine Statistics Authority. (2021). *Value of Production (VaPI), year-on-year growth rates for manufacturing sector (2000=100)*. Retrieved November 24, 2021, from <https://openstat.psa.gov.ph/database>, updated June 11, 2020.
- Philippine Statistics Authority. (2021). *Value of Production in Philippine Agriculture and Fisheries, in current prices* [Data file]. Retrieved November 24, 2021, from <https://openstat.psa.gov.ph/database>, updated November 11, 2021.
- Philippine Statistics Authority. (2021). *Volume of Production (VoPI), year-on-year growth rates for manufacturing sector (2000=100)*. Retrieved November 24, 2021, from <https://openstat.psa.gov.ph/database>, updated June 11, 2020.
- Philippine Statistics Authority. (2021a). *Agricultural Systems Indicators: Agricultural Exports and Imports*. Retrieved November 25, 2021, from [https://psa.gov.ph/sites/default/files/3-%5Bons-cleared%5D\\_FO5\\_AIS%20Agri%20Exports%20and%20Imports%202016-2020%20ao%2029092021\\_ONS-signed.pdf](https://psa.gov.ph/sites/default/files/3-%5Bons-cleared%5D_FO5_AIS%20Agri%20Exports%20and%20Imports%202016-2020%20ao%2029092021_ONS-signed.pdf).
- Philippine Statistics Authority. (2021b). *Employment Situation in October 2020*. Retrieved November 25, 2021, from <https://psa.gov.ph/content/employment-situation-october-2020-0>.
- Pietrobelli, C. and Rabellotti, R. (2011). Global Value Chains Meet Innovation Systems: Are There Learning Opportunities for Developing Countries?. *World Development*, 39(7), pp. 1261-1269.
- Pietrobelli, C. and Staritz, C. (2018). Upgrading, interactive learning, and innovation systems in value chain interventions. *The European Journal of Development Research*, 30(3), pp. 557-574.

- Ponce, E.R. and Inocencio, A.B. (2017). *Towards a More Resilient and Competitive Philippine Rice Industry: Lessons from the Past Three Decades*. Los Baños, Laguna, Philippines: International Rice Research Institute, and Quezon City, Philippines: Department of Agriculture. Retrieved March 9, 2021, from <http://books.irri.org/2017-March-Rice-Report-Lessons-from-the-past-3-decades.pdf>.
- Ponte, S. and Ewert, J. (2009). Which way is “up” in upgrading? Trajectories of change in the value chain for South African wine. *World Development*, 37(10), pp. 1637-1650.
- Ponte, S., Kelling, I., Jespersen, K.S., and Kruijssen, F. (2014). The blue revolution in Asia: upgrading and governance in aquaculture value chains. *World Development*, 64(December 2014), pp. 52-64.
- Porter, M.E. (1998). Clusters and the new economics of competition. *Harvard Business Review*, (November-December 1998). Retrieved from <https://hbr.org/1998/11/clusters-and-the-new-economics-of-competition>.
- Porter, M.E. (2000). Location, competition, and economic development: local clusters in a global economy. *Economic Development Quarterly*, 14(1), pp. 15-34.
- Preda Fair Trade. (2021). *Profairtrade, a Fair Trade Organization*. Retrieved April 12, 2021, from <https://www.predafairtrade.net/profairtrade-a-fair-trade-organization/>.
- Preda Fair Trade. (2021). *The Story of PREDA Fair Trade*. Retrieved April 12, 2021 from <https://www.predafairtrade.net/the-story-of-preda-fair-trade/>.
- Preda Foundation, Inc. (2021). *About Preda*. Retrieved April 12, 2021, from <https://www.preda.org/about-preda-fairtrade/preda-foundation-1974/>.

- Preda Foundation, Inc. (2021). *The History of the Work of Preda*. Retrieved April 12, 2021, from <https://www.preda.org/about-preda-foundation/preda-history/>.
- Preda Foundation, Inc. (2021). *The Preda Fair Trade Project*. Retrieved April 12, 2021, from <https://www.preda.org/projects-2/profairtrade/>.
- Quimba, F. M. A., Albert, J. R. G. and Llanto, G. M. (2017), Innovation activities of firms in the Philippines (PIDS Discussion Paper No. 2017-44). Philippines: Philippine Institute for Development Studies.
- Ramirez, M., Clarke, I., and Klerkx, L. (2018). Analysing intermediary organisations and their influence on upgrading in emerging agricultural chains. *Environment and Planning A: Economy and Space*, 50(6), pp. 1314-1335.
- Ranada, P. (2019, February 15). Duterte signs rice tariffication law. *Rappler*. Retrieved February 25, 2021, from <https://www.rappler.com/nation/duterte-signs-rice-tariffication-law-february-2019>.
- Republic Act No. 11203. (2018). *An act liberalizing the importation, exportation and trading of rice, lifting for the purpose the quantitative import restriction on rice, and for other purposes*. Retrieved February 25, 2021, from <https://www.officialgazette.gov.ph/downloads/2019/02feb/20190214-RA-11203-RRD.pdf>.
- Republic Act No. 11293. (2019). *An act adopting innovation as vital component of the country's development policies to drive inclusive development, promote the growth and national competitiveness of micro, small and medium enterprises, appropriating funds therefor, and for other purposes*. Retrieved November 23, 2021, from <https://www.officialgazette.gov.ph/downloads/2019/04apr/20190417-RA-11293-RRD.pdf>.

Republic Act No. 7900. (1995). *An act to promote the production, processing, marketing and distribution of high-valued crops, providing funds therefor, and for other purposes.* Retrieved March 9, 2021, from <https://www.chanrobles.com/republicactno7900.htm>.

Republic Act No. 8178. (1996). *An act replacing quantitative import restrictions on agricultural products, except rice, with tariffs, creating the agricultural competitiveness enhancement fund, and for other purposes.* Retrieved January 22, 2021, from <https://www.officialgazette.gov.ph/1996/03/28/republic-act-no-8178-s-1996/>.

Republic Act No. 9501. (2008). *An act to promote entrepreneurship by strengthening development and assistance programs to micro, small and medium scale enterprises, amending for the purpose Republic Act No. 6977, as amended, otherwise known as the “Magna Carta for Small Enterprises” and for other purposes.* Retrieved November 23, 2021, from <https://mirror.officialgazette.gov.ph/2008/05/23/republic-act-no-9501/>.

Ricepedia.org. (n.d.a.). *Other rice products.* Retrieved January 22, 2021, from <http://ricepedia.org/rice-as-food/other-rice-products>.

Ricepedia.org. (n.d.b.). *Non-edible rice products.* Retrieved January 22, 2021, from <http://ricepedia.org/rice-as-commodity/non-edible-rice-products>.

Sarmiento, J.M.P., Aguinaldo, R.T., Digal, L.N., Castillo, A.K.B., Balgos, C.Q. (2012, July). Mango production in major areas in Davao Region: Value chain and net margin analysis. Proceedings from *End-of-Program Conference and Dinner for the ACIAR-PCAARRD Southern Philippine Fruits and Vegetables Program*. Cebu, Philippines.



- Senanyake, S.M.P. and Premaratne, S.P. (2016). An analysis of the paddy/rice value chains in Sri Lanka. *Asia-Pacific Journal of Rural Development*, 26(1), pp. 105-126.
- Shih, S. (n.d.). *Millennium Transformation: Change Management for New Acer*. Retrieved from [http://www.stanshares.com.tw/Stanshares/upload/tbBook/1\\_20100817144639.pdf](http://www.stanshares.com.tw/Stanshares/upload/tbBook/1_20100817144639.pdf).
- Sieg, J.H., Wallin, M.W. and von Krogh, G. (2010). Managerial capabilities in open innovation: A study of innovation intermediation in the chemical industry. *R&D Management* 40(3), 281-291.
- Sonobe, T. and Otsuka, K. (2006). *Cluster-Based Industrial Development: An East Asian Model*. New York: Palgrave Macmillan.
- Sonobe, T. and Otsuka, K. (2011). *Cluster-Based Industrial Development: A Comparative Study of Asia and Africa*. New York: Palgrave Macmillan.
- Sonobe, T., Hu, D., and Otsuka, K. (2004). From inferior to superior products: an inquiry into the Wenzhou model of industrial development in China. *Journal of Comparative Economics*, 32(3), pp. 542-563.
- Southeast Asian Regional Center for Graduate Study and Research in Agriculture. (2014). *Revolutionizing agricultural science and farming technology: Chemical flower induction of mango*. Laguna, Philippines: SEARCA.
- Stake, R.E. (2003). Case Studies. In Denzin, N. K. and Lincoln, Y. S. (Eds.), *Strategies of Qualitative Inquiry* (2nd ed., pp. 134-164). Thousand Oaks, CA: Sage.
- Sturgeon, T. (2001). How do we define value chains and production networks?. *IDS Bulletin*, 32(3), pp. 9-18.

- Sutthijakra, S. and Intarakumnerd, P. (2015). Role and capabilities of intermediaries in university-industry linkages: A case of Hard Disk Drive Industry in Thailand. *Science, Technology and Society*, 20(2), pp. 182–203.
- Teece, D. J. (2019). A capability theory of the firm: an economics and (Strategic) management perspective. *New Zealand Economic Papers*, 53(1), 1–43. <https://doi.org/10.1080/00779954.2017.1371208>
- United Nations Educational, Scientific and Cultural Organization Institute for Statistics. (2021). *Gross domestic expenditure on R&D (GERD), GERD as a percentage of GDP, GERD per capita and GERD per researcher* [Data file]. Retrieved from <http://data.uis.unesco.org>, updated March 2021.
- United Nations Educational, Scientific and Cultural Organization. (2015). *UNESCO Science Report: Towards 2030* (2nd Ed.). Paris, France: UNESCO Publishing.
- United Nations Industrial Development Organization. (2011). *Pro-Poor Value Chain Development: 25 guiding questions for designing and implementing agroindustry projects*. Vienna, Austria: United Nations Industrial Development Organization.
- Van Lente, H., Hekkert, M.P., Smits, R., and van Waveren, B. (2003). Roles of systemic intermediaries in transition processes. *International Journal of Innovation Management*, 7(3), pp. 1-33.
- Vik, J. and Kvam, G. (2018, February 5-9). Global Value Chains and Middlemen. A Comparative Case-Study of Norwegian Agricultural Export. Proceedings from *System Dynamics and Innovation in Food Networks 2018*. Igls, Austria.
- Wang, Q., Woo, H.L., Quek, C.L., Yang, Y., and Liu, M. (2012). Using the Facebook group as a learning management system: An exploratory study. *British Journal of Educational Technology*, 43(3), pp. 428-438.

- Winch, G. and Courtney, R.C. (2007). The organization of innovation brokers: An international review. *Technology Analysis and Strategic Management* 19(6), pp. 747-763.
- Woolthuis, R.K., Lankhuizen, M., and Gilsing, V. (2005). A system failure framework for innovation policy design. *Technovation* 25(6), pp. 609-619.
- Yin, R.K. (2003a). *Case Study Research: Design and Methods* (3rd ed.). Thousand Oaks, California: Sage.
- Yin, R.K. (2003b). *Applications of Case Study Research* (2nd Ed.). USA: Sage Publications, Inc.
- Yin, R.K. (2018). *Case Study Research and Applications: Designs and Methods* (6<sup>th</sup> ed.). Thousand Oaks, California: Sage.
- Zimmermann, R. and Qaim, M. (2004). Potential health benefits of Golden Rice: a Philippine case study. *Food Policy*, 29(2), pp. 147-168.

## **Appendix 1: Interview Guide for Industry Experts Template**

1. Does the map provided cover all the necessary parts of the rice/mango GVC? Please refer to the map in the succeeding page.
  - a. Are any parts missing? If so, what are these parts?
  - b. What other processing activities are necessary for the rice/mango industry?
  - c. Would you like to add or remove anything from the map?
2. Does the map show the important intermediaries for the rice/mango industry of the Philippines?
  - a. To qualify as an intermediary, the organization may provide access to any or all of the following to producers or MSMEs:
    - i. Market
    - ii. Finance
    - iii. Training
    - iv. Knowledge
    - v. Networks (Partnerships)
  - b. Are there any important organizations that may be missing? Who are these?
  - c. Are the organizations placed in the correct parts of the GVC?
  - d. Among the possible intermediaries, which organizations do you believe are the most important to conduct case studies on?
    - i. Do these organizations serve on a more national level or a more sector/cluster level?
    - ii. Do the national level organizations have local/regional counterparts?
  - e. If possible, may I request their contact information and/or an endorsement to interview them from you?
  - f. Are there common intermediaries that you think are important and perform similar roles or functions for both the rice and mango chains?
3. What are the most important events or turning points (e.g., technology, policy, others) in the rice/mango industry?
  - a. Who were the important actors during those events or turning points?
  - b. How did those events or turning points add or remove value from the industry?
4. For the intermediaries you identified, what are your general comments on the roles and capabilities of the intermediaries that you have identified?
  - a. What significant roles do you think they perform? What do you think of their performance?
  - b. How do you think these organizations build their capabilities to enhance their service provision?
  - c. What aid do you think these intermediaries require to perform better and build their capabilities more?
5. How does the industry adapt to dynamic changes?
  - a. Which organizations do you think can foresee these changes? How do you think they are able to foresee these changes?
  - b. Do they help others in the industry adapt to these changes? If yes, how?
  - c. Is this a role intermediaries should perform? Why or why not?

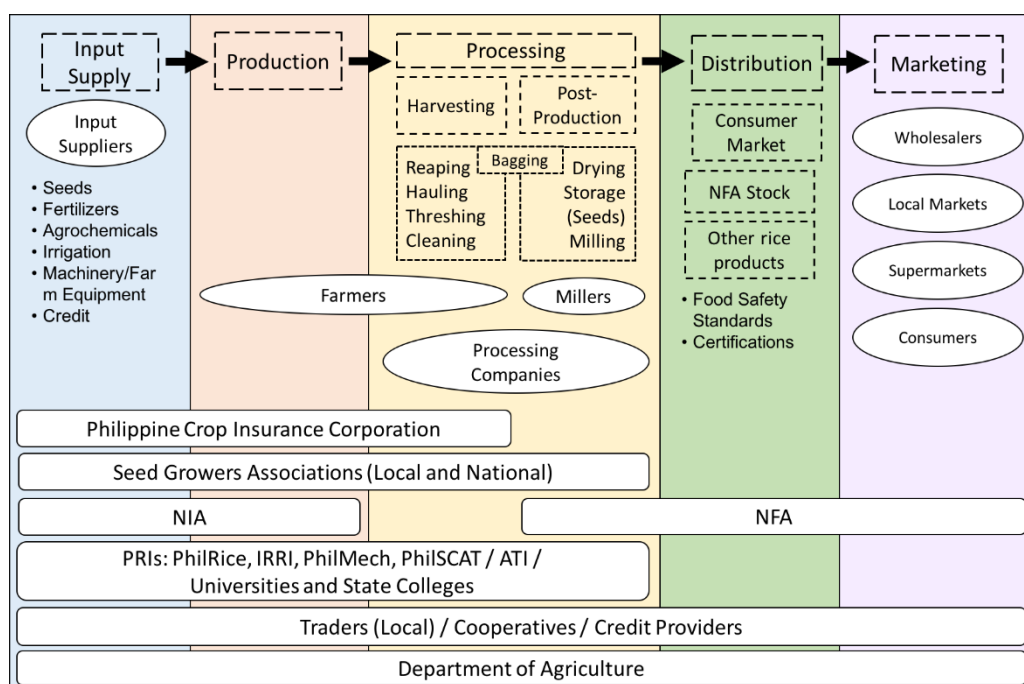


Figure A1.1. Draft rice value chain processes and actors

Note. This figure was created by the author during the beginning of the study.

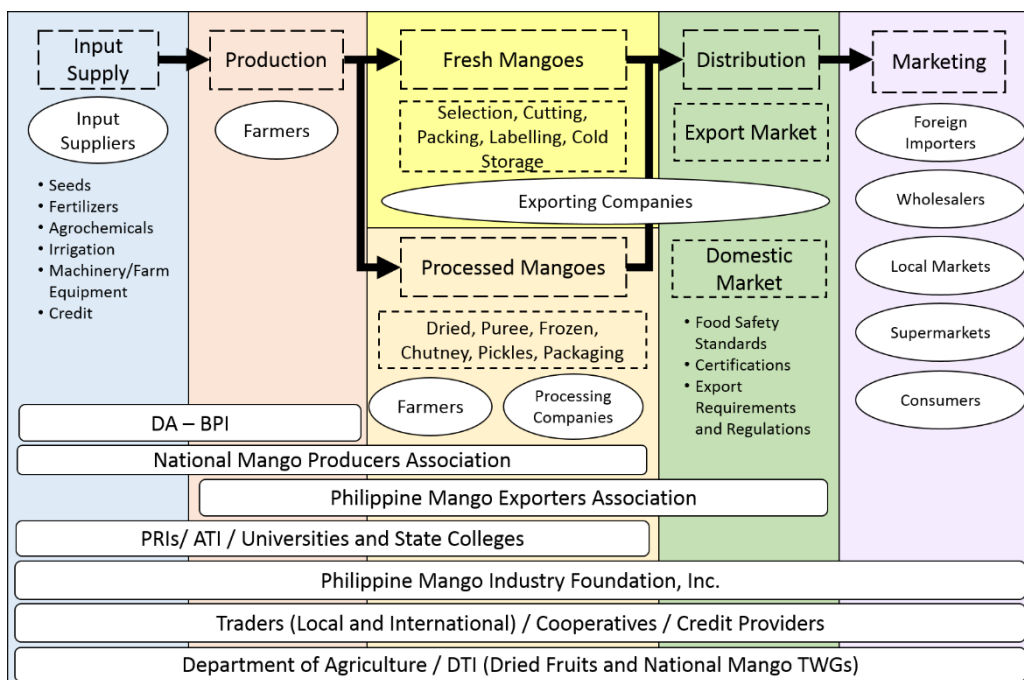


Figure A1.2. Draft mango value chain processes and actors

Note. This figure was created by the author during the beginning of the study.

## **Appendix 2: Letter of Request for Participation for Innovation Intermediaries**

Dear (*representative*),

Greetings!

I am Kevin Go, a Filipino researcher based in Tokyo, Japan. I am conducting a study on innovation intermediary organizations in agri-food business industries in the Philippines. Specifically, I am studying innovations in our rice and mango industries.

My study aims to look into how innovation intermediary organizations promote and diffuse technologies and industry standards to help growers, processors, and other firms innovate. Innovation intermediaries are organizations that help broker or promote technologies and help in mediating partnerships and industry networking. Examples of these organizations are research institutes, cooperatives, and industry associations.

With your organization as one of the leaders in rice/mango industrial, I wish to include your organization as an innovation intermediary for my study. I want to learn how your organization conducts its work in promoting innovation in our rice/mango industry. Also, I hope to understand how your organization has and is continuing to build itself to perform its role in developing our rice/mango industry more successfully.

By accepting to participate in the study, the following are what I wish to request from your organization:

1. Interviews with organization representatives that are involved in the conduct of your intermediary work in the rice/mango industry;
2. Interviews with organization representatives engaged in the development of the organization's capabilities;
3. Aid in contacting and scheduling meetings with several of your intermediation partners; and,
4. Access to available organization reports related to rice/mangoes.

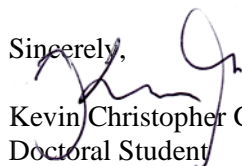
If I may have your organization take part in the study, may it be possible to schedule the interviews or visit your office between (*date*)?

If you have any questions, concerns, or comments regarding my research, please do not hesitate to let me know. You may reach me through this email address (doc18153@grips.ac.jp) or my mobile number: (*mobile number*).

I hope for your consideration regarding my request.

Thank you very much, and I hope to hear from you soon!

Sincerely,



Kevin Christopher Go  
Doctoral Student  
Science, Technology and Innovation Policy Program  
National Graduate Institute for Policy Studies  
Tokyo, Japan

### **Appendix 3: Interview Guide for Innovation Intermediaries Template**

#### **General questions:**

1. Year of establishment
2. Years in the industry (for interviewee; for organization if working in multiple sectors)
3. Number of employees
  - a. Work experience
  - b. PhD or MA in specific fields
  - c. Turnover rate
  - d. Composition of employees
4. Sources of income or budget
  - a. Government support
  - b. Self-financed
  - c. Breakdown
  - d. Change over time (5 years ago; 10 years ago)
  - e. Budget and possible financial constraints
5. Affiliated groups or membership in umbrella organizations
6. Members or affiliated groups under your organization:
  - a. How many are SME or large
  - b. Rates for membership
7. GVC segments involved in
8. Organizational capacity building programs and outcomes:
  - a. Trainings – what kind? Who provides?
  - b. Employee rotation
  - c. Recruitment – who do you usually recruit?
  - d. Collaboration with new or resigned partners; enhancing organization
9. Innovations provided
  - a. New products developed
  - b. New or enhanced processes introduced
  - c. New markets established
  - d. New organizational methods formed

#### **Intermediary roles and capability questions:**

1. How does your organization help your partners broker innovations?
  - a. Who are your partners and are they oriented towards the domestic or export market?
  - b. Who initiates the brokering process?
  - c. What innovations or upgrading paths were you able to broker for them?
  - d. What are the obstacles you faced in brokering? How did you overcome these?
  - e. How did your partners benefit from your organization's brokerage aid? Were there other outcomes?
  - f. How has your organization's brokerage experience or ability changed over time?
  - g. What capabilities were necessary to provide successful brokerage?
    - i. How did you get the necessary capabilities?
    - ii. How do you develop these capabilities?

2. How does your organization provide expert advice to your partners?
  - a. Do you have an internal consultant/external consultant? Full-time or part-time? Do you provide training for hired consultants?
  - b. What kind of expert advice do you provide? How do you keep up to date?
  - c. Who initiates the advice-giving process?
  - d. What are the obstacles faced in being a consultant? How did you overcome these?
  - e. How did your partners benefit from your expert advice? Were there other outcomes?
  - f. How has your organization's consulting experience or ability changed over time?
  - g. What capabilities were necessary in providing expert advice?
    - i. How did you get the necessary capabilities?
    - ii. How do you develop these capabilities?
3. How does your organization mediate or manage partnerships?
  - a. How does your organization create partnerships? Who initiates the mediation process?
  - b. How does your organization balance or mediate different needs and wants of partners? How does your organization mediate conflict between partners?
  - c. How does your organization help in managing the partnership once formed?
  - d. What are the obstacles faced in mediation? How did you overcome these?
  - e. How did your partners benefit from the mediation process or collaborations formed? Were there other outcomes?
  - f. How has your organization's mediation experience or ability change over time?
  - g. What capabilities are necessary in mediating partnerships or collaborations?
    - i. How did you get the necessary capabilities?
    - ii. How do you develop these capabilities?
4. How does your organization provide resources to your partners?
  - a. What kind of resources do you provide? Financial, training, technological, market access, informational, human, physical resources? How did your organization come to provide these kinds of resources?
  - b. How do you know what resources are necessary?
  - c. How do your partners respond or repay the provision of these resources?
  - d. What are the obstacles faced in resource provision? How did you overcome these?
  - e. How did your partners benefit from the resources provided? Were there other outcomes?
  - f. How has your organization's resource provision experience or ability change over time?
  - g. What capabilities are necessary in resource provision?
    - i. How did you get the necessary capabilities?
    - ii. How do you develop these capabilities?
5. Over the course of your organization's work, which roles have been most or have grown in importance?
6. For roles that the innovation intermediaries do not perform, why do they not perform these?



7. Does your organization have any experience where it wasn't successful in performing a role?
  - a. What happened?
  - b. What did the organization learn from this experience?
  - c. How did organization ensure that it does not happen again?
8. Compared to organizations similar to yours, what are comparative advantages?
9. Compared to other types of organizations that enable innovation, what are the comparative advantages of your organization type?

#### Appendix 4: Interview and FGD Schedule

	Interview/FGD Participant:	Position	Date/s Conducted:
1	NRP	Representative	March 21, 2020
2	PMRH	Administrator	May 19, 2020 June 1, 2020
3	Fruit trader-exporter	Owners	May 20, 2020
4	Mango grower	Grower	May 22, 2020
5	Mango grower and rice farmer	Grower and Farmer	May 23, 2020
6	Chen Yi Agventures, Inc.	Owner	May 25, 2020
7	Rice farmer	Farm Owner	May 26, 2020
8	GRECON	President	May 28, 2020
9	PMIFI	President	May 29, 2020
10	MFA	Treasurer	May 31, 2020
11	MFP	Administrator	June 1, 2020
12	Mango grower and rice farmer	Grower and Farmer	June 4, 2020
13	LMFRC	Administrator	June 11, 2020
14	ATI	Representative	June 17, 2020
15	GRECON	PRO	June 20, 2020
16	PHILMECH	Representative	July 4, 2020
17	PDE	Representatives	July 20, 2020 July 21, 2020
18	DOST-ITDI	Representative	July 28, 2020
19	PAKISAMA	Director	August 17, 2020
20	GNCRDPS	Representative	September 10, 2020 December 17, 2020
21	PHILRICE	Representative	October 22, 2020
22	Diamond Star – Japan	Representative	November 18, 2020
23	DA-HVCDP	Representative	February 16, 2021
24	Diamond Star – Philippines	Manager and Staff	March 2, 2021
25	AgriCOOPh	Representative	March 12, 2021
26	AgriCOOPh (FGD)	Director and Staff	May 7, 2021
27	Mango processor	Owner	May 20, 2021
28	Rice retailer	Owner	October 22, 2021
29	University researcher	Researcher	October 29, 2021
30	Rice multi-segment actor	Owner	November 1, 2021
31	Rice cooperative	Representative	November 2, 2021
32	Rice miller	Representative	November 4, 2021
33	Mango growers (FGD)	Growing Partners	November 9, 2021
34	Mango grower	Grower	November 9, 2021
35	Mango sprayer	Sprayer	November 10, 2021
36	Rice cooperative	Representative	November 11, 2021
37	Mango processor	President	November 11, 2021
38	Nursery operator	Owner	November 11, 2021
39	Farm input supplier	Owner	November 12, 2021
40	Rice multi-segment actor	Owner	November 12, 2021
41	Mango grower and rice farmer	Farmer	November 12, 2021
42	Rice retailer	Owners	November 25, 2021

## **Appendix 5: Participating Intermediary Organization Write-ups**

### **Appendix 5.1 Department of Agriculture – National Rice Program (NRP)**

#### *History and Purpose*

The Department of Agriculture's (DA) National Rice Program (NRP) has existed for several decades. By being a program, the NRP does not exactly have a set office. With the government's rationalization plan in 2015, the NRP now finds itself under the DA – Field Programs Operational Planning Division (FPOPD). Under the FPOPD are the operation planning sections of the DA that may change depending on the policies and priorities of the current administration or department secretary. Some of the other programs that share their space with the NRP is the corn program of the DA.

The program is headed by an appointed program coordinator. In terms of its staff, the NRP has approximately 20 employees dedicated to the program. However, a majority of them are contractual employees or are on a job-order scheme. The staff is given opportunities to learn other rice-related skills or knowledge depending on the needs required of the program. They are also given project management training opportunities when needed.

As a government program, the NRP also has local counterparts in the regional DA Offices with rice as a commodity in their respective regions. The head office in Quezon City, headed by the program coordinator, oversees and monitors the rice industry's development. In contrast, the regional offices are its implementing arms. The staff of the regional offices dedicated to the rice program varies between provinces.

The NRP's primary purpose is to orchestrate the industry's development and coordinate with its regional counterparts and other implementing agencies. Budgets and policy directives for the rice industry originate from the NRP and are relayed in its network. Several of implementing agencies that the NRP coordinates with are the Bureau of Agricultural Research, Agricultural Training Institute, Bureau of Plant Industry (BPI), National Irrigation Administration, National Food Authority, Philippine Rice Research Institute (PhilRice), Philippine Center for Post-Harvest Development and Mechanization, Bureau of Soils and Water Management, Agricultural Credit Policy Council, and the Philippine Crop Insurance Corporation.

Apart from managing and monitoring the network, the NRP also supports rice industry stakeholders by providing necessary farm inputs, equipment, credit access, or processing facilities through its regional implementing counterparts. According to the NRP representative interviewed, before 2013, the NRP focused on providing seeds, fertilizer, credit access, irrigation access, on-farm, and harvesting machinery but afterward shifted towards establishing rice processing centers that allowed farmers to dry, mill, and sell their rice. Although the NRP acts as the rice industry's conductor, its actions primarily find the program in the upstream portions of the rice value chain. The value chain segments it supports are input supply, production, and, more recently, milling. The NRP participates less in the downstream portions of the value chain as the private sector is very much present in these segments.

#### *Intermediary Roles*

Given its purpose, the NRP performs several innovation intermediary roles. Table A5.1.1 provides a summary of the NRP's role performance.

Table A5.1.1

*The Intermediary Organization Roles Performed by the Department of Agriculture – National Rice Program*

Broker	Consultant	Mediator	Resource Provider
<ul style="list-style-type: none"> <li>Establishment of rice processing centers in various regions of the country</li> <li>Links to credit-granting agencies</li> <li>Introduction of community mushroom farming using rice by-products</li> <li>Creation of related farm services</li> </ul>	<ul style="list-style-type: none"> <li>Consultation with the private sector to learn what their needs are</li> <li>Sets and heads the promotion of standards and certifications in the rice industry</li> </ul>	<ul style="list-style-type: none"> <li>Orchestrates the entire rice network, coordinating with regional counterparts and implementing agencies on rice industry development activities and provisions</li> <li>Monitors progress of programs and projects to ensure that they reach targets and to avoid duplication of work</li> <li>It gives opportunities for private organizations to demonstrate their technologies to farmers</li> </ul>	<ul style="list-style-type: none"> <li>Provision of farm inputs, machinery, and other rice production materials necessary</li> <li>Provide support to regions outside the initial scope of the RCEF and the RCEF secretariat</li> </ul>

*Note.* The data in this table was compiled based on an interview with an NRP representative, feedback from other interviews, and secondary desk research done by the researcher.

Based on the interviews and desk research, the NRP works primarily as a network orchestrator. As mentioned, the NRP takes the lead in implementing the current policy priorities on rice and relays this information to the other relevant offices. The NRP's head office monitors the progress of the entire DA's rice programs and projects to ensure that targets are met and prevent duplication of work. Regarding its role in executing the Rice Competitiveness Enhancement Fund (RCEF) projects, the NRP provides support to the RCEF secretariat and does not say how the budget for it is used.

As a consultant, the NRP performs a similar leading role as the office that spearheads the promotion and setting of the standards and certifications necessary in the rice industry. The NRP also conducts discussions with the private sector to learn their needs and issues. Projects and programs drawn from these consultations are then planned to fit in the succeeding budgets they receive. However, not all issues or needs may necessarily be addressed. As per the interview, the NRP adheres to the prevailing policy and ensures that its actions align still with the policy set by the country's leaders.

For brokerage and resource provision, the NRP supports the industry by providing a mix of farm inputs, seeds, equipment, and machinery for rice farmers. The NRP has also managed to set up roughly 200 rice processing centers nationally for farmers to use. However, not all these facilities are efficiently used or maximized (Manalili, Yaptengco, and Manilay, 2015). Nevertheless, the NRP's services show that it enables innovation for farmers through product and process innovation and functional upgrading. The NRP has also been able to broker inter-sectoral upgrading through its community mushroom projects that use paddy rice by-products as a critical input<sup>20</sup>.

Although indirectly created, another instance of its brokerage role was when the NRP provided combined harvester-thresher machines to rice farmers or organizations. According to the NRP representative, as farmers saw the savings in cost and time the machine provided, demand for these grew. Although quite expensive, affluent individuals or farmers started purchasing these and began leasing services or harvesting-threshing services for farmers with their machines. The introduction and promotion of this technology generated a new related service in the value chain.

The NRP also does not limit its menu of provisions to ones that originate only from public resources. Private-sector organizations that develop new high-yielding seed varieties or farm equipment are also allowed to demonstrate these to the NRP's beneficiaries. Still, as the NRP representative says, choosing what to adopt rests solely with the farmer. Suppose the farmer decides to adopt technologies that the NRP cannot provide. In that case, the office will instead link the farmer to credit agencies that may provide the capital needed for these endeavors.

For the implementation of the RCEF, the NRP provides support to regions not covered by the fund. For example, provinces that are not targets of the RCEF seed distribution of PhilRice will be catered to by the NRP.

#### *Intermediary Key-Capabilities*

To successfully orchestrate the government's efforts in developing the Philippine rice industry, the NRP requires certain key-capabilities. Table A5.1.2 summarizes instances that show these capabilities in action, opportunities for development, and obstacles that may hinder the NRP from being more successful in its work.

---

<sup>20</sup> As per the interview with a NRP representative, the management and implementation of the community mushroom project has been moved to the purview of the DA-BPI.

Table A5.1.2

*The Intermediary Organization Key-Capabilities Built by the Department of Agriculture – National Rice Program*

External Networking	Internal Communication	Knowledge-Building	Management
<ul style="list-style-type: none"> <li>• Consultations with the private sector and other rice stakeholders, learning of needs through PCAF</li> <li>• Field officers need to be sociable towards beneficiaries</li> </ul>	<ul style="list-style-type: none"> <li>• Monitoring and communication with implementing agencies</li> <li>• Provides the information necessary and directives to regional counterparts</li> <li>• Field officers need to be sociable and learn how to acquire the data they need from LGUs</li> <li>• Provides support to the RCEF secretariat</li> </ul>	<ul style="list-style-type: none"> <li>• Information sharing within the DA</li> <li>• Improves programs through evaluations and monitoring of data</li> <li>• Provision of technical training (e.g., proposal writing, program evaluation) to staff</li> <li>• Technology specific training or seminars provided to staff</li> </ul>	<ul style="list-style-type: none"> <li>• Most staff are under a job-order system, contractual basis</li> <li>• Currently under the DA – Field Programs Operational Planning Division</li> <li>• An appointed program coordinator heads the team in implementing their projects and programs</li> <li>• As a banner program, the NRP does not have a set office may be transferred to another division in DA</li> <li>• Management training is made available for staff that need it for their work</li> </ul>

*Note.* The data in this table was compiled based on an interview with an NRP representative, feedback from other interviews, and secondary desk research done by the researcher.

For its external networking, the NRP expands its network by conducting consultation discussions with the private sector and industry stakeholders to learn about their needs and issues. Furthermore, the program also supports these activities with similar discussions organized by the DA's Provincial Council for Agriculture and Fisheries. The representative interviewed reports that the NRP is always open to suggestions of its stakeholders.

On the local implementation side of the NRP's work, the representative mentioned that a vital networking capability is for its staff to be sociable. Being sociable allows their staff to approach their beneficiaries more efficiently, build the trust required to avail of their programs, and acquire data that the NRP needs.

Similarly, for internal communication, being sociable is also a sought-after characteristic. With the LGUs having their development priorities, having the capabilities necessary to persuade local officials to include their beneficiaries in projects and acquire the information the national office needs from local units is necessary.

In its entirety, the NRP develops and uses its internal communication capabilities in relaying information and directives to its partner implementing agencies and regional counterparts. Some of the staff in the head office may also be assigned or hired in regional offices. Experiences like these build relationships between the national and regional offices. These experiences also provide the staff members an understanding of the ground situation in the regions they work. Moreover, the NRP maintains and builds its relationship with other government organizations by providing various forms of support to the RCEF secretariat. The secretariat is composed primarily of DA-affiliated organizations but also involves other public and line agencies like the National Economic Development Authority.

Apart from opportunities to work in regional offices, the head office also provides project management and technical training and seminars to its national and regional staff. Some of the critical skills the staff needs to learn are proposal writing, project assessment, program evaluation, and some technical know-how on new technologies developed.

For management capabilities, it seems that there may be more challenges than development opportunities. Although project management training is made available to its staff, the NRP may be heavily limited by how the entire program is structured. Many of its staff are employed on a contractual basis, and its work is complemented by job orders instead. Its employment policies may be due to the program being co-terminally tied to the ruling administration. The rice program itself risks changes every time a new administration takes power, as Ponce and Inocencio (2017) discuss. Despite experiencing changes, the staff involved in the NRP may still be hired again, as evidenced by several employees being in the program for nine to ten years.

### *Challenges*

According to the NRP representative, rice is a highly politicized commodity. Its priorities constantly evolve, and that they have had experiences of red tape or politicking in implementing their programs. An instance of this is local politicians controlling the beneficiary list to only those who support their regime. A solution to this issue, the interview relays, is their office being more encompassing in their guidelines to influence localities to involve a more extensive beneficiary base. Similarly, because of an already limited budget, the NRP does its best to strategically implement its programs by ensuring that all regions feel their support.

Another challenge is the ever-changing political landscape that surrounds the rice industry. With the recent and controversial passing of the RTL, the government's programs need to quickly address the immediate impacts felt by rice farmers on top of their already existing work. The NRP has no choice but to constantly adjust its projects and directives to fit the prevailing policies on rice.

Related to the political landscape are the challenges created by the procurement system of the government. According to the NRP representative, how public procurement occurs sometimes may place their office in a corner. There are, he laments, limited capable suppliers for some items that they require. At times, deliveries may be delayed. The NRP tries to combat this by providing these bidding opportunities to suppliers within the same region requesting. However, this may not always be possible. Some suppliers that may be present in an area may be unable to fulfill the stringent bidding requirements set by the law, thus, limiting the government's choices.

The challenges listed are all structural. Nevertheless, the NRP also experiences obstacles that limit its capability to function fully. One of these, as mentioned, is that majority of its staff works on a contractual basis. Although contract renewal is very much possible, creating permanent employment opportunities for staff may allow for better knowledge sharing and relieve some training costs. Another structural issue is the NRP being a banner commodity program and not a more structured agency or office. With rice being such a vital crop for the country, creating a more recognized and mandated office may help the NRP perform its role as a network orchestrator.

#### *Summary*

In summary, the NRP performs intermediary roles consistent with those found in the literature (Van Lente et al., 2003; Klerkx and Leeuwis, 2009; Intarakumnerd and Chaoroenporn, 2013a). As a public organization, the NRP's primary role is as a network orchestrator of government initiatives in developing the rice industry. It does this by mediating and monitoring rice-related programs implemented by its regional counterparts and other implementing agencies. It successfully does its role by being consistent in its external networking and internal communication capabilities and building its knowledge-building capabilities through staff development and information sharing between its partner agencies. Nonetheless, the NRP also experiences several political and structural problems that may hinder or limit its work. Despite challenges, the NRP does its best to adjust to these issues to maximize its service for its stakeholders.

### **Appendix 5.2 Philippine Rice Research Institute (PHILRICE)**

#### *History and Purpose*

The Philippine Rice Research Institute (PhilRice) was established in November 1985 through Executive Order 1061 signed by then-President Ferdinand Marcos (Philippine Rice Research Institute [PhilRice], n.d.a.). Initially, the institute was housed in the University of the Philippines – Los Baños (UPLB) campus, where its College of Agriculture began the groundwork for the program and operations of PhilRice. By 1987, a PhilRice-UPLB Management Committee was formed to select UPLB staff that may serve as PhilRice project leaders that will helm its operations. As PhilRice became organized, the committee slowly dissolved. Soon after, the organization needed to expand further, and in 1990, transferred its operations to its Nueva Ecija station. With the help of the Japan International Cooperation Agency (JICA), PhilRice built the foundations of its now Central Experiment Station. PhilRice has expanded its reach and presence through its ten branch stations in key provinces through the years.



PhilRice is the lead public research institute of the government when it comes to rice research and development. Its primary purpose is to develop high-yielding and cost-reducing technologies to help the Philippine rice industry become more competitive and rice-secure. It conducts R&D on a variety of rice-related areas under several research divisions: plant breeding and biotechnology, agronomy, soils, and plant physiology, crop protection, genetic resources, rice engineering and mechanization, and rice chemistry and food science. Apart from these science-based divisions, PhilRice also conducts socio-economic research and deploys and promotes its technologies to farmers and the entire industry through its Development Communication and Technology Management Services divisions and branch stations nationwide. Online, its Information Systems division manages rice-related data, technology, and information that is accessible through their website.

As per their 2018 milestone report, PhilRice houses 265 permanent employees conducting its breadth of work. PhilRice's staff covers a significantly wide variety of expertise from crop specialists, socio-economists, IT personnel, geneticists, biologists, plant breeders, food scientists, development communicators, teachers, agricultural engineers, agriculturists, and much more. Heading the capability development of their employees is PhilRice's Staff Development Committee that provides their staff the opportunities for further studies, training, and seminars. The organization is very supportive of its staff pursuing PhDs in and out of the country. Apart from internal support for staff development, the representative interviewed mentioned that they also receive leadership training from the Civil Service Commission. Additionally, international organizations like JICA and the Korea International Cooperation Agency provide training opportunities for PhilRice staff. Moreover, the representative wishes to highlight that PhilRice staff is proactive in looking for personal and professional growth opportunities.

As a government-owned and controlled corporation, PhilRice funds most of its work from its budget under the annual General Appropriations Act. PhilRice also has a Business Development division that sells its knowledge products and the seeds that the institute produces to seed growers or farmers. The Business Division also sells processed-rice products. The central office also has a hostel that it rents out to visitors. The income generated from these sources helps fund some of PhilRice's work, but the amount produced is not significantly large. The institute also licenses its patents out but only to those who would use the patents for commercial means (e.g., produce and sell machinery using PhilRice-patented technology). Apart from these, PhilRice also receives funds for its R&D through external or public research grants and collaboration with local and international organizations.

Possibly the most significant of the innovations the institute has produced is its rice seed varieties. These rice seeds are high-yielding that cater to a vast array of farming ecosystems. PhilRice also developed rice farm machinery that may be used for land preparation, crop establishment, post-harvest processing, and biomass energy creation and use. They have created diagnostic tools to check weeds, leaf color charts, soil nutrient diagnosis, and biocontrol agents. The institute was also vital in developing and implementing the PalayCheck<sup>21</sup> system for irrigated lowland rice ecosystems.

Regarding their participation in the rice value chain, PhilRice is present in the input supply, production, post-harvest processing, milling, and milled and rice product processing. Of these, the most significant contribution in the input supply segment as PhilRice leads the production of high-yielding seed varieties for the country. Their importance is even more highlighted with their lead of

---

<sup>21</sup> The PalayCheck is an rice crop management system that provides farmers the best key technology and management practices as Key Checks for the different phases of rice production (Pinoy Rice Knowledge Bank, n.d.).

the Rice Competitiveness Enhancement Fund's (RCEF) Seed Program. For its seed component, PhilRice distributes high-yielding inbred seeds to farmers and aid in teaching integrated crop management. Nonetheless, PhilRice is very much present on the policy side that affects parts of the value chain. The representative also mentioned that PhilRice indirectly participates in the marketing segment of the value chain. PhilRice does this by conducting policy evaluation, market, industry competitiveness comparison, value chain, and supply chain studies.

### *Intermediary Roles*

PhilRice, as a public research institute, performs innovation intermediary roles consistent with those reported in previous research (van Lente et al., 2003; Klerkx and Leeuwis, 2009). Table A5.2.1 presents a summary of PhilRice's role performance as an innovation enabler. Of the four innovation intermediary roles, PhilRice performs the brokerage and resource provision roles the most.

PhilRice primarily provides access to high-yielding inbred seed varieties, farm machinery, mobile and web-based applications, and rice production management systems and checks for its brokerage role. By brokering these, rice farmers may gain better competitiveness. The institute provides these technologies on their own accord, through their various branches or other Department of Agriculture (DA) affiliated organizations. For its seeds, PhilRice propagates seeds for distribution. However, it also partners with and brokers its seeds for further propagation to seed growers that may sell these to local farmers. Furthermore, the institute provides training, some but not all for free, on seed technologies, machinery use, and technologies developed by PhilRice. As mentioned, PhilRice also takes a leading role in the seed distribution program under the RCEF.

Under its Development Communication division, PhilRice had an Infomediary Campaign where it partnered with technical-vocational schools with agricultural tracks (Manalo, Balmeo, Berto, and Saludez, 2016). As the program developed, PhilRice started including non-technical-vocational schools. In the campaign, PhilRice provides funding and further access to rice technologies to encourage the youth in agriculture, particularly rice farming. Apart from this, PhilRice's Infomediary Campaign also helped expand the reach of PhilRice's technologies to the farmers in the areas of their partner schools.

One other significant innovation PhilRice helped in brokering was its research on rice husks as biomass fuel (PhilRice, 2015). With the request of rice millers, PhilRice scientists developed a way to utilize the rice husk by-product from milling as biomass to generate electricity. Through this technology, PhilRice partnered with the private sector to establish power plants in several areas with rice millers to provide electricity for the surrounding areas.

The representative interviewed believes that the brokerage and extension work of PhilRice is serendipitous. Although the institute's primary mandate is to conduct research, its work soon evolved to include extension work and the deployment of its technologies. For the representative interviewed, the 'D' in R&D does not just stand for development but also deployment. The deployment of the technologies the institute has and is developing is critical to its and its rice industry stakeholders' success. Furthermore, the breadth of expertise and experiences of aggressive collaboration and international perspectives of its staff only solidifies PhilRice's capability in performing as an innovation broker.

Table A5.2.1

*The Intermediary Organization Roles Performed by the Philippine Rice Research Institute*

Broker	Consultant	Mediator	Resource Provider
<ul style="list-style-type: none"> <li>Creates and brokers new rice technologies, most especially new rice seeds (banking over 400 varieties) and production efficiency processes</li> <li>The brokerage of technologies caters to various rice ecosystems</li> <li>Leading the seed disbursement under the RCEF</li> <li>Brokers rice machinery developed in PhilRice</li> <li>Developed a biomass powerplant that uses rice husks as fuel</li> <li>Provides training to farmers on seed technologies, machinery use, and use of technologies developed when requested</li> <li>Conduct of the Infomediary Campaign to widen extension reach</li> </ul>	<ul style="list-style-type: none"> <li>Multiple divisions that allow for a broader range of expert advice</li> <li>Rice farmers may contact them through Text Center</li> <li>Provides consultancy services for other organizations or the government</li> <li>National Seed Industry Council housed within PhilRice</li> <li>Promotes industry standards (e.g., use of high yielding seed varieties, PalayCheck system)</li> <li>Does research collaborations with local and foreign universities and organizations</li> </ul>	<ul style="list-style-type: none"> <li>Coordinator of the National Rice R&amp;D Network</li> <li>Numerous research collaboration projects with other PRIs, universities, foundations, and other organizations</li> <li>Partners with schools across the country to promote rice farming to the youth</li> <li>Partnered with the private sector to develop a biomass powerplant that uses rice husks as fuel</li> <li>Adheres to points in partnership agreements to ensure understanding of terms between parties</li> </ul>	<ul style="list-style-type: none"> <li>Provided funding for rice-related projects of schools through their Infomediary Campaign</li> <li>Shares information and research through social media and their printed publications</li> <li>Produces high-yielding seeds, machinery technologies, mobile applications, and other technologies for farmers to use</li> <li>Hosts databank for rice-related data and inquiries on their website; PhilRice library is also accessible through their website</li> <li>Conducts socio-economic research and shares its work through its Development Communications division and websites it hosts</li> <li>Conducts participatory needs and opportunities assessment for partners and projects</li> <li>Multiple divisions allowing for a broader range of human resource provision</li> </ul>

*Note.* The data in this table was compiled based on interviews with PhilRice representatives, feedback from other interviews, and secondary desk research by the researcher.

For its resource provision role, the most significant resource PhilRice provides is the high-yielding inbred seeds to the farmers. Apart from seeds, PhilRice also provides a depth of information for free to the public. The institute hosts the rice databank, PalayCheck system, socio-economic research reports, R&D results, and other rice-related information. These are all accessible through their website. The organization also publishes its free PhilRice magazine that houses updates and interest pieces related to the rice industry or the work done by PhilRice. For its Infomediary Campaign, PhilRice also provided a seed fund of Php 50,000 (approximately US\$ 1,000) to its partner schools to implement technology development projects needed in their respective areas.

Moreover, through its Socioeconomics Division, PhilRice conducts market and policy research to better understand and evaluate the Philippine rice industry's state. Results from this division are also shared through its website and during institutional or policy seminars. According to the representative, they believe that the R&D PhilRice conducts also provides or influences market access, albeit indirectly.

PhilRice learns its stakeholders' needs through a variety of methods. They conduct information crowdsourcing through the PhilRice Text Center that sends a blast message to all subscribers asking about their needs and sending announcements. Through their branch stations, PhilRice regularly conducts needs assessments. The PhilRice staff in both the central and branch offices go on field visits and Q&A sessions. The research of staff pursuing further studies or its Socioeconomics Division also presents new findings and needs that the organization may address. Moreover, PhilRice also receives personal inquiries from farmers and private sector individuals.

Throughout its lifetime, PhilRice's consultancy experience has evolved from just providing its services to farmers to providing its breadth of expertise to other organizations. The base of its consultancy role is providing expert advice to farmers through its Text Center or other platforms. From here, PhilRice's consultancy experience branched towards providing expert advice to other government offices and organizations. On occasion, these organizations would even temporarily hire PhilRice staff as consultants. An example of this is the stationing of PhilRice staff to the National Rice Program Central Office in Manila. PhilRice also provides non-rice-related consultancy on communication modalities, communication strategies, stakeholder engagement, monitoring and evaluation, socio-economic research, and development communication research. In line with its research mandate, PhilRice collaborates with other local and foreign universities and private sector organizations by sharing its experts and research capabilities.

As one of the most significant rice institutions in the country, PhilRice is a part of the body that sets industry standards and actively promotes these. These standards include the use of high-yielding inbred seed varieties, farm mechanization, and the adoption of the PalayCheck management system. Although they actively promote its adoption, PhilRice does not impose on farmers to adhere to these standards. Instead, to the best of their ability, PhilRice encourages farmers to adopt these standards and technologies and adapt these to best suit their conditions.

As a mediator, PhilRice has and continues to conduct research collaborations with private and public organizations aggressively. As per the representative, they experience partnerships both ways, with PhilRice starting the partnerships or with potential collaborators approaching them first. Apart from requesting research grants, its staff actively updates their research on academic networking sites like Research Gate to reach a wider audience. PhilRice works with local organizations and international foundations, research institutes, NGOs, and private sector groups (PhilRice, n.d.c.). The

institute is also the coordinator of the National Rice R&D Network, a formally organized network of 57 institutions in strategic parts of the Philippines that conduct rice-related research (PhilRice, n.d.b.).

To prevent conflict, PhilRice always ensures that the terms of partnerships are clear to all parties and strictly adhere only to what is written in their partnership contracts. Furthermore, PhilRice is notably stringent with intellectual property agreements that they begin and other organizations add to or collaborate with afterward.

Finally, PhilRice does its best to be neutral by not promoting any particular brands of rice-related products. An example of their nonpartisan stance is not providing space for advertisements in their magazine.

#### *Intermediary Key-Capabilities*

To perform its intermediary roles, PhilRice has and continues to build its key-capabilities. A summary of how PhilRice has and is building its capabilities is provided in Table A5.2.2.

First, for its external networking capabilities, farmers may contact PhilRice through their Text Center or by visiting their branch stations. Also, PhilRice has an active online presence through its social media accounts. The research output and work that PhilRice does is shared through its social media accounts. Nonetheless, PhilRice continues to use traditional media platforms like radio broadcasts to ensure that they reach the most remote rice-farming communities.

To further its network, PhilRice staff present their work in academic conferences, which provide the opportunity for networking between attendees. In these conferences, the staff joins the social events to meet and search for potential research collaborators. By presenting and attending in these, PhilRice is also able to receive funding support for its projects. Citing the Infomediary Campaign as an example, the representative shared how the project proponents secured external funding from multiple organizations as they presented the project and its potential in several academic and grant conferences and seminars. The money received was used as the seed capital for their partner schools.

Moreover, the researchers explore and are open to using new platforms to extend their research reach further. PhilRice staff has set up ORCID IDs and consistently update their Research Gate pages to allow potential collaborators to contact them. Also, the representative mentioned that they have started stating the research interests and expertise of their staff on their website, which they have not previously done.

Another critical facet of their external networking capability is their good working reputation. With its multiple citations and awards and its collaboration experiences, PhilRice has built a remarkably favorable reputation that allows the organization to attract collaborators more easily.

Table A5.2.2

*The Intermediary Organization Key-Capabilities Built by the Philippine Rice Research Institute*

External Networking	Internal Communication	Knowledge-Building	Management
<ul style="list-style-type: none"> <li>• Availability of Text Center for farmers to use</li> <li>• Joins academic conferences to look for potential collaborators</li> <li>• Staff use ORCID IDs and Research Gate to open up their research to the world for possible collaboration</li> <li>• Active use of social media for promotion and sharing of work</li> <li>• Good reputation allowing more collaboration with others</li> <li>• Research is shared on social media and traditional media platforms</li> <li>• Former staff working in other organizations further PhilRice's advocacy</li> </ul>	<ul style="list-style-type: none"> <li>• Manages ten branches across the country</li> <li>• Can rotate staff between the branches if necessary for projects and other practical considerations</li> <li>• Research is managed and shared in the National Rice R&amp;D Network and to other relevant offices</li> <li>• Good reputation allowing continued collaboration</li> <li>• Active use of social media and traditional media platforms to promote and share their work</li> </ul>	<ul style="list-style-type: none"> <li>• Has a considerable number of patents registered in the Philippines</li> <li>• Staff with diverse expertise (economists, development communicators, agriculturists, botanists, crop economists, sociologists, IT personnel, geneticists)</li> <li>• Staff that earned their respective degrees abroad recruit and encourage other staff members to pursue postgraduate degrees abroad</li> <li>• Staff are pro-active in searching for training seminars that can develop themselves</li> <li>• Conducts participatory needs and opportunities assessment for partners and projects</li> <li>• Crowdsources farmer needs through Text Center, field visits, Q&amp;A sessions, and social research findings</li> <li>• Joins academic conferences</li> </ul>	<ul style="list-style-type: none"> <li>• Has a Business Development Division that sells seeds and knowledge products but does not earn as much as income; a majority of the budget still from the government</li> <li>• Has leadership training from Civil Service Commission</li> <li>• Staff development committee in charge of support for further studies and staff training</li> <li>• Very supportive of staff taking further studies</li> <li>• Conducts participatory needs and opportunities assessment for partners and projects</li> <li>• Adheres to points in partnership agreements to ensure understanding of terms between parties</li> <li>• Espouses open-mindedness and passion for their work</li> <li>• Encourages staff to do social immersion to understand better those that they serve</li> </ul>

*Note.* The data in this table was compiled based on interviews with PhilRice representatives, feedback from other interviews, and secondary desk research by the researcher.

One more expansion of their external networking capability is the transfer of their employees to other organizations. Although PhilRice would rather not lose a capable employee, they believe that former employees advance the advocacy and mandate of PhilRice. Quoting a former director, the representative said: “When people go, it is not really a loss of the institute. Because when they go, they will bring with them the knowledge that they gained from PhilRice, and they will help us promote our advocacy and our values.”

PhilRice has ten branch stations (PhilRice, n.d.e.) to expand and sustain its presence with rice farmers. These branches constantly communicate with each other, discussing the needs of and working on different R&D projects in each area. Staff may be assigned to other branch stations if a project requires particular expertise not yet present in the assigned branch. As the coordinator for the National Rice R&D Network, PhilRice takes the lead in sharing and knowing the rice-related R&D needs and results to relevant offices. Finally, similar to its external networking capabilities, the excellent reputation of PhilRice allows it to continue to work with its already established partners.

PhilRice has built and continues to build its knowledge-building capabilities the most out of the four key-capabilities. As mentioned, the breadth of expertise of its staff is vast, with several having advanced degrees from foreign universities. The staff themselves are also very active in their professional growth, often looking for further study, training, or seminar opportunities. Moreover, PhilRice has filed 27 invention, 35 utility model, and ten industrial design patents since 2000 (Intellectual Property Office of the Philippines, personal communication). Of its patent filings, nine invention, 19 utility model, and six industrial design patents have been granted by the Intellectual Property Office of the Philippines.

Through its network, PhilRice can also tap into the resources and expertise of other research bodies like the University of the Philippines. Former employees in universities abroad also often present opportunities for research and further studies to their colleagues in PhilRice. Staff that received degrees from foreign universities also recruit and encourage their other staff members to pursue their postgraduate studies abroad. Moreover, the relationships built with academic advisers by staff that studied abroad add to PhilRice’s research partnership opportunities. Examples of these are collaborative research with Japanese universities. These experiences and exposure to international perspectives further broaden the knowledge-building capabilities of PhilRice.

To learn of the needs of its rice industry stakeholders, PhilRice often conducts needs assessments when it begins projects or partners with a community or organization. Furthermore, PhilRice also consults with the farmers by sending blast messages through its Text Center, asking about farmers’ current issues or training needs. The PhilRice staff also learn of farmer needs when they conduct field visits, Q&A sessions, or research findings.

For its management capabilities, the representative highlighted how PhilRice supports the development of its staff, who contribute the most to the organization’s success. PhilRice has a Staff Development Committee that oversees the professional development of all its staff. The institute recognizes the necessity of research institutes staff with advanced degrees and fully supports them in pursuing further studies. As mentioned, the staff, too, are proactive in looking for opportunities for their professional growth. The representative also mentioned that PhilRice provides its younger professionals the opportunities to lead projects they propose.

Conducting its research and extension work, PhilRice habitually does needs assessments to ensure that the programs and projects address the needs of the rice farmers. Furthermore, when

collaborating or partnering with other organizations, PhilRice always requires signed memorandums or letters of agreement. These should clearly state the deliverables and expectations of each party.

When probed further on the capabilities necessary for their success, the representative mentioned that PhilRice staff is very passionate about their work. They have a deep emotional connection with what they do by challenging norms and doing their best possible research to empower rice farmers. The passion of the PhilRice veterans infects and breeds the passion of the younger researchers. Furthermore, they add that social immersion is necessary to understand the plight and situation of the rice farmers. They exclaim that working with farmers may require thinking beyond what is logical or rational. Not all farmers adopt modern technology, even if it is the most logical or economical choice. One must be imaginative when conducting research, development, deployment, and extension work in PhilRice.

These last two capabilities may speak on a much deeper level than the four identified key-capabilities. Sutthijakra and Intarakumnerd (2015) posit that deeper within these four capabilities are two underlying capabilities: strategic and learning capabilities. It seems that a deep emotional connection and social immersion may fit as part of underlying learning capabilities. However, the deep feelings of passion espoused in connection and immersion may suggest an underlying capability that is more emotional rather than cognitive.

### *Challenges*

Despite their success, PhilRice faces several challenges. For some of these obstacles, the organization has already placed ways to overcome them. However, some challenges are very structural that need solving on a societal level.

One challenge PhilRice faces are the need to balance between R&D and extension work. While R&D is its primary mandate, the institute cannot leave extension work behind. Furthermore, although the breadth of expertise is there, there seems to be uneven distribution in human resources in the branch stations. The need to balance R&D and extension work and the inadequate staffing in its branch stations led to overworked personnel. The representative cited their experience of being assigned to a branch station. The representative recalled how there were only four of them working for several regions of the Philippines. Another example given was the Los Baños branch that catered to three other regions but with five staff only. One way PhilRice addressed these is by establishing newer branch stations. In the Los Baños branch's case, a Bicol branch was established and removed the Bicol region from their purview. Another way to alleviate the issue of overwork is to hire more staff. As per PhilRice's 2018 Milestone report, the branch station the representative was assigned to now houses four times the number of staff, apart from the hired service contractors.

PhilRice prevents issues by ensuring that their intellectual property office and their legal team always review and approve intellectual property and partnership agreements before these are finalized. For consultancy, the representative mentioned that they prevent issues by consistently delivering what is required of them. The critical action to prevent these issues is constantly referring to the terms in their contracts or agreements.

Exacerbating these challenges are structural obstacles PhilRice faces still today. Issues with the bureaucratic system and legal limitations often hinder or slow down the progress of their work. Recalling their experience of publishing a coffee table book about PhilRice, the representative relayed how the project could not be done with a major bookstore because of banking limitations. PhilRice could only transact with the government's Lank Bank of the Philippines. In contrast, the bookstore



only dealt with one private bank for its accounts. Although developments in the banking industry may make this solvable today, the systemic limitations hindered PhilRice in its book project during that experience.

An example of slowing down progress was seen during the Infomediary Campaign. The distribution of the seed fund for the partner schools took longer than expected. The Department of Education required justifications as to why those specific schools were chosen, in addition to other questions.

Another often cited hindering issue is the procurement process of the government. Regardless of how much a project bid will cost, the requirements are the same. The stringent requirements may hinder or disincentivize private sector companies from submitting a bid to smaller projects. It costs the same investment to prepare documents required for small projects and big projects.

One other cited obstacle that PhilRice face but is still trying to overcome are social context issues that affect the sustainability of otherwise successful projects. The institute has experiences where the conflict in their project areas end these already working and successful projects.

These last few issues require solutions beyond what PhilRice may be able to provide. It requires advocacy and policy action to overcome these issues. Hopefully, as PhilRice and its partners' voices grow, these issues may be addressed.

### *Summary*

Leading rice research in the Philippines, PhilRice performs several intermediary roles that help farmers and other rice stakeholders acquire the necessary technologies for their development. Of the four innovation intermediary roles, PhilRice performs brokerage and resource provision roles the most. PhilRice provides high-yielding inbred seeds, access to farm machinery, and a gamut of production efficiency resources to farmers. As a research institute, PhilRice is also active in collaborating with researchers, universities, foundations, NGOs, and others for further research. The institute houses an array of capable staff ready to provide consultancy and advice on their field expertise.

To be successful in its role performance, PhilRice also builds its key-capabilities. Highlighted in the interview is the critical role that the PhilRice staff play in developing PhilRice into what it is today. The staff is active in building the institute knowledge base, sharing these throughout their network, and applying their knowledge to create newer technologies. With its reputation, PhilRice's network of partners continues to expand. Furthermore, the institute continues to collaborate with its current set of partners.

Although PhilRice faces several challenges, the institute has also overcome a majority of these. It needs all the support to overcome the more difficult societal challenges that require more people to stand for positive change. Advocating for a rice-secure Philippines, PhilRice continues its research, development, deployment, and extension work.

## **Appendix 5.3 Grain Retailers Confederation of the Philippines (GRECON)**

### *History and Purpose*

The Grains Retailers Confederation of the Philippines (GRECON) was formed on October 15, 1980. For the past 40 years of its existence, GRECON has served as the most prominent industry

association focused on the retailing side of the rice industry. GRECON's primary goal is to ensure that rice is available, accessible, and affordable to all Filipino consumers.

As of 2020, the organization has roughly 20,000 members divided across 15 regions of the Philippines. Of the total number of members, 20% are micro to small retailers with stalls found in public markets. A vaster majority of its membership consists of larger SMEs involved in rice retailing. To become and remain a member, one must pay an annual fee of Php 100.00 (roughly US\$ 2.00). Also, its members are not allowed to join any other rice retailer organizations.

Before the rice tariffication law (RTL) passed, GRECON was the largest private partner of the National Food Authority (NFA) to distribute government-subsidized rice. During that time, the NFA still had control over imports and was also mandated to accredit millers. Upon passing of the law, however, the NFA has lost many of its oversight powers. It is now left to maintaining the country's buffer stock of rice. The agency also is no longer allowed to sell its subsidized rice to the private sector. However, it only distributes it to local government units during a calamity or rice stocks in an area dip below consumer demand.

No longer having direct access to selling subsidized rice, retailers in the Philippines are left to acquiring supplies from locally produced rice and privately imported rice. Based on the interview with a GRECON representative, its direct support is its network that sees organization members sharing rice stocks and information on cheaper rice. Without the option of subsidized rice, rice retailers jump between whichever is cheaper between locally produced or imported rice. However, according to the representative, they have seen a vast influx of imported rice in the last two years. These are more often a lot cheaper than the locally produced varieties. Since GRECON's members are the ones that directly face consumers, the organization knows that price matters quite heavily at that end of the value chain.

Nevertheless, GRECON continues to support its members through its network but is now looking into how they can also aid Filipino farmers to produce at lower costs. The GRECON representative cited how a lack of affordable rice in the Philippines may and has caused civil unrest. The country needs to truly develop its rice industry before it is completely overrun by imported rice. If that occurs, then the Philippines will be at the mercy of the world price of rice. Preventing that entails partnership across the entire value chain. One step that GRECON took towards unity with other rice groups is forming the Philippine Rice Industry Stakeholders Movement. This movement is a private sector-led coalition formed in 2020 to develop the rice industry.

#### *Intermediary Roles*

As an industry association, GRECON has exhibited several roles performed by innovation intermediaries. Table A5.3.1 presents a summary of its general role performance through most of its 40 years of existence.

Table A5.3.1

*The Intermediary Organization Roles Performed by the Grains Retailers Confederation of the Philippines*

Broker	Consultant	Mediator	Resource Provider
<ul style="list-style-type: none"> <li>• Market linkage of member millers or importers with member rice retailers</li> <li>• Linkage of non-member rice stakeholders to member retailers</li> <li>• Membership provides access to selling government rice (pre-RTL)</li> <li>• Members help each other finance shipping of rice stocks to areas that lack rice supply</li> <li>• Helps government distribute rice during disaster relief</li> </ul>	<ul style="list-style-type: none"> <li>• Joins government consultations to share the situation of the rice industry</li> <li>• Shares information to members on cheaper imported rice</li> </ul>	<ul style="list-style-type: none"> <li>• Mediates conflict within the association from the local level then moves up the association if parties cannot settle</li> <li>• Convenes with other rice groups and brings up their issues and needs together</li> <li>• Linkages to local associations</li> <li>• Ran as a party list in the 2019 elections but lost</li> </ul>	<ul style="list-style-type: none"> <li>• They used their network to funnel rice supply in disaster areas</li> <li>• Membership provides access to government rice (pre-RTL)</li> <li>• Looking for ways to aid local farmers (post-RTL)</li> <li>• Shares information to members on cheaper imported rice</li> </ul>

*Note.* The data in this table was compiled based on an interview with GRECON representatives and secondary desk research done by the researcher.

Of the four intermediary roles, GRECON performs brokerage the most for its members. Although the group does not provide hard technologies, the innovations generated are more market innovations. The most significant of these is the linkages formed between member retailers, wholesalers, and millers. There is a greater sense of trust within purchasing rice stocks from co-members. Moreover, GRECON also helps link non-member millers and wholesalers to its member retailers. Its network of 20,000 strong allows the organization to augment rice stocks to areas that are lacking in supply. Members were said to support each other financially to ship rice stocks between different regions.

GRECON shares market and supply information to its members as part of its resource provision and consultancy roles. As several of their members can mill or import rice, GRECON passes their supply information to members looking for more stocks to sell in their areas.

Before the RTL, GRECON was able to broker the NFA rice stocks to its member retailers. The access to NFA rice was not only limited to retailing. During times of disaster, the government taps GRECON to aid in distributing rice stocks to calamity-stricken areas. With its network, GRECON can quickly assess how much rice is available in a particular area.

Because of its history working with the government, GRECON does not hesitate to join public consultations to share the current situation faced by its member retailers. The group joins on their own accord and encourages other rice groups to be a part of the consultations.

As an organization, GRECON mediates conflict of its members through its structured leadership. Conflicts are first discussed at the municipal district level. They may go up to the regional and national level if the disputes are not settled in the lower levels.

Another possible form of mediation the organization attempted was to run for a party list spot in the Philippine Congress during the 2019 midterm elections. GRECON was hoping to represent the rice industry more in the lower house and propose bills that will help develop the rice industry and not just the retailing side. Unfortunately, they did not win a seat and are currently unsure if they would like to run again in the 2022 elections.

### *Intermediary Key-Capabilities*

To be successful in its intermediary roles, GRECON built its key-capabilities. Table A5.3.2 presents a summary of the key-capabilities that GRECON has built.

With GRECON's chief benefit to its members being the network it provides, the organization focused on building its external networking and internal communication capabilities. In building these two network-focused capabilities, they also developed their management capabilities. Before discussing the networking-related ones, it may be vital to understand their organizational structure first as it affects how they perform their networking roles.

First, GRECON's structure has leadership positions on the national level, 15 regional levels, and numerous municipal districts. National level positions are elected or appointed every two years during their annual meeting or conference held on their anniversary on any given year. The National President position may be held by a member for two consecutive terms only. This position is elected based on the 15 regional leaders. To become a regional leader, one must also be elected from the prevailing municipal leaders in a set regional district. These 15 regions were set up based on the NFA's regional distribution of its subsidized rice.

Table A5.3.2

*The Intermediary Organization Key-Capabilities Built by the Grains Retailers Confederation of the Philippines*

External Networking	Internal Communication	Knowledge-Building	Management
<ul style="list-style-type: none"> <li>• Nationwide presence through provincial/regional and municipal counterparts</li> <li>• Part of the Philippine Rice Industry Stakeholders Movement group</li> </ul>	<ul style="list-style-type: none"> <li>• Chain of communication and linkage starting on the municipal level working up</li> <li>• Annual meeting during their anniversary</li> </ul>	<ul style="list-style-type: none"> <li>• Network of members as the base of knowledge sharing</li> <li>• Members knowledgeable of where to source cheap and imported rice</li> <li>• Knowledgeable of the consumer market, cheaper rice is the most sought after</li> </ul>	<ul style="list-style-type: none"> <li>• Member-led activities</li> <li>• Cheap membership fees, annual fee of Php 100</li> <li>• Members may not join other rice retailing associations</li> <li>• Has a formal organizational structure with national, regional, municipal leadership</li> <li>• Regional groups split into 15 based on the NFAs regional distribution of its subsidized rice</li> <li>• Used to have an orientation for members</li> </ul>

*Note.* The data in this table was compiled based on interviews with GRECON representatives and secondary desk research done by the researcher.

Understanding the structure, one may say that GRECON builds its relationship with its members on vast and multi-tiered levels. Having this chain of command and leadership allows GRECON to make communicating with each other much more manageable. It also makes their presence felt across the country, making them accessible to interested members or rice industry stakeholders looking for retail markets.

The organization's structure also makes managing and applying industry knowledge smoother. The distribution of members into municipal districts and regions allows GRECON to assess where to send rice stock support and where surplus may be available more quickly. Since its leaders need to be elected, the municipal leaders also have a relationship with their constituents. Moreover, GRECON's activities from the national down to the local level are all member-led. They do not have an office nor staff that prepares for meetings and related activities. Individual members help each other prepare for their activities, such as the annual meeting hosted by a different city every year.

One more highlighted knowledge-building capability that GRECON has a clear advantage on is their knowledge of the rice consumer market. This advantage has been built through their direct relationship with consumers as rice retailers. Although they do not directly interact with farmers, GRECON and its members can pass down market information to the millers and importers. These other actors eventually pass the information to the upstream value chain actors.

### *Challenges*

According to the GRECON representative, the most significant challenge the association faces now is the passing of the rice tariffication law. As rice retailers, the most economical choice is to sell rice that they may purchase at lower costs. With imported rice almost always cheaper than locally produced rice, GRECON members are caught between sustaining their business and supporting the local industry. Moreover, the representative cites how paradoxical the funds for helping rice farmers are raised. As stated in the law, the money for the Rice Competitiveness Enhancement Fund will come from the tariffs imposed on imported rice. For the representative, although importing more rice means more funds, how the farmers will sell their produce if an influx of cheaper imported rice is present is a question. An undeveloped local industry will sooner or later affect their members once retailers are under the control of world price.

GRECON continues to combat this issue by attempting to shift its priorities and plan ways on how retailers may aid in developing the production aspect of the rice industry. One concrete action the group tried to do was run for party-list representation in the legislature's lower house during the 2019 midterm election. They, however, were unsuccessful in their bid. Currently, they are still unsure whether the group will try running again in the upcoming 2022 elections. If they were to win, their primary platform would be to legislate bills that will further develop the rice industry, focusing on the production aspect.

### *Summary*

GRECON is an industry association that performs several intermediary roles. In its 40 years of existence, its primary role has been to help ensure available, accessible, and affordable rice to Filipinos through its network of retailers, wholesalers, millers, and importers. With 20,000 members spread throughout the country, GRECON's presence is felt down to the municipal levels. Its members can benefit from its network to receive information and support in finding rice stocks for their customers. Before the RTL, GRECON was also the leading partner of the NFA in distributing and

retailing the government's subsidized rice. With that no longer an available option, GRECON is now shifting towards finding ways to help local producers compete with the cheaper imported alternatives. The organization hopes to proudly sell more Filipino-made rice and not be at the mercy of other rice-producing countries.

#### **Appendix 5.4 Pambansang Kilusan ng mga Samahang Magsasaka (PAKISAMA)**

##### *History and Work*

Following the 1986 EDSA Revolution, the Philippine Partnership for the Development of Human Resources in Rural Areas (PhilDHRRA), a national network of NGOs involved in organizing farmers and fisherfolk, facilitated three conferences for grassroots consultations that sought to create strategies for genuine agrarian and aquatic reform. These consultations were attended by over 10,000 farmers and fisherfolks and culminated in a call for a national alliance that will push for agrarian and aquatic reform, rural development, and protection of peasants' rights (PAKISAMA.com, n.d.). This alliance was organized into the *Pambasang Kilusan ng mga Samahang Magsasaka* (PAKISAMA) or the National Confederation of Family Farmers' Organization<sup>22</sup>.

Since its establishment, PAKISAMA has been active in the campaigning and lobbying for several critical policies for the agriculture, fisheries, and forestry (AFF) sector. Following its inception in 1986, the organization participated in the 1987 constitution draft, particularly in the agrarian reform section. It was successful in campaigning for the passage and subsequent extensions of the Comprehensive Agrarian Reform Law of 1988 and involved in the legislation of the 1988 Fisheries Code, Agriculture and Fisheries Modernization Act of 1997, the Indigenous Peoples Rights Act of 1997, the National Organic Agriculture Act of 2010, and the Coconut Farmers and Industry Trust Fund Act of 2021. PAKISAMA also took part in the discussions and negotiations of the Rice Tariffication Law of 2019.

Apart from its role in policy advocacy, PAKISAMA has been involved in community organizing to provide capacity building, training, seminar, and community development activities for its members. Since 2010, the organization has given more focus on strengthening the capabilities of cooperatives in providing more services to their members apart from financial services. The organization brokers access to land, seeds, market, equipment, and other AFF technologies from its many different partners and donors for its community development programs and projects. The confederation also has a gender program that organizes women groups and provides gender awareness training in rural areas (Penunia, 2011). In addition to these, PAKISAMA does policy and social research to build cases for its work and its advocacy campaigns.

The third role of PAKISAMA is its networking and collaboration role. As per the representative interviewed, this networking role of the group has been growing more and more in importance. In its 35 years of existence, PAKISAMA has grown a vast network composed of NGOs, church groups, law groups, international organizations, academicians, farmer and fisherfolk groups, and more. It mediates between its network to gather and employ the rich human resources available to provide their expertise in serving the members of PAKISAMA and expanding each other's networks.

---

<sup>22</sup> The Food and Agriculture Organization of the United Nations (2013, p. 1) defines family farming as "a means of organizing agricultural, forestry, fisheries, pastoral and aquaculture production which is managed and operated by a family and predominantly reliant on family labor, including both women's and men's."

Moreover, the organization catalyzes its network to garner support for its policy advocacy and campaign work.

PAKISAMA sustains its work primarily from grants and donations from individuals and international organizations. Although it acts as an industry association or confederation of AFF groups, the annual dues are not enough to support its work. The initial membership fee is Php 1,000.00 (approximately US\$ 20.00), and annual dues amount to Php 2,000.00 or about US\$ 40.00 per year. As per the representative, several of their member cooperatives experience difficulties in paying the annual dues. However, by the time they convene for their national congress, members pay off their outstanding dues.

Regarding its human resources, PAKISAMA currently has 25 employees distributed in its national office and regional offices. The national office is in Metro Manila and oversees the organization's overall strategy, networking, and funding. It has a regional office in each of the three central regions of the Philippines, namely, Luzon, Visayas, and Mindanao, delivering the various services for its members in those areas. Of its 25 employees, about 17 or 18 work in the main office, while each regional office has an average of two employees. PAKISAMA hires agriculturists, lobbyists, community organizers, and lawyers on a retainer basis. According to the representative, one of the organization's strengths is that, since its inception, PAKISAMA has been professionally administered by individuals knowledgeable in organizational development and management. As an association, its board comprises a national council of farmers and fisherfolk who are elected every three years during their national congress.

Regarding its position in the agri-food business value chains, PAKISAMA participates more in the upstream segments of the chain and, lately, in the marketing portion. Moreover, PAKISAMA contributes to creating the institutional environment supporting these value chains because of its heavy advocacy mandate.

#### *Intermediary Roles*

As a confederation of farmer and fisherfolk groups, PAKISAMA acts as an industry association and performs roles associated with innovation intermediaries. Table A5.4.1 presents a summary of its intermediary role performance. Of the four innovation intermediary roles identified by Partners (2007), PAKISAMA performs the brokerage role the most.

By performing its brokerage role, PAKISAMA delivers its services to its members. Since the late 1980s, the organization has continuously organized communities into farmer or fisher groups and cooperatives and provide them with a range of capacity and technical training. Furthermore, PAKISAMA brokered available programs and projects of the government and other organizations to their members by applying for grants and these programs on their behalf. According to the representative, they would broker farm inputs, equipment, technologies, a variety of training, and seminars depending on the needs of their members. An example of this is their partnership with PHILMECH in the provision of rice farm machinery under the Rice Competitiveness Enhancement Fund (RCEF).



Table A5.4.1

*The Intermediary Organization Roles Performed by PAKISAMA*

Broker	Consultant	Mediator	Resource Provider
<ul style="list-style-type: none"> <li>• Community organizing work allows them to provide capacity building for members</li> <li>• Brokers projects by receiving grants from international organizations and government to provide a variety of services to their members</li> <li>• Convergence of separated farmer groups into more solidified commodity unions</li> <li>• Attempting to form a political party that will represent farmers</li> <li>• Tries to transform associations into cooperatives</li> <li>• The key organization in setting up the AgriCOOPh</li> <li>• Co-hosts annual conference where stakeholders may present best practices on a range of AFF-related topics</li> <li>• They started doing weekly farmers markets with a partner IP group</li> </ul>	<ul style="list-style-type: none"> <li>• Advocating policy improvements for the AFF sector</li> <li>• Provides consultancy services for members and other groups on tackling issues related to the AFF, IPs, women, and youth sectors</li> <li>• Gathers policy and social concerns of the AFF sector and bring these forward to the government and the public</li> <li>• Currently advocating for professional management of cooperatives and farmer associations</li> </ul>	<ul style="list-style-type: none"> <li>• Heavily involved in community organizing</li> <li>• Organizes groups in particular sectors to convene and form a unified group and stance</li> <li>• Key organizer in the establishment of AgriCOOPh</li> <li>• Catalyzes its vast network of NGOs, religious groups, law groups, and other types to gather resources</li> <li>• Hosts an annual conference to have stakeholders meet and engage with one another</li> <li>• Links members to organizations and institutions that can address needs PAKISAMA cannot provide</li> </ul>	<ul style="list-style-type: none"> <li>• They do policy and social research work when necessary</li> <li>• Provides other community development projects funded by donor agencies</li> <li>• Provides legal assistance, community development training, community organizing training, lobbying, and policy research support</li> <li>• With the pandemic, looking into providing training and capacitating members in using web-based or internet-based communication tools</li> </ul>

*Note.* The data in this table was compiled based on an interview with a PAKISAMA representative and secondary desk research done by the researcher.

One key organizational innovation PAKISAMA brokered for its member and commodity sectors was integrating these separated farmer groups into a unified coalition. PAKISAMA began this unification strategy in 2012 with coconut farmers across the country to form a coconut farmers union to push for the coco levy trust fund, which was passed in 2021. With the passing of the Rice Tariffication Law, PAKISAMA is now organizing rice groups into one union to advocate for policies and cluster development for the rice farmers in the Philippines. An additional aspect of forming farmer unions for different commodity groups is PAKISAMA taking a lead role in forming a political party representing farmers. According to the representative, they envision this group to be led by farmers, unlike other political parties. Furthermore, they want farmers as the party's face while supported by PAKISAMA and other like groups in policy research and advocacy.

Another organizational innovation PAKISAMA brokers are transforming farmer groups into cooperatives rather than associations or people's organizations. For PAKISAMA, cooperatives, as an entity, provides a broader base of support services that it may offer its members. Furthermore, it is an organization that is profit-seeking, allowing farmers to earn more in the process. The caveat of cooperatives is that these organizations need to be professionally or well-managed to be successful. To aid in developing the professional capacity of cooperatives, PAKISAMA, together with several other NGOs and farmer groups, established the national federation of agri-fishery-forestry cooperatives called AgriCOOPh. This newly formed organization is set up as a whole-chain service provider focused on providing consultancy and training services to develop and manage cooperatives. As per the representative interviewed, AgriCOOPh will focus on service delivery, while PAKISAMA will focus on the advocacy and creation of farmer unions. The community development and capacity building of PAKISAMA member cooperatives will now be complemented by AgriCOOPh.

PAKISAMA has also brokered innovation and learning through its active and catalytic participation in the multi-stakeholder Agriculture Rural Development, Knowledge, and Policy Platform (ARDKPP) which organizes the annual two-day conference called the Knowledge Learning Market Policy Engagement (KLMPE). Since 2014, the ARDKPP invites over three hundred farmer and fisherfolk leaders, government agencies, donor agencies, NGOs, and international organizations to share best practices in land tenure, resilient agriculture, building market power, agri-governance, building cooperatives, and working with women and youth. These conferences also show PAKISAMA's mediation role. It uses the conferences as a platform for the different groups to engage in knowledge sharing and policy discussion.

During the pandemic, PAKISAMA has also brokered market innovation for one of its member indigenous people (IP) farmer groups relatively close to the national office. At first, as an experiment, PAKISAMA began a weekly farmers market in Marikina City to support the farmers. Through the farmers market, PAKISAMA saw that their members could earn 25% more than their usual farm gate price. Moreover, customers paid 5% less than they would in a traditional market. Because of its initial success, it rapidly reached 400 farmers supplying the market. Unfortunately, the weekly farmers market had to cease as customers slowly returned to purchasing from traditional markets. Since the weekly market stopped, PAKISAMA took the opportunity to upgrade the governance and management capacity of its partner IP groups that supplied the market.

For mediation, it seems that PAKISAMA performs this role simultaneously with the three other roles. As it brokers organizational innovations through community organizing and farmers' unions, PAKISAMA allows opportunities for relationship-building between and within its stakeholders and non-members. Moreover, PAKISAMA provides the opportunity for creating and fostering relationships within the AFF sector through its annual conferences. By co-hosting these

events, PAKISAMA allows multiple groups to meet, present, and discuss developments and issues facing them.

Another form of mediation PAKISAMA performs is tapping its network to garner support for its members' causes. They also request partner NGOs, churches, law, and other groups to gather and provide resources to support PAKISAMA's work and members. Similarly, PAKISAMA may link its member cooperatives and associations to partners that may address needs that PAKISAMA is unable to provide. An example of this is linking member cooperatives to services provided by AgriCOOPh. Although PAKISAMA still provides capacity building for its members, they realize that it is more important to collaborate with and maximize the varied competencies present in the AgriCOOPh ecosystem of service institutions.

As a consultant, PAKISAMA's chief role is providing expert advice in understanding and tackling issues related to the AFF sector, indigenous peoples, women, and the youth. Their team of experts conducts policy and social research to further their understanding of these issues. They also provide training and seminars to improve the response and understanding of their members' rights. Furthermore, PAKISAMA brings its research and issues faced by the sectors mentioned above to the relevant government agencies and policymakers. Besides these, they stimulate public discourse and awareness of issues to drive public demand and opinion towards the passage of policies that hope to improve the lives of their members and other industry stakeholders.

Apart from the policy and issue consultancy, PAKISAMA also provides consultancy on organizational development. With its years of experience, PAKISAMA realized that one weakness member and non-member farmer and fisherfolk organizations lack is professional management. It currently advocates for these groups to adopt or hire professional managers to stimulate growth and professionalize them. PAKISAMA is trying to bring this agenda to universities hoping that graduates start considering careers in AFF cooperatives or associations management and development.

Finally, as a resource provider, PAKISAMA provides several services and forms of support for its members. Several of these have already been mentioned previously. PAKISAMA does social and policy research for its members to learn more deeply about issues and craft policy proposals to address them. As part of its work, PAKISAMA also provides capacity building and community development projects funded by international and donor organizations grants. PAKISAMA also provides legal assistance and a gamut of training on community organizing and development, lobby, and conducting policy research for its members and interested parties. With the advent of the pandemic, PAKISAMA is looking into training their member organizations in using web- or internet-based technologies such as using Zoom for their conferences and seminars with members.

#### *Intermediary Key-Capabilities*

To successfully perform its innovation intermediary roles, PAKISAMA builds upon its key-capabilities. The instances and actions that the organization takes or took to build its key-capabilities are presented in Table A5.4.2.

Table A5.4.2

*The Intermediary Organization Key-Capabilities Built by PAKISAMA*

External Networking	Internal Communication	Knowledge-Building	Management
<ul style="list-style-type: none"> <li>• Receives invitations from government and international organizations for consultation workshops and conferences</li> <li>• Part of NGO and other AFF confederation networks</li> <li>• Co-organizes an annual conference for sharing of new knowledge and best practices in the AFF sector</li> <li>• Takes the initiative in applying for partnerships with government agencies and donor agencies</li> <li>• Grows membership through community organizing and meets other groups through their advocacy work</li> </ul>	<ul style="list-style-type: none"> <li>• Semestral meeting of the elected national council</li> <li>• National congress with all members held every three years</li> <li>• Strategic plans are discussed, and the national council elected during their national congress</li> <li>• The skills of their regional area managers are crucial as they directly interact with their members</li> <li>• Part of NGO and other AFF confederation networks</li> </ul>	<ul style="list-style-type: none"> <li>• National secretariat composed of professionals that have expertise in agriculture, community organizing, law, agri-business and lobbying</li> <li>• The elected national council members are all farmers or fisherfolk who are deeply knowledgeable of their sectors</li> <li>• Has a network of experts and professionals willing to share their craft for the cause</li> <li>• Members come from farmer, fishers, IPs, rural women, and youth groups</li> <li>• The realization that they need to scale up their workforce and collaborate more with other civil society organizations</li> </ul>	<ul style="list-style-type: none"> <li>• Has about 25 staff; hopes to one day have over 160 staff across the country</li> <li>• The national council appoints the national secretariat</li> <li>• National office heads strategy, networking, and funding</li> <li>• Regional offices do service delivery</li> <li>• Grants-dependent</li> <li>• Composed of 75 member AFF associations and cooperatives, equating to about 74,000 individual members; 21 are rice cooperatives</li> <li>• Understood the need to have the organization professionally managed</li> <li>• May hire other staff depending on the needs of their members</li> <li>• Wants to focus on the policy and convening of sectors and works with AgriCOOPh in cooperative capacity building development</li> </ul>

*Note.* The data in this table was compiled based on an interview with a PAKISAMA representative and secondary desk research done by the researcher.

For its external networking capabilities, PAKISAMA builds its network through referrals and attendance in various events. As it applies for and receives grants from international organizations, PAKISAMA's network extends beyond the Philippines. According to the representative, PAKISAMA often receives invitations from international organizations for consultancy workshops and conference presentations regarding their work. PAKISAMA is also a member of several other regional and international associations like the Asian Farmers' Association for Sustainable Development the International Federation of Organic Agriculture Movement, and the International Land Coalition.

On its own accord, PAKISAMA expands its network as it participates in the annual KLMPE conference. Through these conferences, the organization meets new individuals and groups and fosters relationships between itself and others. Furthermore, PAKISAMA takes the initiative and actively searches for partnerships from government agencies, international organizations, and donors that provide programs and services that may benefit PAKISAMA members. Finally, its community organizing work allowed it to grow its membership base to one of the largest farmers and fisherfolk confederations in the Philippines.

PAKISAMA manages communication with members through the delineated work between its national and regional offices. The national office handles the networking with other groups, management and search for funding, and implementation of its strategic plan. On the other hand, the regional offices are in charge of the service delivery and relaying of information from the national office. As per the representative, the skills and capabilities of regional area managers are crucial to their success since they are the ones who interact with the members directly. PAKISAMA must hire persons well versed in community organizing and community development for these positions.

Membership in and partnership with larger industry associations, donor agencies, and international organizations is another internal communication capability PAKISAMA builds. By fostering and abiding by its terms of membership and partnership, PAKISAMA builds its relationship with these organizations and gains access to the services and grants that PAKISAMA may broker for its members. An example of this is PAKISAMA's partnership with AgriCOOPh, which grants its member cooperatives the multitude of training and organizational development opportunities AgriCOOPh offers.

The knowledge base of PAKISAMA is quite deep, especially in understanding the AFF sector industries, its issues, opportunities, and laws. Its elected national council members are all farmers or fisherfolk who are deeply aware of their sectors. This knowledge is shared in the networking and work of PAKISAMA.

Regarding its staff, PAKISAMA employs agriculturists, community organizers, lobbyists, and lawyers on a retainer basis. Having a diversity of professionals allows PAKIASAMA to provide a wide range of technical and developmental support to its members. Moreover, they can craft proposals for policymakers and stimulate public opinion. Their knowledge and skills are also supplemented by their vast network of colleagues and friends composed of experts and professionals from different fields and sectors. Its members are composed of farmers, fisherfolk, indigenous peoples, women, and youth, who gain knowledge and share their own with PAKISAMA.

The organization continues to learn by joining conferences, attending workshops and conducting its own social and policy research. PAKISAMA also does internal evaluations and reflections of its work. As per the representative, by undergoing reflections, the organization realized several of its lapses and weaknesses. From these, they strategized ways to overcome these. One of its

realizations is its lack of scale economies in providing impact in the AFF sector. Although considered one of the largest AFF sector confederations with over 74,000 members, PAKISAMA can only cater to 75 organizations out of the thousands present in the Philippines. They realized that their work is much smaller than the scale that the government needs. A case in point is PHILMECH's distribution of rice farm machinery under the RCEF. PAKISAMA, with AgriCOOPh, partnered with PHILMECH to build the capacity of recipient associations and cooperatives. PAKISAMA could only provide for 21 of their rice cooperatives or groups out of the 5,000 organizations that PHILMECH is targeting. PAKISAMA is now in the process of reorganizing itself to earn or receive enough income or grants to and building broader partnerships in the provinces with colleague civil society organizations to scale up its workforce and membership base.

The overall direction of the confederation is discussed and set during its national congress held every three years. During these congresses, members share lessons learned, discuss issues they want to tackle in the coming years and the overall strategy that the organization should take moving forward. It is also during these times where members vote on the national council or board. To be eligible for nomination and vote, each member organization must have fully paid all its annual dues to the confederation. Once elected, the national council will then convene semestrally to discuss and update its strategic plans. With improvements in digital communications technology, the national council now meets quarterly. The national council, through its Executive Committee led by its President, is also in charge of appointing and hiring the Executive Director, who in turn facilitates the formation and selection of the PAKISAMA Secretariat in their national and regional offices.

Across its national and regional offices, PAKISAMA has 25 employees. As per the representative, the organization hopes to one day expand this to over 160 staff nationwide. One management capability the group built very early on in its life is hiring professional organization managers to oversee the daily operations of PAKISAMA. The organization ensures that their staff managing PAKISAMA's campaigns, projects, and programs are professionals trained or educated in required work. Depending on future needs, PAKISAMA may hire other professionals that may address these needs.

One limitation of PAKISAMA, however, has been how it has operated in the last 30 years. As per the representative, although the organization is professionally managed, PAKISAMA operated as if it were an NGO. They were very grants-dependent, which limited their ability to scale projects and provide support to even more of their members. Currently, PAKISAMA only received enough grants to cater to about 30% of all its members. To address this issue, PAKISAMA is pushing its member organizations to develop themselves into multi-purpose cooperatives that provide a more comprehensive range of services for their members. By capacitating their members, PAKISAMA may earn additional funding from marketing its members' products. The organization has also strategically partnered with AgriCOOPh to provide the capacity-building and development training needed by its members. At the same time, it focuses on its advocacy work and providing other forms of training and consultancy services.

### *Challenges*

Throughout its existence, PAKISAMA has faced several industry challenges that it became an integral part of solving. Examples of these are PAKISAMA's participation in the successful extension of the Agrarian Reform Program and the organizing months-long marches from the Southern tip of the Philippines to Manila advocating for farmers' rights and legislation. One of its greatest strengths is its ability to galvanize its network to take up the causes that the organization and its

members advocate. Nevertheless, there are several challenges that PAKISAMA is still facing and slowly overcoming.

The first of these challenges is in its ability to scale its impact and service delivery. As previously mentioned, PAKISAMA realized how small their reach is in comparison to the entire AFF sector. Even with 74,000 members, the entirety of workers in the AFF sector amount to somewhere close to ten million people. Even if PAKISAMA delivers or brokers several of the government's services, the scale at which the organization can do it may be too small for the government. PAKISAMA needs to grow and work on scaling its reach and impact.

Related to their challenge of scale is PAKISAMA's realization that they have been operating the organization like an NGO for the longest time. By operating in this manner, PAKISAMA has been heavily grants-dependent. Grant-funded projects are often limited in their scope and scale since these target one or a few communities. They may then take numerous rounds of replication to reach the ten million people in the AFF sector. The representative adds that PAKISAMA's dependence on grants needs to stop since the number of grants offered in the Philippines has been declining and getting more competitive. To address this issue, PAKISAMA is currently thinking of income-earning strategies. Several of the strategies it has thought of are marketing member cooperatives' products, providing more training and consultancy services, and utilizing some of its sleeping assets.

Growing the organization to scale its service provision is another strategy PAKISAMA is doing. Currently, the organization is seeing how it may grow its presence and workforce from 25 to more than 160. Their dream is to have at least two managerial staff in each regional office in all 18 administrative regions of the Philippines. Furthermore, PAKISAMA hopes to double its membership base to 150 by 2022. By working with other federations, associations, and groups, PAKISAMA hopes to scale up its member cooperatives to show others the value in joining the organization.

Another strategy PAKISAMA is doing is forming a training and consultancy group. Together with allies from various institutions, PAKISAMA hopes to create a pool of professionals that will provide consultancy and training services across the AFF sector. PAKISAMA realized that they would need to collaborate with all other groups and not treat them as competitors to reach the government's required scale. Once this group is set up, they plan on becoming a competitive force by participating in government bids for AFF service provision.

### *Summary*

In its 35 years of existence, PAKISAMA has brokered several innovations for its members and the greater AFF sector. Among its most significant achievements was the organization's critical role in the passage of several critical legislations to develop the AFF sector. Acting as an effective mediator in the AFF sector, PAKISAMA has organized communities, farmers, fishers, women, and youth groups. The organization provides access to a gamut of community development and capacity-building opportunities for its members by acting as a broker to government agencies and other organizations that provide these. With the expertise of its staff and network, PAKISAMA provides access to legal assistance, policy research, community organizing, and technical training for its members.

To provide all these, the organization continues to build its network of partners and members. Recently, PAKISAMA has also changed. It realized that it needed to scale up its work and go beyond depending on grants. With its experiences working with other organizations, PAKISAMA builds its knowledge and manages its network by pooling together the expertise of others. It then enlists them

in its journey of achieving more significant economies of scale in capacity building and community development in the AFF sector.

## **Appendix 5.5 Mabaling Farmer's Association (MFA)**

### *History and Purpose*

The Mabaling Farmers' Association began in 2016 and comprised 26 farmers in the Pampanga province of the Philippines. These farmers produce paddy rice, corn, and sweet potatoes. The group's name means 'to keep returning.' From the 26 farmers, the group elects leadership positions that will manage the group's expenses and activities.

According to the representative, the group's primary purpose is to provide its members access to farm machinery that would otherwise be too expensive for individuals to own and use. Since its inception, the group has been able to broker various farm equipment and even pay to maintain these items. To pay for these, the group requires an annual membership fee of Php 1,000 (approximately US\$ 20) per hectare of land a member owns.

Apart from machinery, the group is also a platform for camaraderie and relationship building for its members. The association provides simple birthday presents for all its members and even gifts each member something every Christmas.

### *Intermediary Roles*

Although a young organization, the Mabaling Farmer's Association has performed several innovation intermediary roles. Table A5.5.1 presents a summary of the activities and roles the association has done in its roughly five years of existence.

Of the four innovation intermediary roles, the most important of these that the association performs are the brokerage and resource provision roles. Coming from the interview, it seems that both roles work hand-in-hand in the experience of the association. For brokerage, the group allows its members access to and uses farm equipment the group has procured or received as a donation. As of May 2020, the group has a tractor, hand tractor, planter machine, and an irrigation pump. The group also helps its members gain access to the free livestock being given out by the government. For now, the group is saving its money to procure a harvester.

The association uses its funds to pay for its members' gas and operator expenses to use their farm machines. According to the representative, the irrigation pump is placed on stand-by in the association president's house if anyone would require it. As mentioned, the group provides birthday and Christmas gifts to its members as a form of relationship-building and support from the association.

As of the moment, the group also does not seem to be consolidating their produce together. As per the representative, members would still sell their products to the highest bidder available to each of them. The group does not do price mediation. However, the individual members do share the buyer information. During their meetings, they share farming tips, advice to one another, and market information. Apart from these, the group also discusses items they wish to procure. Furthermore, they discuss the support from the government or local officials they may request.



Table A5.5.1

*The Intermediary Organization Roles Performed by the Mabaling Farmers' Association*

Broker	Consultant	Mediator	Resource Provider
<ul style="list-style-type: none"> <li>Allows members to use machinery that was either donated by their congressman or bought by the association: tractor, hand tractor, planter machine, and irrigation pump</li> <li>The group helps its members receive livestock from the government</li> <li>No mention of produce consolidation yet</li> </ul>	<ul style="list-style-type: none"> <li>Aids each other on farming issues</li> <li>Shares buyer or market information with one another</li> </ul>	<ul style="list-style-type: none"> <li>Not planning on creating partnerships with other groups yet as they are still a young association</li> <li>It does not help members with price mediation yet</li> <li>Mediates requests to the government and local officials</li> </ul>	<ul style="list-style-type: none"> <li>Uses association funds to pay for the gas and operator expenses of communal use machinery</li> <li>Provides members with birthday gifts and Christmas gifts</li> </ul>

*Note.* The data in this table was compiled based on an interview with a Mabaling Farmers' Association representative.

As a relatively young group, the association has not yet had any partnerships with other organizations. According to the representative, the group chooses not to create partnerships with others yet to maximize working with each other first. Nevertheless, the association mediates for its members by acting as their representative to the government and local officials when requesting financial and equipment support.

#### *Intermediary Key-Capabilities*

To perform its intermediary roles, the Mabaling Farmers' Association has and continues to build necessary key-capabilities. Table A5.5.2 shows these key-capabilities and the instances that develop these.

For its external networking capabilities, despite not wanting partnerships, they have a relationship with the local government, most especially with the congressman of their district. The representative mentioned how the group writes to and meets with their congressman or governor to request machinery and financial support for their operations. Sometimes, these officials would take the initiative also to ask the association – and other groups in the area – what they need or what further support the government may provide them.

When asked about the municipal agriculture technicians, the representative mentioned that they do receive visits from them. These technicians monitor the individual farmer's progress; however, the representative is unsure why and what more the group can acquire from these technicians. According to the representative, these technicians would usually tell the members they will monitor. The association may build upon this potential relationship to receive further support from the municipal agriculture office.

For internal communication capabilities, the association meets at least once a month to discuss their issues and requests to the government. These meetings also provide an avenue for relationship-building between the members. However, because of COVID-19, the association cannot meet once a month. Instead, they recently do their meetings once every three months.

When asked about their issues, the representative mentioned that these are usually on farming issues and looking for buyers. The group can resolve these through their collective experiences as farmers and dealing with traders in their area. It is during these meetings that the group gets to share and apply their knowledge-building capabilities as farmers. Outside of these meetings, the group's leadership tries to learn what further support and aid they can request from the government. The new knowledge they acquire is shared with the group during the meetings. Buyer and market information is also shared by individual members inside and outside of these meetings.

For management capabilities, the most significant of these is the election of leaders from their group of 26 farmers. These leaders manage the activities, equipment, and funds of the group. As mentioned, each member pays an annual fee to remain in the group and access the shared equipment.

Table A5.5.2

*The Intermediary Organization Key-Capabilities Built by the Mabaling Farmers' Association*

External Networking	Internal Communication	Knowledge-Building	Management
<ul style="list-style-type: none"> <li>• Requests from the provincial government for machinery and financial support</li> <li>• Members get visits from the municipal agriculture technicians</li> </ul>	<ul style="list-style-type: none"> <li>• Association meeting every first Sunday of the month; now, once every three months because of COVID-19</li> </ul>	<ul style="list-style-type: none"> <li>• Members are farmers of rice, corn, and sweet potatoes</li> <li>• Members are long-time farmers that also have experiences dealing with traders</li> <li>• Members try to find out what support and aid they can request from the government</li> </ul>	<ul style="list-style-type: none"> <li>• Members pay Php 1000 per hectare of land they own</li> <li>• 26 smallholder farmer members</li> <li>• Membership has been shrinking as some farmers started selling their land</li> <li>• Elects leaders from its membership base</li> </ul>

*Note.* The data in this table was compiled based on an interview with a Mabaling Farmers' Association representative.

### *Challenges*

For the groups' challenges, the most significant of these are structural and challenging for the association to address for the time being. According to the representative, they have lost some members due to these individuals selling their farmlands to developers. The production areas of the association's members are relatively close to the New Clark Smart City being developed by the government. Thus, land prices in the surrounding area have been rising, leading to some members selling their lands. The representative further adds that several of their current members are also considering the sale of their farmlands.

Addressing this issue is quite tricky. One possibility for the association is to earn more money for their members by consolidating their produce. Doing so may show their current members that their farming livelihood is still profitable. Nevertheless, the government may not force the sale of their lands, especially if the ones buying these are private sector companies that seek to develop within the smart city complex. As land prices continue to rise, the association will need to develop plans to sustain its members' livelihoods as farmers or aid them in transitioning into another livelihood.

As for their other challenges, these are more farming- and buyer-related issues that the members aid each other in addressing through their collective experiences as farmers and in dealing with traders.

### *Summary*

The Mabaling Farmers' Association provides and brokers several technologies for its members, thus innovating their farm work. The association further supports this by shouldering the maintenance and usage costs for several of its shared equipment. The members also find the association as a space for relationship-building and an avenue for sharing of information.

Performing as an intermediary organization, the association has a good start in managing its funds and equipment. The group meets regularly to discuss their members' issues and addresses these through their collective knowledge-building capabilities. As a relatively young organization, the Mabaling Farmers' Association still has much growth potential. The association has yet to partner with other public or private intermediary organizations that may help their group grow further and enable innovation better for its members. Growing further and opening itself to other partners may allow the group the space and options for solving the possible loss of its members due to land sales.

## **Appendix 5.6 Luzon Mechanized Farmer and Rice Consumer (LMFRC) Facebook Group**

### *History and Purpose*

The Luzon Mechanized Farmer and Rice Consumer Group (LMFRC) was started in 2016 by an Overseas Filipino Worker (OFW). As of late April 2021, the group has 29,970 members and sees at least 21 new posts daily. The group's primary purpose is to link rice farmers, equipment manufacturers and leasers, paddy or rice buyers, and other value chain players with one another. There is only one administrator who actively sifts through posts and ensures that the discussion only revolves around the group's purpose. Members may buy or sell rice-related equipment or products or post seeking advice on farming or equipment repair. The researcher also observed posts discussing the prevailing issues like the effects of RTL and government programs like how to avail the free farm equipment and seeds the DA offers.

At the onset, however, the group was not supposed to be a platform for trade. The administrator, who is also the group's creator, initially desired a platform for farmers to share what machines they were using through photos or videos. He also wanted to promote new equipment he was looking into selling in the Philippines. Before starting the group, the creator worked as a construction site supervisor abroad, where he learned how to order various equipment from Japan, including farm machinery. On his trips back to the Philippines, he helped on his family's farm. Wanting to modernize, he saw how bringing in brand new equipment in the Philippines would incur significantly high costs, so he decided only to import used farm equipment and support local manufacturers. He recalls that one limitation of old equipment is the lack of a user's manual. To address this, he first learned how to operate these machines before bringing any more to the Philippines.

LMFRC group is present in multiple segments of the value chain, particularly in input supply, production, post-harvest processing, and milling. For most of these segments, the group provides knowledge of and linkage to equipment, machinery, and service providers. Some participation in marketing is present, but the group's primary focus is still the promotion, use, repair, and trade of rice farm machinery. According to the group's administrator, although the group has selling posts of equipment originating from other countries, priority is given to local manufacturers.

#### *Intermediary Roles*

The LMFRC group exhibits several instances of innovation intermediary roles. Table A5.6.1 presents a summary of the group's role performance as an intermediary organization.

As an innovation intermediary, the LMFRC performs more consultancy and resource provision roles, albeit these roles may not necessarily be consciously performed. Although the group administrator manages posts, the group itself is heavily driven by member interaction. The consultant role occurs most in member posts that seek advice on farming techniques, equipment use, machinery repair, among other things. As numerous members are rice farmers or equipment traders, they can advise each other based on their own experiences. Their advice is freely given through comments, with the possibility of private messaging. Some members, such as equipment traders, also introduce new foreign and local technologies available in the market.

Furthermore, the researcher observed that members also share about seminars, training, or government programs outside of the social media group. To a certain extent, price monitoring of equipment and other farm inputs is present through the posts and comparisons of items being traded in the group. Resource provision through knowledge-sharing between members is abundant.

The LMFRC group also performs some brokerage roles. However, the group does this role more as a platform rather than an active broker. The group provides a space for farmers and equipment traders to buy and sell their new or used equipment. Pricing and successful deals between members is a task left to those interested in making the trade. The group's administrator or its other members are not responsible for ensuring that a successful trade occurs. Nevertheless, the administrator tries his best to ensure that the equipment or products being sold are in the Philippines at the time of posting.

Mainly as a platform, the LMFRC group does not seem to perform mediation roles. The group administrator relays how advice is freely given and that there is no strict rule in correcting advice given by others. Everyone in the group is entitled to their own opinions. On occasion, the researcher observed debates within the comments of specific posts in the group.

Table A5.6.1

*The Intermediary Organization Roles Performed by the Luzon Mechanized Farmer and Rice Consumer Facebook Group*

Broker	Consultant	Mediator	Resource Provider
<ul style="list-style-type: none"> <li>• As a platform for new and used equipment and product trade</li> <li>• Members may also sell parts for farm equipment, especially for Japanese equipment</li> <li>• Administrator only approves selling posts if these are located in the Philippines</li> </ul>	<ul style="list-style-type: none"> <li>• Members may post questions and receive answers from other members</li> <li>• Members may also be passive and learn by reading through posts and comments</li> <li>• Introduction of new foreign and local technologies and programs</li> <li>• Advice is freely given</li> <li>• To a certain extent, price monitoring of equipment and farm inputs occurs</li> </ul>	<ul style="list-style-type: none"> <li>• Advice given may vary between members, and there is no strict rule on whether the advice is correct or not</li> <li>• On occasion, debates within posts may occur</li> </ul>	<ul style="list-style-type: none"> <li>• Knowledge-sharing between co-farmers and other value chain actors</li> <li>• Members may offer seminars or training outside of the group's purview</li> <li>• Members may also share about government programs</li> <li>• Photos and videos are available</li> </ul>

*Note.* The data in this table was compiled based on an interview with the group administrator and the researcher's observations of the group's activities.

### *Intermediary Key-Capabilities*

With its ever-growing membership base, the group also built intermediary key-capabilities. Instances that exhibit growth in the group's key-capabilities are presented in Table A5.6.2. As publicly searchable on Facebook, the LMFRC group is easily accessible to anyone interested in joining. The membership base is constantly growing and even sees OFW members. According to the group administrator, he noticed that these OFWs are mostly the children of farmers looking into investing in modern equipment for their family farms.

As a platform, internal communication capabilities may be built as more members post and comment. Although, the posts and comments may not necessarily be helpful or constructive. As the researcher has observed, some posts in the group are no longer related to the group's primary purpose. Nevertheless, the administrator still gets to remove these irrelevant posts when he has the time to do so.

Managing the group is solely done by one person. According to the administrator, he does this work for free. His passion for promoting modern rice farming technology in the Philippines drives him to manage the group. With his background, he is knowledgeable in the use, trade, and importation of new and old rice farming equipment and machinery, especially those that come from Japan. He gatekeeps and assures that the group stays relevant to its cause by reviewing current posts and, on occasion, deleting irrelevant posts. He also decides on how long posts may remain active. Now sitting above 27 thousand members, the administrator may have trouble managing and approving posts and members.

For its knowledge-building capabilities, the administrator was confident that when someone seeks advice, they can be assured that those commenting were practitioners in the rice industry. Although a significant number of those commenting are practitioners, the experience and knowledge of each of these members vary. An increase in members may not necessarily mean better knowledge-building capabilities. A large majority of the membership base may be passive accounts that do not or only seldom contribute to knowledge-sharing within the group.

### *Challenges*

The group also experiences several issues. Although members show much interest, the administrator tells of their waning interest upon learning the costs associated with farm mechanization. He clamors to have more used equipment available in the market and teach how to use and repair these properly. He also shares accounts of farmers who tried using machinery but returned to their traditional methods if the farmers experienced difficulties in adopting. An example of this is when he finds rice transplanters provided by the government being sold online because the farmers did not know how to use these machines properly. Issues like these seem to be out of the group's capabilities to address. Since joining and managing the group is freely or voluntarily done, no financial or other forms of support apart from the linkage and consultation is possible.

When debates on a post ensue, no resolution is made as the issues raised remain in the post where individual members comment. If posts are being spammed multiple times, the administrator will delete these posts.

Table A.5.6.2

*The Intermediary Organization Key-Capabilities Built by the Luzon Mechanized Farmer and Rice Consumer Facebook Group*

External Networking	Internal Communication	Knowledge-Building	Management
<ul style="list-style-type: none"> <li>• Online nature allows for a wider audience (presence of OFWs)</li> <li>• Growing membership base</li> </ul>	<ul style="list-style-type: none"> <li>• Sending of personal messages to one another</li> <li>• Ability to freely post inquiries, equipment demonstrations, items for trade, opportunities to learn (e.g., seminars and training) related to rice farming</li> </ul>	<ul style="list-style-type: none"> <li>• Members are practitioners or persons that work in the rice value chain</li> <li>• The administrator is knowledgeable about equipment importation, trade, and use of new and old rice equipment and machinery</li> </ul>	<ul style="list-style-type: none"> <li>• Free service; no payment to administrators and moderators</li> <li>• Administrator, on occasion, deletes posts irrelevant to the group's purpose</li> <li>• Gatekeeping how long posts remain active</li> <li>• The administrator is serious about mechanization and promoting modern farming technology</li> <li>• The administrator may be experiencing difficulty in managing posts</li> </ul>

*Note.* The data in this table was compiled based on an interview with the group administrator and the researcher's observations of the group's activities.



### *Summary*

Nonetheless, the LMFRFC group performs as an innovation-enabler by being a platform for equipment trade, knowledge and advice sharing, and the promotion of available technologies in rice farming. The administrator relays how new members are farmers or relatives of farmers interested in modernizing their rice operations. Furthermore, he recounts the desire shown by their OFW members in returning to their family farms, thus continuing their family's business. As an online platform, the LMFRFC group provides easy access to knowledge, information, advice, and linkages for farmers and other rice value chain actors.

Unfortunately, the researcher could not receive feedback regarding LMFRFC as none of the regular group members responded to the call for interviews.

### **Appendix 5.7 Chen Yi Agventures, Inc.**

#### *History and Work*

Chen Yi Agventures, Inc. is a private firm started by a French-Filipino couple around 2014. Seeing the devastation brought by Typhoon Haiyan in 2013, the couple was moved to uproot themselves from their life in France and go to the affected areas in the Leyte province of the Philippines. Then, the couple did not know what kind of aid they could provide. Upon arriving and traveling around the typhoon-stricken areas, they noticed that there were significant patches of rice paddies but no processing or milling centers in the province. Realizing this, they decided to help the rice farmers in the region by setting up a state-of-the-art rice processing center and provide the most technologically advanced support possible.

According to the Chen Yi Agventures representative interviewed, the couple began by learning about the rice industry, its processes, and its issues. Before coming to the Philippines, the couple had no experience nor background in rice farming. They had a lot to learn but were aware of the resources available to them. One of the first things they did was to survey roughly 4000 farmers from the province to learn about their needs, issues, and capabilities. The couple also made trips to the International Rice Research Institute (IRRI) and the Philippine Rice Research Institute (PhilRice) to learn of the developments and specificities of rice cultivation in the Philippines. The husband also traveled around South East Asia, China, and Japan to learn how farmers in those countries produce rice and learn the technologies available. After learning all that they could, they decided to use the technologies from Japan for their rice processing center.

Investing about 1.7-billion Philippine Pesos (approximately US\$ 34 million) for their facility, Chen Yi Agventures created the most advanced rice processing center in South East Asia (Gonzales, 2019; Ochave, 2020). Their operations are fully automated, begin with job orders, have silos that keep dried paddy at a constant 21 degrees Celsius to ensure freshness, state-of-the-art milling, and high-quality packaging to keep the rice clean and at its best (Chen Yi Agventures Inc., 2018b).

Alongside assuring high quality in their value chain's downstream activities, the couple also began the Renucci Rice Partnership Program to develop and help farmers earn more from paddy production. Through the program, Chen Yi Agventures cuts the middleman by buying their paddy direct from the farmer. Once a farmer is enrolled in the program, they are provided zero-interest loans for high-yielding seeds, low-interest loans for imported fertilizer and pesticides, access to farm machinery for land preparation, production, and harvesting, and free technical advice from the company's agricultural or field technicians. Through this program, Chen Yi Agventures has uplifted

the state of numerous farmers and hopes to continue to do so in the years to come. Currently, they have around 700 farmers enrolled in their partnership program (Ochave, 2020).

By automating and mechanizing rice production, the couple hopes to how fully modernizing operations bring about more significant development and impact not only for the product but also for the producers. As a testament to the work and dedication to quality that they strive for, their rice, branded under Dalisay Rice, won the third best rice in the world in 2019. With its success, the couple is now working on expanding sales in the domestic market and soon exporting its products (Arcalas, 2020).

### *Intermediary Roles*

Traditionally, innovation intermediaries are known to be third-party organizations that often take a neutral stance (Howells, 2006). However, Chen Yi Agventures' experience seems to allude to that the company can perform roles associated with innovation intermediaries even as a private firm. Table A5.7.1 provides a summary of their role performance in enabling innovation in the rice sector.

Of the four roles, Chen Yi Agventures performs brokerage and resource provision roles the most. Through its operations, the company could broker farm machinery that farmers may use once they have enrolled in the Renucci Rice Partnership Program. Alongside this, the company provides the necessary farm inputs at either zero interest for seeds and low interest for fertilizers and pesticides. According to their data and news reports, their partner farmers have seen growths in yield by two to three times, or an increase of 40 to 50 more sacks of paddy per hectare (Chen Yi Agventures Inc., 2018a; Desiderio, 2020). With their processing facility as an example, Chen Yi Agventures shows that downstream processors can be highly sustainable even with heavy capital investment.

Through the Renucci Rice Partnership Program, the company can act as an innovation consultant. Incorporated into the program are site visits by Chen Yi Agventures agricultural and field technicians. According to the representative interviewed, these technicians support the farmers by monitoring their activities and teaching them ways to care for their crops properly when problems arise. By acting as a consultant, Chen Yi Agventures attempts to slowly change the mindset of farmers on how much farm mechanization and adoption of modern farming techniques can increase paddy yield.

The partnership program is also the company's main avenue to practice mediation and partnership creation. As mentioned, Chen Yi is currently partnered with 700 farmers in Leyte alone. For now, they do not plan on expanding their farm and milling operations beyond their initial site. Another possible instance of mediation is their integration of several value chain activities. Chen Yi Agventures controls its entire value chain by being the paddy aggregator, post-harvester, miller, and marketer of its own branded rice products. Instead of procuring dried paddy from traders, they directly purchase their supply from rice farmers, simultaneously supporting them through its partnership program.

### *Intermediary Key-Capabilities*

To properly perform its intermediary roles, the company has built a solid base of key-capabilities. Table A5.7.2 presents a summary of these key-capabilities.

Table A5.7.1

*The Intermediary Organization Roles Performed by Chen Yi Agventures Inc.*

Broker	Consultant	Mediator	Resource Provider
<ul style="list-style-type: none"> <li>• Began one of the first rice processing centers in Leyte</li> <li>• Increased farmer yields by 40 to 50 bags of paddy per hectare</li> <li>• Exposure of local farmers to one of the most advanced rice processing facilities in Asia: fully automated, data collection at all points, and has a job-order system</li> <li>• Markets rice online and through several supermarket chains</li> <li>• They allow farmers to mechanize farm operations</li> </ul>	<ul style="list-style-type: none"> <li>• Through the Renucci Rice Partnership Program, agriculture or field technicians are provided through continuous farm visits to partner farmers</li> <li>• Trying to change the mindset of farmers through the Renucci Rice Partnership Program</li> </ul>	<ul style="list-style-type: none"> <li>• Partners and engages with farmers through the Renucci Rice Partnership Program</li> <li>• Direct contact purchase from farmers</li> <li>• Controls distribution of their product</li> </ul>	<ul style="list-style-type: none"> <li>• Provision of seeds at zero interest; seeds come from PhilRice</li> <li>• Provision of imported fertilizers and pesticides at low-interest</li> <li>• Provision of farm machinery for land preparation, paddy production, and harvesting</li> </ul>

*Note.* The data in this table was compiled based on an interview with a Chen Yi Agventures representative and secondary desk research done by the researcher.

Table A5.7.2

*The Intermediary Organization Key-Capabilities Built by Chen Yi Agventures Inc.*

External Networking	Internal Communication	Knowledge-Building	Management
<ul style="list-style-type: none"> <li>• Partnered with PhilRice to ensure that they get top quality certified seeds</li> <li>• Initially approached the local government to garner support</li> <li>• No plans of expanding farm operations beyond Leyte yet</li> <li>• Visited SEA, China, and Japan to gather the best practices in rice production</li> <li>• Currently looking into the export market, but they still need to drive down their price</li> <li>• Previous work experiences as a fund manager and a book publisher</li> </ul>	<ul style="list-style-type: none"> <li>• The one company controls all operations</li> <li>• Their technicians consistently visit partner farmers</li> </ul>	<ul style="list-style-type: none"> <li>• Needs to be an engineer to work in the Leyte facility</li> <li>• Development of the facility and training of the staff was provided by nine in-house Japanese engineers that stayed on for the first two years of operation</li> <li>• Surveyed approximately 4000 farmers and did their research to set up all of their operations and learn farmer needs</li> <li>• Visited SEA, China, and Japan to gather the best practices in rice production</li> <li>• They used to do R&amp;D on seed varieties but later decided to procure these from PhilRice</li> </ul>	<ul style="list-style-type: none"> <li>• Has over 100 permanent employees; expands to 250 workers during the harvest season</li> <li>• Built facility bearing in mind GMP and ISO certifications as minimum standards</li> <li>• The entire value chain operation is fully managed and built by the French-Filipino couple</li> </ul>

*Note.* The data in this table was compiled based on an interview with a Chen Yi Agventures representative and secondary desk research done by the researcher.

The initial knowledge-building done by the founders was quite essential in their success. They initially surveyed over 4000 farmers to learn of their needs and issues. Moreover, they visited IRRI and PhilRice to gain all the knowledge possible for rice production. They also traveled across South East Asia, China, and Japan to learn and gain the best practices and most modern technologies available to them. With these, Chen Yi Agventures built the most advanced rice processing center in South East Asia.

To ensure that their capabilities and the facility are not put to waste, they only hire certified engineers to work in the rice processing center. These engineers were also trained by nine in-house Japanese engineers that came from the Japanese company Chen Yi Agventures partnered with to attain and build the facility. These Japanese engineers stayed for the first two years of operations to ensure that the local staff mastered the technology.

As a last note on knowledge-building capabilities, Chen Yi Agventures also used to conduct R&D on rice seed varieties to provide their farmers. Later on, they decided to partner and procure the high-yielding seeds of PhilRice and provide these seeds to their partner farmers in Leyte.

Going back to their operations, Chen Yi Agventures has also built a solid management capability base. As of the interview, they have at least a hundred permanent employees that balloons to around 250 persons during the harvest season. In establishing their rice processing center, the company made sure that it was built with GMP, ISO, and all other necessary certifications in mind.

As Chen Yi Agventures controls its entire value chain, the company can manage and monitor all of its operations independently. With their processing center fully automated, the company can control milling operations and only produce milled rice based on job orders. They also control their distribution channels. With the company able to control all value chain points from input supply to marketing, they can more easily communicate within the different points of their operations.

Another opportunity to build and practice their internal communication capabilities is the site visits performed by their agricultural and field technicians to their partner farmers. Conducting these checks and monitoring allows the company to learn how best they can support their partner farmers.

For its external networking capabilities, from the very beginning, the French-Filipino couple seemed to have a strong base already, possibly built from their previous work experiences as a fund manager and a book publisher. When the couple arrived in Leyte, they did not know anyone. They had to build all the connections from scratch, which shows that they can capably expand their network.

Currently, the company is planning to expand its distribution to the export market. However, they still need to overcome some challenges in their product cost.

### *Challenges*

Regarding challenges, the first that the couple faced was having no local ties upon arriving at Leyte. To overcome this, they started approaching the local government and other people in the province to support their surveying of the area and the farmers to identify where they could invest. Following their decision to create the most advanced rice processing center in the region, they started building their project but soon encountered a costly obstacle. As per the representative, he said that the very first contractor they hired to build the facility ran off with their 40 million Peso investment. Unfazed, they continued with their project with another and more trustworthy contractor. Unfortunately, the couple was unable to find the person that scammed them and retrieve their money.

As they started their operations, they also faced several deeply rooted challenges in the rice industry. One of these was the need to change the mindset of farmers to adopt modern technologies. The company realized early on that simply providing seeds to farmers would not do. Chen Yi Agventures found that most rice farmers in their area had poor water management capabilities and needed to learn these as soon as possible. Compounding this issue was the culture of hiring farm laborers or sub-contracting farm work. These people may not necessarily have the incentive to develop and care for the land as if it were their own. Besides adopting modern technologies, Chen Yi Agventures needed to show how rice farming could be lucrative for landowners and those who work on the farm.

Creating the Renucci Rice Partnership Program was their response. The program assures farmers that the company will buy their paddy and provide all the farmer's inputs through zero to low-interest loans. It is not precisely contract farming as the farmers still have their agency and responsibility in repaying loans but are incentivized by the possibility of earning much more. Though farmers are given the opportunities to use modern machinery and receive aid from agricultural technicians, Chen Yi Agventures does not force the use of these. Rather, they try to persuade the farmers by showcasing the success of those who adopt and use these innovations as examples. Nevertheless, even with all the support, some issues still prevail. The representative lamented that the company had experiences where partner farmers under the program sold their high-quality paddy to local traders to settle outstanding debts with the trader. Unfortunately, Chen Yi Agventures could not do anything yet about these instances. However, they continue to support these farmers the best they can.

Finally, the company is now facing the challenges created by the influx of cheaper imported rice and the effects of COVID-19. As Chen Yi Agventures hopes to expand and compete globally, the company is now finding ways to drive down its costs. Fortunately, the increase in productivity of their farmers has decreased the cost of their paddy production but still not on par with imported varieties (Arceo-Dumlao, 2020). With their Dalisay brand rice sold at a premium, Chen Yi Agventures has also decided to produce and introduce a cheaper variety: Dinorado Heirloom.

### *Summary*

Based on Chen Yi Agventures experience, it seems that a private firm can perform as an innovation intermediary. However, compared to a traditional firm, one distinguishing factor is the founders' desire to uplift and aid the rice farmers in Leyte. From their arrival in the Philippines up to this point of their operations, they ensure that their partner farmers benefit from the company through resource provision, machinery use, and procuring paddy at fair or higher than market price. Chen Yi Agventures highly values the quality of its rice and is not afraid to share its resources to ensure that they keep that standard high. The company has built a solid foundation of necessary key-capabilities to drive their success, eventually awarding them the third-best rice in the world in 2019. Faced with the perennial and evolving challenges in the country's rice industry, Chen Yi Agventures continues its work to enable innovation for its rice farmers.

## **Appendix 5.8 AgriCOOPh**

### *History and Work*

The history of the Philippine Family Farmers Agriculture-Fishery-Forestry Cooperatives Federation, or more known as, AgriCOOPh, began in 2015 during a national agriculture conference attended by 80 farmer organizations. In that conference, the attendees collectively agreed that the

agriculture, fisheries, and forestry (AFF) sector needed a sector-encompassing federation to address the challenges of management, governance, and overall development of cooperatives. In August 2017, after a series of strategic planning workshops, several attendees of the conferences established AgriCOOPh. With a development strategy in place, the group continued their meetings the following year with business planning workshops and consultations with cooperatives. At that time, AgriCOOPh was finalizing its framework and method to support the cooperatives federated under them. By August 2018, they registered the organization under the Cooperative Development Authority and is recognized by the government as the national apex of primary AFF cooperatives in the Philippines.

AgriCOOPh considers itself an NGO but runs as a business by providing various services to its member cooperatives and earning commissions through some agricultural trading. The organization works under a whole value chain paradigm. Its services aim to improve participation and link actors in the value chain. The organization's support may come as training and workshops on governance, cooperative management, business development, and support in marketing, agricultural planning, and financial assistance. To differentiate themselves from similar organizations, the AgriCOOPh representatives proclaimed that they specialize specifically in developing agricultural cooperatives and agriculture-based enterprises, especially those with micro- to small-scale operations.

As a growing national federation, AgriCOOPh, as of early May 2021, comprises 30 primary cooperatives with a combined membership of approximately 500,000 individuals. Most of its members are medium- to large-scale cooperatives, and several are billionaire cooperatives. The cooperatives are involved in the production of rice, corn, cocoa, coffee, banana, palm oil, coconut, cassava, vegetables, livestock, rubber, abaca, and organic fertilizer. About half of the member cooperatives participate in the rice industry. To become a member, a cooperative must pay an initial fee of Php 25,000.00 (approximately US\$ 500.00). As a member, each cooperative must adhere to its duties and responsibilities. These include embodying the federation's mission and vision, availing the services of AgriCOOPh, participating in its projects, and supporting or creating activities that support the development of other member cooperatives. By complying with membership requirements, member cooperatives may run for board positions of the federation.

The organization has two offices, its main office in Metro Manila and a satellite office in Cebu. As of early May 2021, AgriCOOPh has 13 staff working for both offices. Since it is a relatively new organization, AgriCOOPh has only recently filled up its human resource requirements. Regarding their staff experiences, many came from NGOs and other organizations involved in agricultural or cooperative development. Also, they have staff that has experience working or are trained in AFF management and development communications.

Besides daily operations, its staff is divided to provide their three primary services: capacity building, business development, and supply and marketing services. Its capacity-building services involve assessments and profiling of each member cooperative, tailoring development plans, and providing training and mentoring to guide the development of their members. Under its business development services, AgriCOOPh provides new ideas, information, and opportunities for its members to improve their agri-food businesses. They do these by conducting value chain analysis and market research, crafting business plans, or creating cooperative business hubs between their members. On the other hand, supply and marketing services see AgriCOOPh performing product matchmaking for its cooperatives and providing financial aid through its bridge financing program.

To be a sustainable business, AgriCOOPh charges service fees for each of the activities it provides its members. As its membership base grows, so too will its income from service fees. When

it provides loans, the organization charges a minimal interest rate. Apart from service fees and loan interest, AgriCOOPh also receives commissions from its market trading and linking services. Furthermore, the organization applies and receives funding through grants offered by funding agencies and donor partners. About 60% of its budget and revenue come from the support provided by its funding and donor partners.

As a national federation, AgriCOOPh may also be a recipient of the law-mandated Cooperative Enhancement and Training Fund (CETF). The CETF is an amount that primary cooperatives annually remit to organizations they are members of. According to AgriCOOPh representatives, the CETF is a competitive fund. Each cooperative decides the percentage each group they are a part of will receive. The representatives further state that receiving a larger share of member CETFs signifies the growing trust and support in the work that AgriCOOPh provides. As per AgriCOOPh's by-laws, the organization must use 60% of the amount they receive to support the skills development of its member cooperatives and the remaining 40% to sustain the governance and management of the federation.

### *Intermediary Roles*

AgriCOOPh acts as an intermediary, enabling innovation for its member cooperatives through its services. It has provided organizational and market innovation for most and product innovation for several of its members. Table A5.8.1 presents a summary of its innovation intermediary roles.

For its brokerage role, AgriCOOPh provides a gamut of training services. The training topics include the basics of agriculture cooperatives, primers on value chains, cooperative services management, marketing, human resource management, good governance modules, building entrepreneurship, developing food cooperatives, and crafting business development plans. According to the representatives, their training services are tailored to the needs and context of each cooperative. They are meant to increase or strengthen the participation of their member cooperatives in their respective value chains. Apart from the training that AgriCOOPh may provide, the organization also offers its members access to training, seminars, and workshops offered by their partner organizations.

Another brokerage function AgriCOOPh does is giving access to markets for its members. Through its supply and marketing services, the organization brokers market access in three ways. First, by linking member cooperatives to other member cooperatives. An example of this was brokering a cooperative that produced red rice to a cooperative interested in selling red rice in their area. The second market brokerage AgriCOOPh does is linking member cooperatives to non-member organizations, firms, or directly to consumers. An instance of this was linking one ginger-producing member cooperative to a tea-producing company and a retailer in need of ginger suppliers.

AgriCOOPh also created a program and platform they call Coops4Food, where other cooperatives, retailers, and consumers may purchase products from member cooperatives. Unfortunately, the Coops4Food initiative was not sustainable. According to a representative, the program was generated under the guise of action-oriented research rather than as a business. Because of this initiative, AgriCOOPh decided to create a similar project that will set up an e-commerce platform for its members and consumers.

Finally, AgriCOOPh also brokers market access for non-members to other non-member clients. This third brokerage path was born out of the COVID-19 pandemic. Individuals and groups in the AgriCOOPh network requested help in marketing the produce of farmers that lost sales due to the restrictions placed.



Table A5.8.1

*The Intermediary Organization Roles Performed by AgriCOOPh*

Broker	Consultant	Mediator	Resource Provider
<ul style="list-style-type: none"> <li>Provides a whole value chain approach in its training services</li> <li>Provides access to training and other resource opportunities of their partners</li> <li>Training services are on cooperative management, governance, and development</li> <li>Brokers markets for products of its members through its matchmaking service</li> <li>Created unified branding for several products that their members may supply</li> </ul>	<ul style="list-style-type: none"> <li>Provides consultancy on cooperative management, governance, and development</li> <li>May do value chain analysis and market research for members</li> <li>Conducts initial assessment for all member cooperatives then tailors organizational development proposals for each</li> <li>Hires external consultants to address needs they are not experts in</li> </ul>	<ul style="list-style-type: none"> <li>Stands as the representative of their members during negotiations and possible collaborative projects</li> <li>Mediates trade and product matchmaking between members, member to non-members, and non-members to non-members</li> <li>Building a centralized database that they plan on transforming into an e-commerce platform for direct marketing to consumers</li> <li>Conducted roundtable discussions for investments in the rice value chain</li> </ul>	<ul style="list-style-type: none"> <li>Shares market information to their members</li> <li>Provides financial support for projects</li> <li>Provides loans through bridge financing</li> <li>Shares information for training, projects, funding, and other resources to members</li> <li>Provides opportunities for learning from international partners through exposure trips or visits to other countries or visits from international partners</li> </ul>

*Note.* The data in this table was compiled based on an interview and a focus group discussion with AgriCOOPh and secondary desk research done by the researcher.

In addition to these, AgriCOOPh also managed to create unified branding for several products: coconut oil, banana chips, mongo seeds, corn, and well-milled rice. Under their Verdelaine and AgriGain brands, member cooperatives may supply them to AgriCOOPh, who will then market these products to retailers across the nation.

As a consultant, AgriCOOPh provides expert advice on cooperative management, governance, and development. It provides these for its members and their partner organizations and other organizations that request their expertise. Suppose one of their members requires commodity or industry-specific advice. In that case, AgriCOOPh will hire external consultants or do a call for proposals that may address the needs of its members. AgriCOOPh reported having about 16 consultants working with them as of May 2021. One case of this is AgriCOOPh accepting the proposal of an industry expert in processed tuna production for one of their member cooperatives in the Mindanao region interested in venturing and expanding in the tuna industry.

Another aspect of consultation that AgriCOOPh does is tailoring cooperative development and business development plans for their member cooperatives. After assessing a member's state and needs, AgriCOOPh presents its plan for the cooperative's development and proceeds with it upon the agreement of their member. Moreover, AgriCOOPh also does value chain analysis studies and market research upon the request of its members.

A role AgriCOOPh performs rather abundantly is mediation. As a federation, it often stands as the representative on behalf of its member cooperatives during negotiations for projects or when other organizations offer collaborative projects or training. AgriCOOPh assesses how these offers benefit their members and also identifies which of their members are eligible or may be interested. To do this, AgriCOOPh utilizes its membership database that houses all the information it has gathered from the membership profiling and organization scanning activities. A similar mediating action that will use its membership database is the e-commerce platform they are building.

AgriCOOPh may also begin the mediation process by hosting its activities, such as the 2019 roundtable discussion it conducted to raise investments in the rice industry. During this event, AgriCOOPh invited its member rice cooperatives, international funding agencies, government agencies, and other related organizations to discuss and propose ways to improve national competitiveness in the rice industry. By the end of the event, several funding agencies pledged to establish more rice processing centers to provide rice farmers more access to milling and other post-harvest processing.

AgriCOOPh's matchmaking and trade facilitation in its supply and marketing services programs is another vital mediation function. AgriCOOPh may initiate the conversation between its members to address the supply and demand needs using its membership database. Members may also avail of the organization's mediation services in searching for markets outside of its pool of member cooperatives. Moreover, as earlier stated, non-members have also begun requesting for AgriCOOPh's mediation in market access.

As a resource provider, AgriCOOPh offers other resources besides its training, consultancy, and matchmaking services. They provide financial assistance through a bridge financing program they offer their members. When meditating and brokering trades between member cooperatives, AgriCOOPh may provide a loan to the purchasing cooperative if they require financial assistance in the trade. This loan will have a corresponding interest rate. However, a representative assured that the rate is relatively low and in favor of the loaning cooperative. Apart from bridge financing, AgriCOOPh may aid in funding projects of its members. During the COVID-19 pandemic, AgriCOOPh also

mediated and managed the distribution of a resiliency fund offered by several of its donor and partner agencies.

Aside from financial assistance, AgriCOOPh provides market information and development opportunity offers to its members. When they receive information for training, seminars, funding, or projects, AgriCOOPh forwards this information to their members. They also aid their interested members in applying for these. Suppose the call for participants targets a specific group. In that case, AgriCOOPh identifies which among their members may be eligible and offers it to them. Apart from these offers, AgriCOOPh, and its billionaire cooperative members also offer their facilities for their smaller co-members to visit and learn. Similarly, some AgriCOOPh's international cooperative farmers may also open their facilities to visits from the member cooperatives.

As it does its work, AgriCOOPh would often perform several of these innovation intermediary roles simultaneously, especially when conducting supply and marketing services. An example of this was when it matched two of its members to trade red rice. AgriCOOPh mediated by initiating and identifying the trade partners and brokered the trade by ensuring that it was successful. Another instance was for its member interested in developing in the tuna industry. AgriCOOPh found an industry expert that proposed the project and business plan. It then mediated between the project proponents, brokered the partnership, and AgriCOOPh will provide its marketing services for the products generated by its member. As AgriCOOPh's CEO puts it, they provide their resources and knowledge in agricultural cooperative and enterprise development by delivering these through their consultancy, brokerage, and mediating mechanisms.

#### *Intermediary Key-Capabilities*

To perform its intermediary roles successfully, AgriCOOPh was endowed with several of key-capabilities as it was being established. As a young organization, it fosters its key-capabilities to provide better services to its current members and expand its reach. Table A5.8.2 gives a summary of how AgriCOOPh builds its key-capabilities.

Following the resolution of creating a national federation for AFF sector cooperatives, the founders of AgriCOOPh, supported by several international and local AFF experts and network organizations, underwent a series of planning and strategic workshops organization's mandate and roles. Succeeding these, the leaders proceeded to craft a business development plan for AgriCOOPh to ensure that organization will be viable as it does its work. Even if the founders decided to list AgriCOOPh as a non-profit foundation, they understood the necessity of managing the organization professionally. They opted to operate it as a business. Although it took over a year to establish AgriCOOPh, the time and effort spent by the initiators in strategizing its business model served as a solid base for the organization's management capabilities.

AgriCOOPh charges reasonable fees for its services to earn from its service delivery rather than providing these for free. Furthermore, the organization continues to create unified branding for some standard products that their member cooperatives produce. It also receives a fee for marketing these to retailers and consumers. AgriCOOPh also receives additional funding from grants from their donor and international partners. AgriCOOPh continues to develop ways to sustain itself financially to support its 30 member cooperatives.

Table A5.8.2

*The Intermediary Organization Key-Capabilities Built by AgriCOOPh*

External Networking	Internal Communication	Knowledge-Building	Management
<ul style="list-style-type: none"> <li>• Part of multiple international and local AFF and NGO networks</li> <li>• Expands network by tapping contacts from previous work of staff or through referrals</li> <li>• Open to project proposals from other organizations</li> <li>• Communicates through their social media pages</li> </ul>	<ul style="list-style-type: none"> <li>• Conducted consultations with its members and stakeholders before beginning its work</li> <li>• Constantly sends follow-ups to its members regarding inquiries and projects</li> <li>• Supports partners' projects by attending these too</li> <li>• To remain a member, one must adhere to their duties and responsibilities like availing of AgriCOOPh services and participating in events</li> <li>• Shares evaluations and plans to members during their annual General Assembly</li> <li>• Larger member cooperatives mentor small members</li> </ul>	<ul style="list-style-type: none"> <li>• Conducted consultations with its members and stakeholders before beginning its work</li> <li>• Profiles all new members to learn their needs, opportunities, and weaknesses</li> <li>• Ensures their members learn and develop by conducting assessments at every step of their projects or programs</li> <li>• Staff have backgrounds working in the AFF sector, cooperative development, agricultural management, development communications, and work experiences from like organizations</li> <li>• CEO has a vast network of contacts from the AFF sector</li> <li>• The staff attends training provided by partner organizations to hone their skills</li> </ul>	<ul style="list-style-type: none"> <li>• Conducted a year worth of planning and strategizing to ensure the organization's viability</li> <li>• Operates as a business but listed as a non-profit federation; direct player in the value chain</li> <li>• Focused on the governance and managerial development of cooperatives</li> <li>• 13 staff members</li> <li>• Gets funds from donor partners and service fees</li> <li>• Has 30 member cooperatives with a combined membership of approximately 500,000 individuals</li> <li>• Very young organization (began in 2017) but rich in knowledge</li> <li>• The hiring of a knowledge management officer</li> </ul>

*Note.* The data in this table was compiled based on an interview and a focus group discussion with AgriCOOPh and secondary desk research done by the researcher.

During its planning stages, AgriCOOPh also began working on creating a foundation for its knowledge-building capabilities. Apart from generating its business model and strategy, the initiators of the organization also conducted several consultations with its would-be member cooperatives. These consultations were done to learn what their members expected of AgriCOOPh and to create a baseline for needs and issues they face.

Another knowledge-building action and application of these that AgriCOOPh does is the profiling of its member cooperatives. Upon becoming a member, a cooperative is treated to a series of scanning activities that gives AgriCOOPh an understanding of their member's context, needs, opportunities, and weaknesses. AgriCOOPh then applies this knowledge in tailoring development plans for its members. It also ensures the learning and development of their members by conducting multiple stages of assessments and checks as their members undergo the agreed-upon organizational development program.

To provide its services, AgriCOOPh has recently filled its staffing requirements. The skills and capabilities of its staff also add to the foundation of the organization's knowledge-building capabilities. When hiring staff, AgriCOOPh looks for people with backgrounds or experiences working in the AFF sector and cooperatives. Their staff have degrees or are trained in cooperative development, agricultural management, and development communications. According to a representative, several have worked in organizations that also provided cooperative development training. The CEO of AgriCOOPh is also vital in the organization's knowledge-building as his work experience and network revolved heavily in the AFF sector. Because of this, AgriCOOPh can tap on the expertise of the CEO's network to provide commodity- or industry-specific support for their members. Similarly, the work provided by these experts helps build AgriCOOPh's staff individual capabilities as well.

One key management and knowledge-building capability decision that AgriCOOPh took is the hiring of a knowledge management officer. According to the CEO, in early 2020, they realized the significance of having an online presence and a person dedicated to managing the knowledge and technological resources available to AgriCOOPh. Thus, they approached one of their funding partner organizations and proposed hiring a knowledge management officer. By having one, AgriCOOPh has been able to expand its reach online.

Regarding the training of its staff, AgriCOOPh has not yet conducted any formal staff development training. However, the staff receives project-based training for trainers who will download these sessions to the member cooperatives. Furthermore, its staff is given opportunities to attend capacity development training workshops provided by AgriCOOPh's many partners offered to members. Examples of these are workshops on value chain analysis and cooperative management. Looking ahead, AgriCOOPh staff hope to conduct training on the basics of cooperatives, leadership and management, business and marketing, and procurement and production management for their professional development.

For its internal communication capabilities, AgriCOOPh develops these through its consistent and constant communication with its members. They also set off on the right foot by organizing consultations with their stakeholders before their work. Moreover, conducting several feedback sessions with their members, from the development proposals to its implementation, adds to the relationship building between AgriCOOPh and their members. In addition to its services, AgriCOOPh builds internal communication by participating in events hosted by its members. AgriCOOPh also presents updates on their work and the federation's plans during their annual General Assembly.

Likewise, their members foster the network between them and AgriCOOPh by adhering to the duties and responsibilities expected of them. Included in these are availing AgriCOOPh's services and programs and participating in projects and programs of other members. The member cooperatives also strengthen their relationship with one another as they interact as board members of AgriCOOPh. Moreover, the larger and more experienced member cooperatives build on internal communication and knowledge-building by providing mentorship for the smaller member cooperatives.

For its external networking capabilities, AgriCOOPh has a solid foundation for this as the organization was erected by multiple AFF sectors and supporting organization networks. By being affiliated with these networks, AgriCOOPh is also able to expand its reach nationally and internationally. Currently, they are affiliated and partners with the Asian Farmers' Association for Sustainable Rural Development, the Philippine Cooperative Central Fund Foundation, the Philippine Cooperative Center, USAID, AgriTerra, the Collectif Stratégies Alimentaires, the Confederación Alemana de Cooperativas, ACDI/VOCA, the Asian Partnership for the Development of Human Resources for Rural Areas, and the Global Green Growth Institute. Moreover, AgriCOOPh collaborates with several organizations to share and provide services. They work with organizations such as the National Confederation of Small Farmers' and Fishers' Organization, more locally known as PAKISAMA, the Cooperative Development Authority, the Philippine Partnership for the Development of Human Resources for Rural Areas, We Effect NGO, the Philippine Partnership for Sustainable Agriculture, FarmCoop, the Nueva Segovia Consortium of Cooperatives, the Foundation for a Sustainable Society, the Peace and Equity Foundation, the TRIAS NGO, the Philippine Business for Social Progress, the Caucus of Development NGO Networks, and the COOP NATCCO Network.

Furthermore, AgriCOOPh expands its network and reach of cooperatives and AFF sector organizations through its staff's contacts and referrals of friends. Such was the case during the COVID-19 pandemic, where several referrals from friends and affiliates requested the marketing services of AgriCOOPh for non-member cooperatives and groups. In addition to these, AgriCOOPh remains open to proposals from other organizations for collaborations, partnerships, and networking.

Finally, AgriCOOPh maintains and announces its presence and updates online through its social media pages. AgriCOOPh's knowledge management officer consistently monitors and updates their social media accounts to show their accomplishments and opportunities that others may support. Through its active online presence, the group hopes to expand its membership and pool of supporters.

### *Challenges*

As an organization of just three years of age, AgriCOOPh's biggest challenge is to prove that it can deliver on its promises and services. Several organizational assessments by their donor and partner agencies highlight the need for AgriCOOPh to set itself apart from similar organizations that provide similar services. Moreover, these reports cautioned the speed at which the AgriCOOPh was growing. Confirmed by one representative, the organization had numerous activities planned at its birth but still lacked the personnel to manage these. Nevertheless, these reports underline the potential of AgriCOOPh. The concept is good but, as it is still young, the sustainability of the organization's business model is still put into question. However, one positive outcome that shows AgriCOOPh is slowly proving itself is its report on the growing CETF share it receives from its members.

As AgriCOOPh hired more staff and built its momentum, the COVID-19 pandemic struck. Due to the restrictions imposed stemming from the pandemic, the organization experienced several project delays. Before the pandemic, AgriCOOPh conducted their activities physically, visited member cooperatives, and held learning and exposure trips between members and abroad. However,

because of the travel restrictions set by the government, communication with their members became limited to mobile calls or internet-based video conferences. The restrictions limited their capacity building services and the research conducted by their business development unit. Many of the studies they began required observation and immersion in the daily operations of their member cooperatives. However, the circumstances heavily reduced their data collection to online interviews and surveys subject to the members' availability. AgriCOOPh's supply and marketing services were also unable to maximize trade opportunities and negotiations, especially for difficult-to-contact areas that required physical visits. Not all their members adjusted to the technological requirements because of their geographic locations. Several members resided in areas that were not endowed yet with cellular signal or broadband internet connections.

Still, AgriCOOPh would do constant following-up to address this issue, hoping that their members would be in an area with a cellular signal at the time of a call. At the beginning of the pandemic, it proved quite a challenge. However, as months passed, more members gradually adjusted to using the newer modes of communication. AgriCOOPh modified its activities to be held online, with training, seminars, and meetings conducted via different web-based platforms. Simultaneously, the organization also contracted resource persons located in or close to their members to curb the travel restrictions between provinces. AgriCOOPh is now building a pool of localized resource persons and organizations that may support its work. Through these efforts, AgriCOOPh has been able to organize some training and seminars in several areas physically. Although risky, AgriCOOPh staff, resource persons, and member cooperatives abide by the minimum health protocols to ensure that they can safely conduct their activities.

Another challenge caused by the pandemic was the disruption of market access of its member cooperatives. To aid their members, AgriCOOPh ramped up and developed further its supply and marketing support services. One strategy they employed was supporting product resellers for those that lost their jobs during the pandemic. In the beginning, AgriCOOPh would promote their products and find markets for them. However, AgriCOOPh has since dropped this initiative. More and more of the resellers they supported found work as quarantine and lockdown protocols eased.

Another of its most significant actions was linking one of its member cooperatives from the Mindanao region to supply over 150,000 tons of rice in the Cebu market. Aside from that, AgriCOOPh also helped linked several of its member cooperatives to possible consumer markets. Furthermore, AgriCOOPh also began supporting non-member cooperatives to market their products to consumers, member cooperatives, or possible markets. Learning of the difficulty of logistics during the pandemic, AgriCOOPh realized that an e-commerce platform would benefit its members significantly. Now, the organization is transforming its member database into an e-commerce platform that will present all of its members' products. Through this platform, AgriCOOPh makes its members' products accessible to all consumers, processors, and retailers in the market.

AgriCOOPh also experienced two strikingly unsuccessful transactions. The representatives relayed one experience of connecting two cooperatives to supply 200 sacks of rice from one to the other. Upon delivery of the sacks, the receiving cooperative found that the rice was not what was promised. Many of these had poor quality rice mixed in with the agreed-upon quality of rice. AgriCOOPh later found that the supplying cooperative entrusted the rice supply to a local miller-trader who mixed in the poor quality rice. Neither the transacting cooperative nor AgriCOOPh was able to check the sacks of rice before delivery. Another experience was when AgriCOOPh bridge financed another group to purchase rice to be sold to parishes across the country. However, the organization that requested the loan was unable to sell the rice. A majority of the rice purchased is still stocked and

unsold. The pandemic has heightened the challenge in selling these as the rice purchased was of an expensive variety. Luckily for AgriCOOPh, these experiences did not cost them too many financial losses. The organization may still recoup its investments, albeit at a later date. Through these experiences, AgriCOOPh realized that they needed to slow down their pace and be more stringent in conducting background checks to ensure that they were repaid.

### *Summary*

AgriCOOPh is a non-profit organization that operates as a business to provide capacity building, business development, and supply and marketing services to its member cooperatives and other parties. As an innovation intermediary, AgriCOOPh performs roles that enable product, market, and, most significantly, organizational innovations. In providing its services, the organization mediates between its members or non-members to broker relationships and trades, thereby creating new markets and improved participation in the value chain. By providing consultancy services and sharing financial and knowledge resources, AgriCOOPh offers industry-specific advice and support for project implementation.

AgriCOOPh has already made a name for itself in its three years of existence. The organization has produced several successful development opportunities for its members and even expanded its support to groups outside its network. Upon its establishment, AgriCOOPh was endowed with a rich foundation of key-capabilities built by competent and experienced staff, support from multiple AFF sector and internal organization networks, and a well-strategized business model. Today, AgriCOOPh develops these capabilities and its network to serve more farmers and fisherfolk in the Philippines.

## **Appendix 5.9 Department of Agriculture – High-Value Crops Development Program (HVCDP)**

### *History and Purpose*

The Department of Agriculture – High-Value Crops Development Program (HVCDP) came into fruition through the High-Value Crops Development Act of 1995 (Republic Act 7900). The program is currently housed under the Office of the Undersecretary for High-Value Crops and Rural Credit. The focus of the program is the development and monitoring of all non-traditional crops. According to the law, these crops refer to all other crops besides rice, corn, coconut, and sugar. Furthermore, industrial crops like rubber, tobacco, abaca, and ornamental crops like flowers fall under the purview of the HVDCP. More recently, although it is grass, bamboo is now part of the crops that the program monitors and develops. The HVCDP has ten target commodities that it prioritizes: coffee, cacao, rubber, banana, pineapple, mango, upland vegetables, lowland vegetables, red onions, and sweet potato. Of these ten, lowland vegetables have the largest share of their budget as these crops are the most widely consumed by Filipinos, according to the HVCDP representative interviewed. In addition to these priority crops, each region may also have specified champion crops. Examples of these are cashews for Palawan and durians for Davao.

In the HVCDP Central Office, there are 24 staff members, where a majority of which are contractual employees that require renewal almost annually. Because the Undersecretary leading them is co-terminus with the administration, their employment arrangement needs to remain contractual. However, the possibility of being taken in by the succeeding administration is possible.

Like other programs directly under the DA, the HVCDP has implementing counterparts in the DA regional offices. The central office provides the policy directions and overall programs. The



regional offices implement these and collect data on the ground level. On average, a regional office may have five to ten focal persons assigned to high-value crop development in their area. However, this number may be influenced by the priorities of the local government or crop focus of the region.

The HVCDP's primary purpose is to oversee the implementation and development of all non-traditional crops in the Philippines. Monitoring these requires the office to coordinate the network of government agencies that work in each crop. For the R&D of mangoes and other crops, the HVCDP often interacts with the Bureau of Plant Industry, Bureau of Agricultural Research, the DA – Agribusiness and Marketing Assistance Office, state colleges and universities, the Philippine Center for Post-Harvest Development and Mechanization, regional research centers, and the Department of Science and Technology. It also works with the Department of Trade and Industry for downstream product processing. Specifically for mangoes, the HVCDP is also in contact with the Bureau of Fisheries and Aquatic Resources Engineering in designing processing facilities.

Aside from the oversight work, the HVCDP also provides production support to mango growers, with a preference to provide aid to smallholder farmers and MSMEs. The HVCDP may provide planting materials, flower inducers, and linkages to access credit, machinery, and R&D information. Although they provide these, the HVCDP's current focus for the industry is supporting mango tree rehabilitation and revitalization. The program is also testing new technologies such as drone spraying and integration of beekeeping with mango growing. The HVCDP, in coordination with other government agencies, also establishes community processing centers for cooperatives, associations, and grower organizations to use for product processing. Given these activities, the HVCDP participates in the following segments of the mango value chain: input supply, production, post-harvest, assembly and trade, and fresh and processed mango products. For the marketing segment of the chain, the program connects growers and MSME processors to the relevant agencies that may aid them in marketing. Although the HVCDP supports the industry in multiple portions of the value chain, it must be noted that their activities chiefly center on the upstream segments. Nevertheless, the office is slowly moving towards developing downstream support services to complement the growth they feel will come from fresh mango production.

#### *Intermediary Roles*

Primarily working to conduct the network of government interventions for the mango industry, the HVCDP performs intermediary roles consistent with previous research (Van Lente et al., 2003). Table A5.9.1 presents a summary of how this government program performs its role as an innovation intermediary.

As the network orchestrator, the HVCDP primarily performs mediation. It monitors and coordinates the implementation of programs through its regional counterparts and other government agencies. Through its monitoring, the office also prevents duplication of work by its implementing partners. Furthermore, the HVCDP adheres to the DA's current policy of providing aid chiefly to clustered or consolidated farmer groups such as cooperatives and associations. Given a limited budget, the HVCDP does its best to allocate funds for requests from the private sector. As per the HVCDP mango focal person, if the budget cannot be allocated to a project requested during the current year, they try to allocate the funds for it in the succeeding year.

Table A5.9.1

*The Intermediary Organization Roles Performed by the Department of Agriculture – High-Value Crops Development Program*

Broker	Consultant	Mediator	Resource Provider
<ul style="list-style-type: none"> <li>Establishment of community processing centers in various regions of the country</li> <li>Links to credit-granting agencies</li> <li>Currently focused on mango tree rehabilitation and rejuvenation</li> <li>Does trial projects with some growers (beekeeping for pollination, drone spraying)</li> <li>Tried to offer a loan program for tree rehabilitation, but it did not proceed well</li> </ul>	<ul style="list-style-type: none"> <li>Consultation with the private sector to learn what their needs are</li> <li>Attends the mango industry conferences to learn about current issues and developments in mango production and processing</li> <li>Staff in charge of mangoes became a part of the chat group of growers and traders and can give answers quicker</li> <li>Abolishment of the NMAT is making consultations with stakeholders more difficult Incorporated discussion from mango industry conferences into the Mango Industry Roadmap</li> <li>Promotion of GAP and insecticide resistance management</li> </ul>	<ul style="list-style-type: none"> <li>Orchestrates the entire mango network, coordinating with regional counterparts and implementing agencies on mango industry development activities and provisions</li> <li>Monitors progress of programs and projects to ensure that they reach targets and to avoid duplication of work</li> <li>Promotes clustering of growers and farm consolidation as it is the primary DA policy</li> <li>Gives private sector proposals and request a chance in the succeeding year if not accommodated for in the current year</li> <li>Aids growers in price mediation with traders, especially during seasons that exhibit low farmgate prices</li> </ul>	<ul style="list-style-type: none"> <li>Provision of planting materials, flower inducers, machinery, and other mango production materials necessary</li> <li>Will provide a few hydraulic lifters in 2022</li> <li>Provides information and linkages for pest management and mango by-product processing</li> <li>Will encounter difficulty or delays in the provision of materials if no capable suppliers are available</li> </ul>

*Note.* The data in this table was compiled based on an interview with an HVCDP representative, feedback from other interviews, and secondary desk research done by the researcher.

Another vital mediator function that the HVCDP provides is aiding in price mediation for smallholder farmers. For example, during periods of oversupply, traders and processors may end up purchasing their mango supplies at prices that leave growers at a loss. In times like these, the HVCDP mediate between the mango suppliers and buyers to reach an agreeable price between the two parties.

As a consultant, the HVCDP provides advice to mango growers through its regional offices or links inquiries to agencies that may address concerns raised. Annually, the HVCDP also conducts dialogues with its industry stakeholders to learn about their needs and issues that need to be addressed. Through these consultations and attending industry conferences, the HVCDP developed the Philippine Mango Industry Roadmap 2017-2022.

Another instance of performing its consultancy role is the inclusion of the mango focal person in the application-based chat group of mango growers and traders. As site visits were not often possible during the height of the pandemic, the active growers and traders in one region created the group to discuss and forward their needs to the government. The inclusion in the group was a timely blessing with the recent abolishment of the government-led National Mango Action Team (NMAT)<sup>23</sup>.

In its industry support functions, the HVCDP performs its brokerage and resource provision roles. The office provides planting materials, flower inducers, machinery, and other necessary planting materials through its regional counterparts. Instead of growing yield by planting more mango trees, the focus is on tree rehabilitation and rejuvenating trees above ten years old. The HVCDP provides the funding, training, and materials necessary for growers to rehabilitate old mango trees. Unfortunately, in conducting its rehabilitation efforts, the HVCDP encountered a problem in its tree rehabilitation loan program. Interest in the loan was present. However, the HVCDP could not find organizations suitable and capable enough to pass the Agricultural Credit Policy Council requirements. Thus, no organizations were allowed to act as a conduit for the loan distribution. Although a part of the government's roadmap, the HVCDP decided to discontinue the loan program.

Similarly, the HVCDP has encountered problems with public procurement of the items it provides to its beneficiaries. At times, the regional offices experience failures of bids due to the absence or lack of capable suppliers in an area. When procurement proceeds, however, there are instances where the materials purchased suffer delivery delays. These delays create a problem as mango growing is seasonal and requires precise timing in inducing flowering, applying pesticides, fruit bagging, and other processes. To counteract these issues, the HVCDP tries to prepare its pre-procurement processes a year in advance to assess and adequately time the provision of its physical support.

Nevertheless, the HVCDP has succeeded in brokering and providing numerous technologies and resources to its beneficiaries. The program actively promotes the practices set in the GAP and insecticide resistance management procedures developed by the University of the Philippines – Los Baños. They also provide information, linkages, and endorsements to credit granting agencies upon request. New pest management and by-product processing developments are also shared with their stakeholders. For processing, the HVCDP has also set up about ten community processing centers that allow local grower groups to produce their processed mango products. However, these centers encounter two issues: the lack of FDA certification to market these products appropriately and the absence of a GMP certification. The office is now in talks with the engineering division of another

---

<sup>23</sup> The NMAT is a group of persons appointed by the government that regularly conducted consultations with mango industry stakeholders across the country.

DA-affiliated agency to create facilities that will make these certifications accessible. Finally, the HVCDP also tests for possible innovations that growers may adapt, like beekeeping and drones for spraying and hydraulic lifters for tall trees.

### *Intermediary Key-Capabilities*

To successfully perform these roles, the HVCDP has built and is continuing to build its key-capabilities. Table A5.9.2 summarizes the HVCDP's key-capabilities, together with some of the challenges to building these.

For external networking capabilities, the HVCDP continuously consults with the private sector to learn of their most current needs and issues in the mango industry. However, as previously mentioned, the program's main channel of consultation, the NMAT, was recently stopped, crippling the ease of doing these consultations. This lack of consultation is counteracted by the inclusion of the mango focal person in the chat group of growers and traders. Thus, discussions between the HVCDP and its stakeholders continue, albeit to a lesser degree.

Some opportunities for capability building are shared between the HVCDP's external networking and internal communication capabilities. These actions are the proactive interaction and immersion on the ground level with its stakeholders and the sharing of success stories of technology adoption. For both key-capabilities, these activities build the trust necessary to deepen their relationship with those they serve and as a base for fostering new relationships with other actors in the mango industry. Writing and publishing success stories also may influence other stakeholders to adopt or learn about technologies promoted by the HVCDP and its implementing partners. Seeing the success other growers gained through adoption also grants the HVCDP leverage in convincing its beneficiaries of the benefits of adopting new or more appropriate technologies and innovations.

Moreover, for internal communication, as a network orchestrator, the HVCDP's central office monitors and communicates with all its implementing bodies by providing the necessary and updated directives and information. When it comes to their stakeholders, the HVCDP representative mentioned that they must remain unbiased and remain a neutral party supporting everyone in the mango industry.

For knowledge-building capabilities, the staff must have a background in the agricultural industry. Though its staff is not specially trained in an assigned commodity, the HVCDP representative relays how interaction and immersion allow them to master their assigned crops or commodities. Through time and research, the staff learns more about the industry, its needs, issues, and avenues for development. The representative also characterizes their staff as having a high willingness to learn about the commodities assigned to them. Furthermore, the HVCDP's knowledge-building capabilities grow through the information sharing between DA-affiliated offices and through the evaluation of programs it does.

One challenge to its knowledge-building capabilities is the lack of a dedicated engineering division for its community processing centers. Although these projects are joint efforts between government agencies, the representative cited that the facilities they built are relatively simple and not advanced enough to receive GMP certification. As a result, the facilities are still unable to achieve the more critical FDA certification required to properly market products created in these processing centers. Moving forward, the HVCDP is in talks with the engineering division of another DA-affiliated agency to create future facilities that may be able to achieve these.

Table A5.9.2

*The Intermediary Organization Key-Capabilities Built by the Department of Agriculture – High-Value Crops Development Program*

External Networking	Internal Communication	Knowledge-Building	Management
<ul style="list-style-type: none"> <li>• Consultations with the private sector and other mango stakeholders, learning of needs through PCAF/NMAT</li> <li>• Building of trust with stakeholders through constant interaction and immersion</li> <li>• Staff needs to be proactive in interacting with the industry</li> <li>• Writing and publishing of success stories of growers that adapt promoted innovations help in influencing others to adopt</li> <li>• Staff in charge of mangoes became a part of the chat group of growers and traders</li> </ul>	<ul style="list-style-type: none"> <li>• Monitoring and communication with implementing agencies</li> <li>• Provides the information necessary and directives to regional counterparts</li> <li>• Building of trust with stakeholders through constant interaction and immersion</li> <li>• Staff needs to be proactive in interacting with the industry</li> <li>• Writing and publishing of success stories of growers that adapt promoted innovations help in influencing others to adopt</li> <li>• Unbiased and treats all its partners fairly</li> <li>• Staff in charge of mangoes became a part of the chat group of growers and traders</li> </ul>	<ul style="list-style-type: none"> <li>• Information sharing within the DA</li> <li>• Improves programs through evaluations and monitoring of data</li> <li>• Staff do not necessarily get specialized training on the commodities they are assigned but have a high willingness to learn</li> <li>• The staff gains more knowledge and expertise in a commodity by immersing themselves in the industry; it is essential to do field visits</li> <li>• Staff either took an agriculture-related degree or has work experiences in agricultural industries</li> <li>• Encouraged to take further studies but challenging to do so because of their contractual employment</li> <li>• Lack of dedicated engineering office to build GMP and FDA-certifiable processing facilities</li> </ul>	<ul style="list-style-type: none"> <li>• Most staff are under a job-order system, contractual basis</li> <li>• Most staff are co-terminus with the current administration</li> <li>• Assignment to new or additional commodities for staff if someone resigns</li> <li>• Does pre-procurement processes a year in advance to prepare for inputs and other materials that the government will provide</li> <li>• Espouses honesty and transparency in the work that they do</li> <li>• Manages and monitors the budget, regional offices, and programs of implementing agencies</li> </ul>

*Note.* The data in this table was compiled based on an interview with an HVCDP representative, feedback from other interviews, and secondary desk research done by the researcher.

Another potential challenge to knowledge-building is the difficulty in pursuing further studies. Although encouraged, the staff find difficulty pursuing advanced degrees because of the contractual nature of their employment. In addition, as they do not have permanent positions, taking further studies may exhibit risks in their employment.

The contractual or job-order nature of the HVCDP staff may also pose challenges in the program's management capabilities. The jobs are structured in this manner because of the co-terminus assignment of the HVCDP's leader, the Undersecretary for High-Value Crops and Rural Credit. As a result, the tacit knowledge and skills built by the current administration staff risk not being passed on to the succeeding administration's staff. However, there is still the possibility that the staff contracts are renewed, assuming the succeeding administration supports the HVCDP.

Regarding the management capabilities the HVCDP builds, it develops these through the feedbacking and evaluations of its programs. The staff builds and learns their management capabilities as they experience managing and monitoring the budgets, programs, provisions, and projects of their regional counterparts and implementing agencies. An instance that shows development in management capabilities is adapting to the schedule of the public procurement and the timing of when planting materials need to be delivered. Experiencing delays and bidding failures, the central and regional offices adjusted by preparing all the pre-procurement processes a year ahead of when their stakeholders need these items. Finally, the HVCDP representative shares that one other critical capability or trait a service-oriented organization like their office espouses is honesty and transparency in their work.

### *Challenges*

The HVCDP faces several challenges in the form of work and structural obstacles. A challenge that is a mix of both types is the human resources necessary to assist in all commodities. As the list of what is considered high-value crops is quite extensive, having 25 staff manage and monitor developments in all these crops is a tremendously arduous task. In addition, commodity focal persons may be assigned numerous crops under their purview. For example, the person assigned on mangoes also monitors all upland and lowland vegetables. Although this gives the staff a broader opportunity for learning, the minute differences and specializations necessary for each crop may overwork the HVCDP employees. However, the limit on staffing is a structural issue set by the appropriations the legislative branch of government grants in the annual budget.

An upcoming structural challenge is the devolution of several nationally provided services and functions to local government units. With the Mandanas Ruling, starting 2022, local governments will see an increase in their internal revenue. Because of this increase, several services provided by the national government like infrastructure development, agriculture, social welfare, or healthcare will now be delivered by the localities (de Vera, 2021; Laforga, 2021). For now, the HVCDP is still waiting on how this development may change how they do their network monitoring and orchestration roles.

Another challenge faced by the HVCDP is the abolishment of the NMAT. As mentioned, the program receives many opportunities for discussion and feedback with the private sector from the NMAT. With its removal, the HVCDP is still finding other effective ways of creating a bridge between their office and the private sector. One avenue recently created was the inclusion of the mango focal person to the chat group of a large set of growers and traders in the Luzon area. Having similar avenues for direct communication may be possible with other areas as well.

An additional challenge is promoting products generated through the community processing centers, as these still lack FDA certification. To address this issue, the HVCDP will establish their new centers in coordination with Bureau of Fisheries and Aquatic Resources Engineering. By working with the engineers, the HVCDP hopes that their new facilities will reach the standards necessary to attain FDA certification and GMP certification.

Finally, a constant challenge the central and regional offices face is catering to all the crops under the HVCDP. With mangoes as one of the ten priority crops, much attention is given to them. However, on the field level, farmers and growers produce a wide variety of crops. Thus, the field staff needs to learn to balance the needs and support they can provide between the identified priorities in an area and other crops that farmers produce. Balancing and addressing these concerns may require creativity on the part of the central and regional offices. In the case of mangoes, balancing between the different stakeholders is also necessary. The HVCDP faces several complaints and issues such as the lack of capable suppliers for the office's provisions, dishonesty of service providers to growers, disputes between industry associations, and price manipulation during the harvest season. Mediating these issues is usually done as these issues arise. However, the program as much as possible provides support that helps attain the goals set in the industry roadmap.

#### *Summary*

In summary, the HVCDP performs its intermediary roles primarily as the network conductor for the government interventions in the mango industry. It does this by monitoring and managing the projects and programs of its implementing agencies and provides these institutions the directives and policy priorities of the national government. In addition to this, the HVCDP provides material and technology support to its stakeholders through its regional counterparts. The office has also set up several community processing centers that allow their beneficiaries to produce processed mango products. In performing its roles, the HVCDP builds and exhibits its capabilities in external networking and internal communication. The office also holds an excellent knowledge-building capability base that may be further enhanced by training on assigned commodities. Learning on the job through immersion and field visits of its staff is critical for understanding the needs and issues of its stakeholders. Although the HVCDP faces numerous challenges, the program does its best to address these as they come. Now faced with the uncertainty of the Mandanas Ruling, the HVCDP hopes to continue its work and see how they may adjust their intermediary roles as the situation develops.

### **Appendix 5.10 Bureau of Plant Industry – Guimaras National Crop Research Development and Production Center (GNCRDPC)**

#### *History and Purpose*

The center is in the island province of Guimaras in the Western Visayas region of the Philippines. Since its establishment in 1969, the center has undergone several name changes. It was called as the Guimaras Mango and Coconut Station in 1970, the Guimaras Seed Farm in 1972, the Guimaras Horticultural Research Center in 1977, the Guimaras Experiment Station in 1980, and the National Mango Research and Development Center in 1993. In the mid-2010s, the national government agencies underwent rationalization. The center was again renamed to what is now known as the Guimaras National Crop Research, Development, and Production Support Center (GNCRDPSC).

The GNCRDPSC's primary focus is to conduct research and development (R&D) and production support activities on mangoes and other high-value crops. For R&D, the center focuses its

activities on plant genetic resources and technology generation for mangoes and other crops. In particular, their studies concentrate on crop production, crop protection for different pests (e.g., biocontrol agents, minimizing use of synthetic chemicals) and post-harvest technologies. Apart from conducting R&D, the center also produces and distributes quality planting materials for mangoes and other crops, including lowland vegetable seeds.

To conduct its R&D, the GNCRDPSC receives the bulk of its funds from the General Appropriations Act (GAA). The center also applies for R&D grants from the DA – Bureau of Agricultural Research and the Department of Science and Technology – Philippine Council for Agriculture, Aquatic, and Natural Resource R&D (DOST-PCAARRD). For the production and distribution of its planting materials, the center acquires funding from various Bureau of Plant Industry (BPI) and Department of Agriculture (DA) Regional Field Office 6 banner programs and projects.

The center has over 40 employees composed of 17 permanent positions, four contractual positions, and several job hires. Most of the permanent staff have degrees in agriculture, and some have advanced degrees in agricultural sciences and management. According to the GNCRDPSC representative, the center is currently in need of technical personnel with more specific fields of expertise like entomology, pathology, plant breeding, and microbiology.

Regarding innovations the GNCRDPSC has provided, the representative and several others interviewed cite the center's role in the Philippines' success in exporting fresh mangoes to the mainland US and Australia. Sometime in the 1990s, researchers from the center successfully conducted a study that proved the absence of mango seed and pulp weevils in Guimaras island. Through this study, the Philippines was allowed access to the two export markets mentioned above. For quite a while, Guimaras was the only source of mangoes allowed to enter the mainland US from the Philippines. The study was later successfully replicated in Davao del Sur, Samal Island, and, eventually, throughout the country. The pioneering work done by the center opened the US and Australian markets to many more regions from the Philippines, except the Palawan province.

Looking at the mango value chain, the GNCRDPSC focuses on the input supply, production, and post-harvest segments. Apart from providing quality planting materials for mango growing areas, the center provides several process innovations through technology provision, training and consultancy on mango production, monitoring pests and weather, fruit maturity determination, and recommendations on post-harvest treatments.

#### *Intermediary Roles*

As a public research institute, the GNCRDPSC performs its intermediary roles similar to those relayed in previous research (Van Lente et al., 2003; Klerkx and Leeuwis, 2009). Table A5.10.1 presents how the center performs the four roles of innovation intermediaries.

Of the four roles, the GNCRDPSC performs brokerage and consultancy the most. For brokerage, the research institute provides avenues and opportunities to receive various technologies from their center. Of these, the most significant brokerage intervention the GNCRDPSC did was assisting regions of the Philippines to export mangoes to the mainland US and Australia through its studies that validated the absence of mango seed and pulp weevils. The GNCRDPSC also hosts the mango gene bank that contains the 105 accessions of mangoes. Of these accessions, the center has identified and selected 11 Guimaras strains of Carabao mangoes and one Pico variety. These are all registered under the National Seed Industry Council (NSIC) and are recommended for propagation and planting.



Table A5.10.1

*The Intermediary Organization Roles Performed by the Guimaras National Crop Research, Development, and Production Support Center*

Broker	Consultant	Mediator	Resource Provider
<ul style="list-style-type: none"> <li>• Does research collaborations with other state universities and colleges and private companies</li> <li>• Enabled Philippine mangoes to be exported to the mainland US and Australia as a result of their study on the absence of mango seed and pulp weevils in mango production areas of the country; these areas are granted Area Freedom Certifications upon verification of the absence of the pests</li> <li>• Provision of extension services</li> <li>• Identified, selected, and recommended 11 Guimaras strains of Carabao and one Pico variety of mangoes for NSIC registration</li> </ul>	<ul style="list-style-type: none"> <li>• Provides free consultation service for mango growers anywhere in the Philippines (through email, farm visits, phone calls, and walk-in inquiries)</li> <li>• Instrumental in establishing the standards or code of Good Agricultural Practices for mangoes</li> <li>• Assists the media on video shoots and acquiring information regarding the mango industry</li> <li>• Actively promotes and disseminates information on GAP on mangoes</li> <li>• Technologies generated and completed research results are always shared and disseminated with their different stakeholders</li> </ul>	<ul style="list-style-type: none"> <li>• Does research collaborations with other state universities and colleges and private companies</li> <li>• Initiates R&amp;D partnerships with other research institutions</li> <li>• Adheres to roles and responsibilities to ensure partnerships run smoothly</li> </ul>	<ul style="list-style-type: none"> <li>• Does R&amp;D on mangoes and other high-value crops (e.g., crop production management and crop protection)</li> <li>• Banks plant genetic resources for mangoes, cashews, and pigeon peas</li> <li>• Produces and distributes quality planting materials such as grafted mango and other fruit trees and lowland vegetable, rice, and open pollinated variety corn seeds</li> <li>• Conducts farm site visits to mango growers, or upon requested</li> <li>• Assisted the local mango growers and producers through the use of their mango packinghouse for post-harvest processes</li> <li>• Upon request, provides resource persons for seminars and training on mango production, post-harvesting, processing, and propagation, GAP for mangoes, integrated pest management</li> </ul>

*Note.* The data in this table was compiled based on an interview with a GNCRDPSC representative, feedback from other interviews, and secondary desk research done by the researcher.

In line with its role as a consultant, the GNCRDPSC provides free expert advice to mango growers to anyone in the Philippines. According to the representative, the office receives inquiries through email, phone calls, and even visits from locals and foreigners touring around Guimaras. Furthermore, the representative asserts that the number of inquiries to the center has also been growing over time as more people adopt their mango production advice. In performing the consultant role, the center was also instrumental in crafting the code on Good Agricultural Practices (GAP) for mangoes. The center actively promotes and disseminates information on the GAP for mangoes. At times, the media would also get in touch with the center to document and acquire information on mango production.

As the R&D center on mangoes, the GNCRDPSC shares all the results of its completed research to other offices and agencies during annual R&D reviews. Furthermore, the center disseminates its technologies and research results to their stakeholders. As an R&D institute, they also share their results with relevant universities that conduct studies on mangoes. The center also collaborates with the academe to conduct joint research projects. Apart from the universities, the GNCRDPSC partners with mango cooperatives, growers, and processors in Guimaras for some of its production, post-harvest, and processing R&D projects. For most of its projects, especially those that require proposals, the center would initiate contact with the private sector.

When creating these partnerships, the GNCRDPSC would focus only on areas it can deliver. The center is honest in mentioning their limits when it comes to performing their role as a mediator. They adhere to the roles and responsibilities they initially set with their partners to ensure that their work flows smoothly for their partnerships. Through these relationships, the center and its partners learn from each other through information, resource, and staff exchange. One instance the GNCRDPSC representative highlighted was their collaboration with the University of Southern Mindanao. Through this partnership, the GNCRDPSC staff could attend training and use the university's laboratory equipment.

As a resource provider, the GNCRDPSC provides its R&D results to interested stakeholders. The center also distributes quality mango planting materials to growers in different areas of the country as part of its mandate. A limited supply of these resources is given out for free to prevent people from hoarding and taking advantage of the center's public service. Another significant resource the center provides is the use of its packing house and post-harvest facilities to local cooperatives and growers free of charge. In line with its brokerage role, the use of these facilities enables innovation for their local stakeholders that would otherwise require heavy investment on the private sector side. Finally, in line with its consultancy role, the center provides technical and material assistance to mango growers in Guimaras. The most significant technical assistance provided are in the areas of crop production management, proper harvesting and post-harvest handling, and determining appropriate fruit maturity of mangoes prior to harvest. Furthermore, upon request of its stakeholders, the center also sends staff as resource persons for seminars and training on mango production, post-harvesting, processing, propagation, GAP, and integrated pest management.

#### *Intermediary Key-Capabilities*

To perform all its roles, the GNCRDPSC builds the necessary intermediary key-capabilities. Table A5.10.2 provides the instances of how the center builds these key-capabilities.

Table A5.10.2

*The Intermediary Organization Key-Capabilities Built by the Guimaras National Crop Research, Development, and Production Support Center*

External Networking	Internal Communication	Knowledge-Building	Management
<ul style="list-style-type: none"> <li>• Receives inquiries from individuals, groups, local government units, national government agencies, cooperatives, associations from Guimaras and other parts of the Philippines</li> <li>• Takes the initiative in conducting collaborating R&amp;D project, especially with the academe</li> <li>• Attends academic conferences</li> <li>• Provides training and acts as resource persons for seminars and training upon request</li> </ul>	<ul style="list-style-type: none"> <li>• Coordinates with state universities and colleges and other agencies for R&amp;D projects</li> <li>• Part of the PCAARRD WESVAARRDEC research consortium</li> <li>• Has linkages with local government units, national government agencies, cooperatives and associations</li> <li>• Links with other agencies for R&amp;D, extension services, and for production and distribution of planting materials</li> </ul>	<ul style="list-style-type: none"> <li>• Some staff have advanced degrees in agricultural management or an agriculture-related degree, but the center lacks more specialized staff such as entomologists, pathologists, and plant breeders</li> <li>• Scholarships and technical training locally and internationally are available, but they have to apply on their own accord</li> <li>• Gets to have staff train in R&amp;D activities and processes with other agencies</li> <li>• Learn further from R&amp;D collaborations with the private sector and other research institutes and universities</li> <li>• Attends academic conferences</li> </ul>	<ul style="list-style-type: none"> <li>• Of the 40 staff, only 17 have permanent positions while the rest are contractual and job hires</li> <li>• Receives proposal-based funding from DA-HVCDP, DA-BAR, and PCAARRD; GAA is the major source for R&amp;D projects</li> <li>• When collaborating, always focuses on their available services and R&amp;D capabilities</li> <li>• The center is honest enough to admit if they are not capable of performing what is being requested or if they lack the personnel for the partnerships</li> <li>• Always open to suggestions for improvement</li> <li>• Terminates R&amp;D projects that are not relevant and promising upon review and evaluation</li> <li>• Have catch-up plans if accomplishments fall short of their targets</li> <li>• Adjusts strategies when collaborating, especially with private sector partners</li> <li>• Service-oriented and not profit-seeking</li> </ul>

*Note.* The data in this table was compiled based on an interview with a GNCRDPSC representative, feedback from other interviews, and secondary desk research done by the researcher.

For external networking, the center develops its network by responding to inquiries made to them from individuals and groups from within the Guimaras island and the country. For its R&D projects, the GNCRDPSC takes the initiative in collaborating with the academe and other research institutions. Moreover, the private sector may also present their intention to the center for possible collaborations or projects. Apart from R&D, requests were made for consultations on mango-related issues or training requests. As a research institute, its researchers also attend and present in research conferences and symposiums to foster its network and develop its knowledge-building capabilities.

Within its existing network, the GNCRDPSC coordinates closely with its collaboration partners, sharing the relevant information required by their terms of partnerships. Moreover, the center remains in contact with its known mango research colleagues from state universities and colleges, and research funding agencies like the DA – Bureau of Agricultural Research (DA-BAR) and the DOST-PCAARRD. Within its geographic region, the center has a close relationship with local mango cooperatives and businesses. They are often tapped for possible updates on mango technologies. The relationship with the locals was built through the center's interaction with them. They helped develop Guimaras into one of the most known mango-producing areas in the Philippines. In the Western Visayas region, the GNCRDPSC is a member agency in the DOST-PCAARRD's Western Visayas Agriculture, Aquatic, and Natural Resources R&D Consortium (WESVAARRDEC).

Through these collaborations and R&D projects, the GNCRDPSC continues to build and apply its knowledge-building capabilities. The center's staff learn from the research conducted by their partners and gain access to training, seminars, and opportunities to use the laboratories of its collaborators. The staff themselves are also highly skilled in their specific fields, despite only a few having advanced degrees in agricultural sciences and management. However, the GNCRDPSC representative cites that, although their staff has advanced or science degrees, these are more general agriculture-related than highly specialized degrees, like entomology, pathology, and plant breeding. Nevertheless, opportunities for further studies, technical training, and management training are made available to them. However, these are often limited because these opportunities are shared with other DA agencies and BPI offices. Though further studies are encouraged, the staff need to apply for these on their own accord.

A common theme in the GNCRDPSC's management capability instances is the center's ability to adjust to the needs and capabilities of its partners and knowing its limitations. With a limited budget, the center does its best to equitably provide quality planting materials to its stakeholders and conduct its R&D projects. They reassess whether R&D projects need to be terminated during their annual pre-in-house R&D review, and they come up with catch-up plans for projects and activities that fell short in achieving pre-set targets.

When collaborating, the GNCRDPSC will always be honest in stating the limits of its services. Furthermore, they inform partners if they cannot deliver the tasks requested of them. Similar honesty is seen when the private sector requests technical assistance. During these situations, the center directly asks the stakeholders how much they are willing to invest in tackling their issues, especially for significant investments. The center will then adjust the technology package to fit and address the issues, considering the investment amount available and the growers' capabilities. If it is still lacking or ineffective, the GNCRDPSC will reassess and change strategies.

### *Challenges*

The biggest challenge the GNCRDPSC faces is the mango stakeholders adopting new technologies. According to the representative interviewed, mango growers or contractors are hesitant

in adapting to new technologies because of the additional costs associated with the innovations. They see deferment most often occur in smaller backyard operations, as per the representative. These small backyard operators also do not practice proper tree care. When the means to address these issues are given for free, the center finds that growers and other related stakeholders quick to adapt. However, once the free materials or resources are removed, these stakeholders stop implementing the necessary improvements. The center is also challenged by hoarders of these free resources and lack of proper maintenance for facilities they provided for free. To counteract these challenges, the GNCRDPSC now limits the free materials it provides and ensures a more equitable distribution. The center hopes that full adopters' success pushes others to adopt these new technologies to address the lack of technology adoption. The center does not cease providing information and expert advice to mango growers. Also, the GNCRDPSC tries to adjust the possible interventions mango stakeholders may do while considering the financial and growing capabilities of those requesting aid.

Another challenge the research institute faces is the limited funding available to them. At times, they cannot complete all R&D projects they initially implemented because of the lack of funding. To complement some of their projects, the center applies to numerous grants for financial support. Related to the lack of funding and the previous challenge, the center feels that there is also a lack of extension service investment. Currently, the funding of the GNCRDPSC's extension work is embedded in its research funding, and no dedicated funds for extension alone are available. Providing financial support in extension activities may intensify and generate better strategies to persuade producers to adopt technologies. As the representative says, the technologies are available, but the main concern is how to transfer these effectively and efficiently.

An additional structural challenge the GNCRDPSC faces is the need for more specialized experts. The representative mentioned that the center has been looking for entomologists, pathologists, and plant breeders for quite a long time but is still unsuccessful in hiring. One way of alleviating this concern is by enhancing its staff's technical knowledge and providing further study opportunities in the fields they require. Another way to address this issue is by doing R&D collaborations with other universities and research institutes with the expertise the GNCRDPSC requires.

### *Summary*

Although the GNCRDPSC faces several structural challenges, the center is steadfast in its work to generate and share its knowledge and technologies in mangoes and other crops. Furthermore, the institute conducts R&D and is also a source of good quality planting materials that stakeholders may request or procure to ensure better quality agricultural products. As a research institute, the GNCRDPSC continues to enable innovation in the mango industry by introducing process innovations and conducting R&D projects to ease the export of Philippine mangoes. The center has and exhibits several innovation intermediary roles. It continues to build its key-capabilities as effectively as possible. As a generator of technologies, the GNCRDPSC will continue to provide its appropriate, cost-effective, and environment-friendly innovations to develop the country's mango industry for sustainable and export-grade mangoes.

## **Appendix 5.11 Philippine Mango Industry Foundation, Inc. (PMIFI)**

### *History and Purpose*

The Philippine Mango Industry Foundation Inc. (PMIFI) is the mango industry's national association composed of members found throughout the value chain and actors in its supporting industries. PMIFI also has roughly 57 local or provincial mango associations under its purview.

Members are not asked to pay any monthly dues nor membership fees as the foundation does not believe that the organization should be used for profit.

The foundation started in 2002 and is currently led by the organization's president, who assumed her role in 2008. Apart from the president, PMIFI will have a small skeletal workforce of one or two persons when needed, possibly more if a project deems it necessary. For most of its work, however, the president provides the necessary labor required. The organization also does not have a physical office but operates in Cebu, where the president currently resides.

In terms of its activities, the most important event the association organizes is the annual, or soon biennial, National Mango Congress. The National Mango Congress is a conference where industry stakeholders learn and discuss their sectoral issues and introduce new technologies or research findings that may help develop the industry. Apart from the value chain actors, other attendees are the related government institutions, academe, and support industries like logistics partners. These conferences are held in different regions and hosted by one of its local member associations.

Another key and unconventional activity PMIFI does is to export fresh mangoes. According to the representative interviewed, exporting mangoes is necessary to generate income to fund the foundation's activities. To an extent, the foundation acts like other mango exporting firms that go around the country to source fresh mangoes, do the necessary post-harvest processes, and export the fruit. As per the interview, PMIFI exports its mangoes to Hong Kong, Dubai, and France. When procuring their mango supply from growers, the organization does its best to ensure that they purchase the mangoes at a fair price, usually above the going rate of local traders.

Apart from the National Mango Congress, PMIFI also provides training and seminar services on production, post-harvest, and processing upon request. Although, a majority of these training are endorsed to local associations or experts. Payments of training and seminars coursed through PMIFI will grant the organization a small amount, about 10% of the total cost, for the foundation to use in their other activities. Depending on the capabilities of the requesting party, the foundation may remove the need to give an amount to PMIFI.

As of 2020, the foundation is proposing a chain-integrated facility in Mindanao that will produce farm inputs, contract local growers, and produce processed mango and other fruit products. Aside from this, the PMIFI is also taking part in crafting an Individual Quick Freeze (IQF) system for different parts of the nation. The president also drafts position papers when requested by the government and offers her capabilities in creating project proposals for PMIFI members.

#### *Intermediary Roles*

As an industry association, the PMIFI performs several innovation intermediary roles. Table A5.11.1 showcases a summary of the organization's roles in enabling innovation.

Table A5.11.1

*The Intermediary Organization Roles Performed by the Philippine Mango Industry Foundation, Inc.*

Broker	Consultant	Mediator	Resource Provider
<ul style="list-style-type: none"> <li>• Collaboration with members in sourcing cartons or boxes for exporting</li> <li>• Currently trying to create an IQF logistics system for the entire country</li> <li>• Brokering plans with multiple stakeholders for a facility in critical areas (Mindanao focused for now) that will integrate farm input creation, contract farming with growers, and product processing</li> <li>• Procures mangoes from growers</li> <li>• Links stakeholders to local equipment and machinery manufacturers and trusted contract growers</li> <li>• Endorses requests to local counterparts that may conduct the training and seminars</li> <li>• At times has set the buying price in an area</li> </ul>	<ul style="list-style-type: none"> <li>• President will provide consultancy services on her own accord but not as PMIFI</li> <li>• Drafts position papers requested by the government</li> <li>• May help craft project proposals for its members</li> </ul>	<ul style="list-style-type: none"> <li>• Collaboration between members to form logistics maps, supply, and human resource networks</li> <li>• Strictly adheres to responsibility arrangements in project contracts</li> <li>• Will not usually take on the management role for partnerships</li> <li>• Lead for the planned chain-integrated facility</li> </ul>	<ul style="list-style-type: none"> <li>• Hosts annual or biennial National Mango Congress</li> <li>• Provides training in proper production, post-harvesting, and processing of mangoes</li> <li>• Provides information on export requirements and industry standards</li> <li>• Plans to create a pool of PMIFI-certified contract growers and harvesters</li> <li>• Procures mangoes</li> </ul>

*Note.* The data in this table was compiled based on an interview with a PMIFI representative, feedback from other interviews, and secondary desk research done by the researcher.

For brokerage, PMIFI provides a variety of functions. First, it has catalyzed collaboration with its members in sourcing the necessary packaging (i.e., boxes/crates) for mangoes exported to France. The organization has also brokered new markets for growers by being a purchaser of their fresh mangoes at a fairer buying price. PMIFI also links or endorses its stakeholders or inquirers to the appropriate resource persons or local member associations involved in equipment manufacturing, technology or technique provision, and the conduct of mango-related training and seminars. On top of these, the foundation also takes part in crafting the Philippines' IQF logistics system. It leads the push for a large-scale processing center that will contract growers and produce processed fruit products. These two activities will help address the sector's need for a cold chain system and boost the accessibility of processing facilities for growers.

Another significant brokerage function the organization performs is price setting. Aiding its members to acquire mango supplies, PMIFI, on occasion, has set fairer buying prices in a given location. The representative interviewed claims that they have often broken the prevailing disadvantageous buying prices. Citing one instance, the representative recalls how PMIFI set a new buying price of Php 25 per kilogram in a province. Previously, local traders would only buy fresh mangoes at Php 10 per kilogram from growers in the area.

Of the four roles, PMIFI performs the consultant role the least. According to the representative interviewed, the foundation will not directly provide consultancy services or give advice but instead endorse requests to its local member associations. These groups may be able to provide better, more contextualized advice to the inquirers. The president, however, may provide the consultancy service required but under her capacity and not as a representative of PMIFI. Besides advice provision, the organization may draft position papers or project proposals on request.

Regarding the mediator role, PMIFI does not always lead in managing partnerships or the mango network. Nonetheless, throughout its existence, the foundation has worked with its members in creating logistics maps and a network for acquiring mango supplies and the needed human resources. When doing projects, PMIFI will abide by the responsibilities set in contractual agreements with its project partners and will not go below or beyond what is expected.

For resource provision, PMIFI provides several. An essential one is the conduct of the annual or biennial National Mango Congress. As discussed earlier, the congress is an event that sees stakeholders from all over the Philippines gather and discuss issues and new developments in the mango industry. Apart from the national conference, the PMIFI also provides information on export requirements and the different standards and certifications available for mangoes. The foundation also conducts training on production, post-harvesting, and processing by request. As mentioned, PMIFI will first endorse these activities to local counterparts and organize the training if no one else can do it for the requesting party. In the future, the foundation will create a pool of foundation-certified and well-trained contract growers and harvesters that may be endorsed to its members or other industry stakeholders.

Although members cannot request financial aid from the foundation, PMIFI can provide growers a market by procuring their mango produce for its export business. Seemingly uncommon for an association, the representative interviewed relays that exporting mangoes is the primary way for the organization to survive financially and fund its programs like the National Mango Congress.



### *Intermediary Key-Capabilities*

Consistent with previous research (Sutthijakra and Intarakumnerd, 2015; Go, 2019), PMIFI has exhibits and builds key-capabilities that allow the foundation to perform its intermediary roles. Table A5.11.2 provides PMIFI's key-capabilities.

First, as a recognized national mango association by the government, PMIFI extends its reach to mango stakeholders through its local, provincial, and regional counterparts. Though its operations are based in Cebu, PMIFI is open to being approached directly or through its local member associations by anyone. Often, the foundation is approached by growers selling their mangoes or by others for inquirers or requests. PMIFI also does not limit its members to mango value chain actors but broadens it to support services like logistics providers and government organizations.

For internal communication capabilities, the representative interviewed mentioned that the members of the PMIFI network support each other by sharing information and services available to the foundation. Although PMIFI is recognized as the national mango association, there seems to be a divide within the industry. Several groups have conducted mango conferences or congresses unassociated with the one PMIFI hosts.

Moreover, PMIFI may need to work on communicating its purpose and services to others. Several stakeholders interviewed believe that PMIFI is an industry association for mango processors. Others misunderstand it as an association for mango stakeholders in the Visayas region and not for the entire industry or country. To represent the entire mango industry, PMIFI may need to invest time and effort to strengthen its ties with other mango stakeholders, especially those that do not seem satisfied with the organization.

Despite the misconceptions and conflicts, PMIFI is highly competent in its knowledge-building capabilities. For one, the knowledge the current president possesses is not limited to mangoes but extends to other agri-foods. Having this kind of knowledge allows the foundation to think more creatively, like in its proposal for an integrated processing facility that will cater to mangoes and other fruits. The PMIFI president also continues her knowledge-building by visiting other countries to learn how they produce and process their fruits. Particularly for mangoes, PMIFI has ties with capable and known mango-related resource persons that may provide training and seminars. Besides these experts, the organization also logistics companies as members that may provide a solid knowledge base for exporting and other shipping needs. The foundation keeps itself updated with developments in the mango industry through its network of practitioners and through the National Mango Congress, where R&D findings are also presented.

In terms of management capabilities, PMIFI is chiefly operated by one person, the current president. Previously, she used to work for the government, and she has advanced degrees in management. Although she does most of the daily work, the foundation will temporarily hire the staff necessary for training and the mango congress. The foundation also does not charge its members or associates with annual dues or initial membership fees. Instead, the foundation supports itself financially by exporting mangoes and conducting some training. The money PMIFI makes from its operations, however, is just enough for the foundation's survival. The president claims that she would often pay for her travel expenses out of pocket when traveling around the Philippines for the foundation.

Table A5.11.2

*The Intermediary Organization Key-Capabilities Built by the Philippine Mango Industry Foundation, Inc.*

External Networking	Internal Communication	Knowledge-Building	Management
<ul style="list-style-type: none"> <li>• Nationwide presence through local, provincial, and regional counterparts</li> <li>• Growers may approach the foundation to sell their mangoes</li> <li>• Active in searching for mangoes that the foundation may sell</li> <li>• Association extends to related and support services for the mango industry</li> <li>• The nationally known mango industry association but several industry players interviewed believe PMIFI is only for Visayas or for processed mango products</li> </ul>	<ul style="list-style-type: none"> <li>• Has members throughout the Philippines, working on national, regional, provincial, and local levels</li> <li>• Members support each other by sharing services available from the foundation</li> <li>• Endorsement of seminars and training to local counterparts is necessary since the foundation lacks human resources</li> <li>• Foundation is essentially one person</li> </ul>	<ul style="list-style-type: none"> <li>• Members are not just value chain actors directly involved in growing and processing but also in support services like logistics and government</li> <li>• Linked to capable mango growing, harvesting, and processing trainers</li> <li>• Knowledgeable of export requirements for fresh and processed mangoes</li> <li>• The current president is knowledgeable not just on mangoes but other agri-food products too</li> <li>• The current president visits and has ties to other countries' facilities and learns from these experiences</li> </ul>	<ul style="list-style-type: none"> <li>• Personal out-of-pocket expenses for trips and engagements</li> <li>• President as the only permanent staff for now</li> <li>• Hires staff on a job order basis only when they are needed</li> <li>• To support its activities, the foundation generates funding from some training services and exporting of mangoes</li> <li>• Because it is a foundation, members do not pay membership dues or have stocks</li> <li>• The current president used to work for the government and has advanced degrees in management</li> </ul>

*Note.* The data in this table was compiled based on an interview with a PMIFI representative, feedback from other interviews, and secondary desk research done by the researcher.

## *Challenges*

PMIFI faces several obstacles. One of these is the lack of financial capability to fund its activities fully. The response of the foundation to this is the need to export mangoes to earn money. Unlike other private sector organizations like cooperatives, PMIFI prides itself on its being a foundation that does not exhibit any profit sharing for its members. Nevertheless, this perspective may be limiting the organization's potential in providing support for its members or creating better synergy in the mango industry. Some organizations may also take advantage of PMIFI's non-profit stance. The PMIFI representative reports several instances where she, at times, faced red tape and alleged local corruption on some of its projects by project counterparts. During these instances, PMIFI reports these to the proper authorities if possible.

Another challenge the PMIFI needs to address is the supposed dissatisfaction of several mango stakeholders with the foundation. Several interviews with other mango stakeholders and value chain actors have mentioned their dissatisfaction and confusion with PMIFI's role. However, this challenge was not apparent during the interview with the PMIFI representative. Hopefully, PMIFI will address this issue to perform its role as the recognized national mango association fully.

Another obstacle the foundation sees throughout its existence is the lack of adherence to standards and proper growing and harvesting procedures of mango growers. According to several interviews, this challenge is a long-standing and fundamental issue in the mango industry. As per the PMIFI representative, observance and maintaining the PhilGAP, let alone Global GAP, is often not done as these are perceived too costly. She cites that this is most true for small-scale mango growers and those that care for trees dispersed in multiple areas, which are the most common operations in the Philippines. Besides, growers do not believe it is necessary to have since their mangoes still sell even without GAP certifications. Similarly, training on proper production and post-harvesting techniques has been available, but growers do not always follow these. Some research participants posit that this phenomenon is primarily due to previously learned habits that are often difficult to break.

Finally, an evident hurdle the foundation faces is the lack of human resources. As of the interview, PMIFI is essentially one person. It is difficult for the foundation to run as a national association if only one person operates everything. Although PMIFI hires part-time staff for its projects, the organization needs to hire more permanent staff to function better and further build its key-capabilities. PMIFI will inevitably face succession issues if the foundation does not receive the human resources necessary to manage it.

## *Summary*

In summary, as a recognized national mango association, the PMIFI performs several innovation intermediary functions. One of its most significant actions has been setting a fairer buying price for mango growers in different parts of the Philippines. Apart from this, the PMIFI brokers linkages and technologies that may aid its members, as in the planned processing facility. The organization also hosts the National Mango Congress. Although highly unusual, the PMIFI is a foundation that funds its activities by earning money through its mango exporting operations.

Regarding its key-capabilities, the PMIFI has a rich knowledge base generated by its current president and its members that extends beyond just value chain actors. The foundation faces several challenges, with the lack of human resources to run the organization as its most pressing. PMIFI will also need to grow its reputation to create the deep trust necessary to support and develop the mango

industry. Addressing these challenges may allow the foundation to perform its innovation enabling roles even more successfully.

## **Appendix 5.12 Mango Farming in the Philippines (MFP) Facebook Group**

### *History and Purpose*

The Mango Farming in the Philippines (MFP) group was established in 2017 by a Filipino who migrated to the United States. At that time, the founder still had land in the Philippines that he planned to grow mangoes on. He thought of establishing the group to learn from and help other growers pursue mango farming. As of late April 2021, the group has 5,047 members with daily posting and interactions from members. It seems that the MFP group principally participates in the input supply, production, and post-harvest segments for their locations in the value chain. At times, members may also share buyer information, thus participating in the marketing portion of the value chain.

Heading the group are two administrators and a moderator. However, of these three, only one administrator – different from the founder – is still active in managing the group. According to that administrator interviewed, the group used to have at least six administrators and moderators representing the three major island groups of the Philippines. All the leaders are experienced growers or contractors and were allegedly voted in by the members to serve the group. However, as the group grew, these administrators and moderators experienced disagreements in managing the group. Some of these leaders were found using the group for their gain. Some may have also lost interest in the group. Now, the one active administrator sees almost complete management of the group. He screens members that may join and posts that may be posted.

Interestingly, the administrator claimed that they had plans of registering the group as an association with the Department of Agriculture. However, they did not push through with the idea citing difficulties in managing a ballooning membership base. The administrators do not ask for any fees or payments for any consultation through the group's platform. Members, however, are required to follow the rules placed. One such rule is the requirement of having a clear Facebook profile picture. As stated by the administrator, the profile picture rule allows members to know what the person they are interacting with looks like and, to a certain extent, combat fake accounts.

### *Intermediary roles*

Primarily through its consultation and advice-giving, the MFP group exhibits the roles of an innovation intermediary. Table A5.12.1 presents a summary of instances wherein the social media group performs intermediary roles.

Table A5.12.1

*The Intermediary Organization Roles Performed by the Mango Farming in the Philippines Facebook Group*

Broker	Consultant	Mediator	Resource Provider
<ul style="list-style-type: none"> <li>• As a platform for linking growers with service providers and buyers</li> <li>• Members also post growing inputs and contracting services</li> <li>• The administrator helps members, especially inexperienced ones, in growing mangoes</li> </ul>	<ul style="list-style-type: none"> <li>• Members may post questions and receive answers from other members</li> <li>• Members may also be passive and learn by reading through posts and comments</li> <li>• Provision of free consultation on farm equipment, input supplies, buyer information, production, and post-harvest techniques</li> <li>• The administrator provides a growing protocol for chemicals that growers use</li> <li>• To a certain extent, price monitoring of farm inputs and mango-related services occur</li> <li>• Members may send personal messages to administrators to ask for context-specific support</li> <li>• Administrators send personal messages to members seeking advice</li> <li>• Posting patterns may allow members to know when there may be an over or lack of supply of mangoes</li> </ul>	<ul style="list-style-type: none"> <li>• Advice given may vary between members</li> <li>• Administrators and moderators will correct advice if a member provides incorrect information</li> <li>• Reprimands members who seem to be around to use the group as a sales avenue</li> <li>• Removes members that do not follow the rules or creates a commotion and confusion in the group</li> <li>• Limiting selling posts not to flood the group with identical posts</li> </ul>	<ul style="list-style-type: none"> <li>• Knowledge-sharing between co-mango growers and other value chain actors</li> <li>• Members share information on where to get cheaper inputs</li> <li>• Photos and videos are available</li> <li>• Members share their successes and experiences</li> </ul>

*Note.* The data in this table was compiled based on an interview with the group administrator and the researcher's observations of the group's activities.

Since its inception, the group has remained a platform for consultation and advice-giving for mango growers. Like other social media groups in this study, members may post questions regarding mango growing, pest control, service provision, triumphant or tragic experiences, and members may comment freely on these posts. Apart from commenting on the group, administrators and members may also hold their conversions via private messaging. The interviewed administrator cited multiple experiences where he would be in discussion with members who were new to mango growing. He would guide them through the process entirely through the private messaging function of Facebook. He would first provide them a protocol or guide. Then the grower would send pictures back to the administrator for any problems they may encounter. Although he provides a guide, he constantly reminds his members that mango growing is highly climate and location-specific. Furthermore, he adds that everyone needs to adjust their growing techniques, chemical applications, and other processes depending on their area's conditions. The administrator never asks for payment or compensation for the help he provides.

Members may also passively learn by reading through comments. Apart from these grower or post-specific inquiries, another vital piece of information the members may gain is price and market monitoring, the administrator posits. As members post service requirements or sales requests, other members may understand how much mangoes and services will cost at different times of the year. For market monitoring, the administrator claims that one may notice patterns when posts on harvesting surge and when there are hardly any posts on these. Learning these patterns, he says, allows growers to adjust when they may start flower induction, either earlier or later, to avoid coinciding with the supply of others. Adjusting one's timing, the administrator furthers, allows better farmgate price opportunities.

There have also been occurrences where the administrators needed to mediate conflict within the group. Citing the incessant posting of advertisements for grafted Catimon mango saplings, the administrators deleted and limited these. He then posted reminders and requests for members to stop spamming multiple copies of the same post. During cases where members do not follow posts or take advantage of the group, the administrators convene to discuss the member's removal. One instance was when someone posted a university seminar on the pest management of the cecid fly. A disagreement ensued between the active administrator and the poster because they could not agree on whether the seminar was the real thing or a ploy to take advantage of the group members. This dispute led to the kicking or removal of said poster.

#### *Intermediary key-capabilities*

Running a social media group with thousands of members requires time and commitment. Moreover, to be successful as an organization that enables innovation, MFP must build its capabilities as an intermediary. Table A5.12.2 presents the occurrences of building key capabilities.

When asked about the critical capabilities required for the group to function successfully, the administrator interviewed cited the need for good management skills. Elaborating further, he stated that it is essential that all members, especially the administrators and moderators, treat everyone fairly and be placed on a similar standard. An example of what he meant by fairness is the requirement of a profile picture. He relayed how even changing one's profile picture to a completely black image to denote the person grieving for a lost loved one qualified for automatic removal from the group. If the said person wanted to return, they needed to upload their *true* profile picture and reapply their membership.

Table A5.12.2

*The Intermediary Organization Key-Capabilities Built by the Mango Farming in the Philippines Facebook Group*

External Networking	Internal Communication	Knowledge-Building	Management
<ul style="list-style-type: none"> <li>• Online nature allows for a wider audience</li> <li>• Growing membership base</li> </ul>	<ul style="list-style-type: none"> <li>• Sending of personal messages to one another</li> <li>• Ability to freely post inquiries, farm inputs for sale, related to mango growing, sharing of successful growth, and sales</li> </ul>	<ul style="list-style-type: none"> <li>• Members are growers or persons that work in the mango value chain</li> <li>• Administrators and moderators are long-time growers or contractors</li> <li>• The administrator does his best to verify claims of members, especially regarding pest control</li> <li>• The administrator provides a mango growing protocol to his members free-of-charge</li> </ul>	<ul style="list-style-type: none"> <li>• Free service; no payment to administrators and moderators</li> <li>• Members may give gifts (monetary or otherwise) to the administrator who helped out but not a requirement</li> <li>• Administrator checks to approve posts for posting and, on occasion, delete group-irrelevant posts</li> <li>• Gatekeeping of membership, requiring administrator approval through a short group application form</li> <li>• Group requires individuals to show their face in their profile pictures; otherwise, removal from the group</li> <li>• Administrators and moderators used to have a chat group to discuss issues within the group</li> <li>• Only one administrator is left active; used to have 6 in total that represented the three island groups</li> <li>• Being consistent and fair to all members is necessary</li> </ul>

*Note.* The data in this table was compiled based on an interview with the group administrator and the researcher's observations of the group's activities.

The fairness aspect of managing the group is also found in the consistency of approved posts and members allowed in the group. The interviewee cited the group's requirement for all posts to be screened by the administrators before everyone else gets to see and comment on them. Screening also ensures that the page is not spammed by selling advertisements. Allowing such to occur freely would mean the group is losing its purpose of helping growers learn and address their issues.

As with other Facebook groups, the administrators manage the group without any compensation. A lack of payment may be another factor why the group has seen a decline in the activity of its former administrators and moderators. Although, compared to other groups, MFP may have been more organized. When more administrators and moderators were more active, the leaders even had a separate chat group to discuss the group's issues and how they could further develop the group. However, as mentioned, only one active administrator is managing the group.

Observing the posts in the group, the researcher found that the administrator is also often mentioned by members posting their successful mango growing and harvest. As discussed, this one active administrator freely shares his near twenty-year experience of growing mangoes to the group members through a protocol he made. In terms of the group's knowledge-building capabilities, it appears that several of the members, especially those new to mango growing, build their knowledge based on this administrator's experience. When asked about how they learn about newer technologies, the administrator asserts that most of these new ideas come from input suppliers or co-growers. He further laments that there has not been much focus given to mangoes by the government, unlike root crops like rice. Nevertheless, as the group is also composed of other growers and value chain actors, they can share their knowledge, improving the group overall.

As an online platform, the MFP group extends its reach beyond geographic boundaries, having members from across the Philippines. Furthermore, communication within the group is conducted through posts, commenting, and personal messaging. Again, these posts are limited and screened by the administrator to prevent spamming and to ensure that others get an opportunity to ask and share.

### *Challenges*

Through the years of its existence, the group has faced several challenges. One of its first challenges was the desire of its members to be formally recognized by the DA. However, the response to this was unfortunate, as the administrators and moderators decided not to pursue this effort with the constantly growing membership. Another challenge they faced was the decline in the commitment of its previous administrators and moderators. Compared to other social media groups, the MFP group seemed to be more organized. As the remaining active administrator claims, the group even held an election to nominate administrators and moderators, representing the three island groups. Due to internal conflicts, the group started losing its administrators and moderators. Another likely reason for the decline in commitment may be the lack of compensation and the voluntary nature of the job.

Another challenge the group faces are disagreements and confusion caused by member posts. When the group still had several active administrators and moderators, they would convene via a group chat and discuss how they would handle the situation. The leaders would vote on whether they will remove the persons who stir confusion and trouble out of the group.

A third challenge is preventing the group from turning into an online marketplace. Requiring approval before a post is made public is one way the group is preventing this from happening. The active administrator ensures that the majority of the posts are those that elicit discussion. Though the



group allows people to promote their products, these posts are also limited and are sometimes removed by the administrator. To prevent spamming or the group used for some other purpose, the administrator removes members who do not show their faces in their profile pictures and possible fake accounts.

### *Summary*

The MFP group performs roles as an innovation intermediary by providing advice to its members through its online nature. A variety of information on growing, chemical use, farm inputs, buyer linkages, and others are made available to members who choose to post inquiries, share their experiences, or passively read through the comments. Set up to be a space for discussion, the one active administrator continues to practice and enforce the group's rules to guarantee that the group does not simply turn into an online marketplace. The interview shows that the group does not seem to actively try to build its external networking and internal communication capabilities. Instead, it appears that the group's management is a more critical capability in successfully enabling innovation for its members.

## **Appendix 5.13 Philippine Mango Raisers Haven (PMRH) Facebook Group**

### *History and Purpose*

The Philippine Mango Raisers Haven (PMRH) group began in 2015. It was established by a Filipino agriculturist who is knowledgeable in the plant crop industry and the livestock industry. He had a degree in animal sciences from the De La Salle Araneta University. He decided to create the group to help his friends who were experiencing difficulties in mango growing. Upon starting the group, he elicited a friend, a horticulture graduate from the same university, to support the group. The group founder chose this agriculturist friend because he used to work with the DA – Bureau of Plant Industry and is very knowledgeable in mango growing and care. The group's primary purpose is to aid mango growers by providing the correct information in growing mangoes, linking reliable and trustworthy buyers and suppliers, and as a space for inquiries. In the years of the PMRH's existence, the two individuals serve as the group's administrators – managing posts and ensuring that the group's original purpose remains as it is. The group values non-discrimination and the freedom to share knowledge on mango growing. Its mission is to raise the quality of locally grown mangoes.

As of late April 2021, the group now has 18,134 members. Most of these members are mango growers and come from a range of experiences, from beginners to longtime farmers. According to members of the group, their primary reasons for joining were learning and getting tips on mango growing and being updated on going rates for mangoes. Other members are buyers, traders, contractors, input suppliers, and other value chain actors. Regarding its value chain participation, the group support activities in the input supply, production, post-harvest processing, fresh mango trade, and marketing processes. Although the group is primarily a platform for information, the PMRH, through its administrators' help, also provides linkages between buyers, sellers, and service providers.

### *Intermediary Roles*

Because of the free consultancy and linkage services the group provides, the PMRH performs roles and provides services consistent with innovation intermediaries. Table A5.13.1 provides a summary of PMRH's role performance as an intermediary organization.

Table A5.13.1

*The Intermediary Organization Roles Performed by the Philippine Mango Raisers Haven Facebook Group*

Broker	Consultant	Mediator	Resource Provider
<ul style="list-style-type: none"> <li>• As a platform for linking buyers and growers</li> <li>• Members also post growing inputs and contracting services</li> <li>• Administrator helps members contact buyers in their farm's location</li> <li>• Posting of DA-BPI certified mango nursery operators list for growers</li> <li>• Although selling pesticides is allowed, sellers must be truthful as to what these are and not just promote these for the sake of selling</li> </ul>	<ul style="list-style-type: none"> <li>• Members may post questions and receive answers from other members</li> <li>• Members may also be passive and learn by reading through posts and comments</li> <li>• Provision of free consultation on farm equipment, input supplies, buyer information, production, and post-harvest techniques</li> <li>• To a certain extent, price monitoring of farm inputs and mango-related services occur</li> <li>• Members may send personal messages to administrators to ask for context-specific support</li> <li>• Administrators send personal messages to members seeking advice</li> </ul>	<ul style="list-style-type: none"> <li>• Advice given may vary between members</li> <li>• Administrator carefully structures correct advice if a member provides incorrect advice not to shame the advice-giver</li> <li>• Group does not provide price mediation</li> <li>• Reprimands members who seem to be around to use the group as a sales avenue without caring about whether or not the product works for the specific problem</li> <li>• Addressing complaints and user reports</li> </ul>	<ul style="list-style-type: none"> <li>• Knowledge-sharing between co-mango growers and other value chain actors</li> <li>• Administrators share upcoming mango-related training and seminar programs provided by the DA-BPI</li> <li>• Photos and videos are available</li> <li>• Members share their successes and experiences</li> <li>• Administrators are planning to create a cultural management agency that members may hire</li> </ul>

*Note.* The data in this table was compiled based on an interview with the group administrator and the researcher's observations of the group's activities.

As an innovation intermediary, the PMRH mainly performs as a consultant. This role is most evident in the group's posting and commenting on inquiries on mango growing by members. At times, the administrators, particularly the agriculturist, receive personal messages from members and inquire about the growing and mango trade. He freely provides advice and leaves it up to the inquirer if they want to follow his advice. A similar stance is taken in the group's public posts. Any of the members may reply or may even ask further questions, and it is up to the members which advice they will heed. As the advice given may be wrong, the agriculturist administrator carefully corrects these not to shame the person that provided the incorrect information. Similar to other social media groups, members may be passive and learn through reading the comments. However, the administrator interviewed said that most of the buyer information he shares is relayed to members via personal messages.

Related to its consultancy role, one advantage social media groups have is their presence wherever the member may be. Members may inquire at any time. Compared to other organization types, the administrator feels that social media groups provide a less intimidating space for farmers and growers. He mentions that sometimes visiting the local DA also does not guarantee they will be entertained or even receive the information they need. Inquiring through the group likewise saves money as the inquirer will no longer need to travel physically.

The group also performs the brokerage role but possibly not to its full extent. As a social media platform, PMRH provides a space for growers to buy necessary farm inputs from other members. Furthermore, the administrators are also able to link mango buyers with growers. However, the limitation of the brokerage is the sharing of the contact information or connecting two or persons. The group will not meddle in pricing or ensuring that the transaction pushes through. Although the administrators do not intervene in trades, they do their best to ensure that the buyers and growers do not take advantage of one another. They do this only by linking those that seem trustworthy. The administrator interviewed reported that they have yet to experience complaints or ill-fated deals for those they linked. He does, however, emphasize that they are unable to do anything or provide a better price if the prevailing farmgate price for mangoes is low for the season. One reason for the low price is oversupply.

For its mediation role, the PMRH administrators exhibit this role in their reprimanding and policing of members that seem to use the group only as a selling platform. The administrator interviewed recalls an instance of this when a member posted inquiring about ways to prevent cecid flies on his farm. One member commented and suggested using a product he was selling. It turned out that the product being endorsed was a soil conditioner and not even a pesticide. The administrator reprimanded the member and warned the commenting member not to sell his product if it would not help the poster's cause. Another instance of mediation was when PMRH received a report from Facebook to remove a member from the group. To be fair to the member and upon further investigation, the administrators learned that another member in the group reported the member in question for violating Facebook rules. It turned out that both members were mango nursery operators. The reporting member sent the complaint because their sales were dropping when the other member also offered saplings from their nursery. The administrators allowed both members to stay and reminded its members that the group does not endorse specific products or stores but gives growers options.

The resource provision role seems to be tied to the group's ability to perform as a consultant. Most of the resources provided come from information and knowledge-sharing between members. Apart from these, the sharing of photos, videos, and experiences by the members may also be considered a resource that other members may gain. When asked about other resources the group provides, the administrator emphasized that the group did not provide much else as the services are

given for free. They, as administrators, did not receive any payments or royalties from the linkages they foster. Nonetheless, both administrators plan to create a cultural management agency that mango growers may hire to help grow and maintain their mango trees.

### *Intermediary Key-Capabilities*

In performing its roles, the PMRH group also builds intermediary key capabilities, as presented in Table A5.13.2 As a public group on Facebook, the group has been growing its membership base. Although the administrators do not actively promote the group, new members can search for it. Facebook may even suggest the group based on user data. The administrators screen applicants to ensure that new members do not join for the sake of taking advantage of its members. Examples of persons they look out for are promoters simply looking for a new platform to market their products. The administrators gatekeep members by reviewing their interests and purpose based on comments or post requests.

For internal communication, the administrator relays how a mix of posting, commenting, and personal messaging is done by their members. As mentioned, for instances when incorrect information is shared, the agriculturist administrator corrects the information appropriately. The administrator also monitors posts and ensures that the content is all related to mango growing. The researcher observed that the group hardly has any unrelated posts, meaning that the administrators always do their screening job. At the time of writing, the group averages 13 new posts daily.

In terms of developing its knowledge-building capabilities, the group's base is the knowledge of its members, who primarily mango growers or other actors working in the mango value chain. Its knowledge-building capabilities are further built by the expertise of one administrator. This administrator is an agriculturist and has contacts with the DA-BPI, traders, input providers, and growers. As an administrator, the agriculturist is highly active in the group and develops his knowledge-building capabilities by practicing and experimenting on his farm, where he grows mangoes and other crops. He also keeps updated with events and developments from the DA-BPI.

According to the administrator interviewed, one capability he considers very important is consistency in what and who he allows in the group. He takes the time and effort to review post requests. Although the administrators do not undergo any specialized training in managing a Facebook group, they learn as they manage the group. Nonetheless, they manage the group by ensuring that their actions adhere to the group's purpose. As mentioned, the services provided by the group are free of charge, and that the administrators do not receive any financial aid or payments from the members of the people they link. The administrator considers the lack of membership fees and free advice the critical advantage of social media groups. Being free allows members to freely ask for advice from anywhere, even while they are at their farm.

Table A5.13.2

*The Intermediary Organization Key-Capabilities Built by the Philippine Mango Raisers Haven Facebook Group*

External Networking	Internal Communication	Knowledge-Building	Management
<ul style="list-style-type: none"> <li>• Online nature allows for a wider audience</li> <li>• Growing membership base</li> </ul>	<ul style="list-style-type: none"> <li>• Sending of personal messages to one another</li> <li>• Ability to freely post inquiries, farm inputs for sale, opportunities to learn (e.g., seminars and training) related to mango growing</li> </ul>	<ul style="list-style-type: none"> <li>• Members are growers or persons that work in the mango value chain</li> <li>• One administrator is highly knowledgeable in mango growing, farm inputs and has contacts from the DA-BPI</li> <li>• Updates contact information and location list of mango buyers, suppliers, and certified nursery operators</li> </ul>	<ul style="list-style-type: none"> <li>• Free service; no payment to administrators and moderators</li> <li>• Administrator checks to approve posts for posting and, on occasion, delete group-irrelevant posts</li> <li>• The administrator is serious about raising the quality of mango growing in the Philippines</li> <li>• The administrator mentions the difficulty in taking time to review membership and post requests</li> <li>• Being consistent on what posts are allowed, who may remain as members, and with the advice given is necessary</li> </ul>

*Note.* The data in this table was compiled based on an interview with the group administrator and the researcher's observations of the group's activities.

### *Challenges*

Regarding challenges the group faces, the administrator mentions that one common challenge is some members providing incorrect advice. When these are encountered, the administrator will provide more appropriate advice, doing it in a manner to not shame the faulty advice-giver. Another challenge faced by the group is persons actively using the group to promote or endorse their products even if they are not used for the intended purpose. During these instances, the administrators would refute these members of their claims. Furthermore, suppose he finds that a person seems only to be a member to sell or promote products. In that case, he immediately reprimands them and asks them to cease turning the group into a marketplace. Related to the selling of products, the group also receives reports or requests of removal for individual members claiming that these members violated rules. Often, they find that competitors make these reports of similar products or services in the group. Their response is a reminder that selling products or services is not the group's primary purpose.

An additional challenge the group faces is the request for more services. According to the administrator, members previously requested that the group hold a training or seminar taught by the administrators. However, as these require capital and the group did not generate money, it was not done. Another similar request was to create a standard protocol or guide members of the group as a reference. The agriculturist administrator was in the process of making this guide but put it on hold when the computer he was working on encountered technical issues.

### *Summary*

In summary, the PMRH group exhibits innovation intermediary roles and builds relevant key capabilities. Its chief role is to provide growing and market knowledge primarily to actors in the upper stream of the mango value chain. It performs mediation roles as it intervenes when the group's primary purpose is not being followed. Although the group and its administrators help link growers to possible buyers, PMRH does not take responsibility for guaranteeing the success of a transaction. To be successful in its role as an intermediary, the group relies on the industry knowledge of its members and its agriculturist administrator. Moreover, the administrators learned to manage the group through the years by consistently adhering to the group's purpose. As a platform, the PMRH group is open to sharing its knowledge and linking resources to new members interested in developing quality mangoes.

## **Appendix 5.14 Diamond Star Agroproducts, Inc.**

### *History and Work*

The Japanese company began in 1964 but was not in the fruit exporting industry yet. Instead, the company was in the bowling franchise business. Back then, it was called Starlanes Corporation. As the bowling boom grew throughout Japan, the company's founder decided to pull the company out of the industry. He saw a massive oversupply of bowling centers popping up. In the late 1960s, Starlanes Corporation moved into fruit exporting by investing in papaya farms in Hawaii.

The turning point for the company came in 1986 with the development of the Vapor Heat Treatment (VHT) machine. Just before the development of the machine, the Japanese Agricultural Ministry announced that they were in the process of banning the use of an insecticide called EDB, which was effective against fruit flies. Alternative methods suggested by the ministry were the use of Hot Water Treatment (HWT) or VHT. Working with another company, Starlanes developed a machine and system that eliminated fruit flies and their larvae from tropical fruits when exposed to a set high temperature for several hours. With its development, the VHT machine and system enabled Starlanes

to export a more comprehensive range of tropical fruits. Currently, the company has offices in Japan, Hawaii, Australia, Thailand, and the Philippines. In 2003, the company registered the fruit exporting business as Diamond Star Corporation.

The company soon came to the Philippines in 1987 as a joint venture with one large Filipino corporation. In 2007, the company bought out all the shares of their partner and is now wholly Japanese-owned. Their main product was the export of mangoes to Japan. From its establishment until the mid-2000s, the company saw a massive export of the fruit. However, in 2006, the Japanese government created a list commonly known as the positive list. This positive list itemizes chemicals that were either banned for use or allowed a minimum residue limit (MRL) in agricultural products (Ohta, 2014). According to the Diamond Star representatives, Diamond Star had to stop its Philippines mango export for one or two years, as most were found violating the rules. Luckily for the company, they expanded towards the export of other fruits from the Philippines like papayas, pineapples, cardava or saba bananas, and durians.

In the years that followed, Diamond Star was again able to export Philippine mangoes to Japan but no longer at the same amount it did previously. To make up for this, the company also exports its mangoes to other foreign countries like Hong Kong, China, and South Korea. Compared to Japan, their other export markets are not as strict with MRLs and chemical usage. In addition to its expansion towards other markets, Diamond Star also leases its VHT facility to other fruit exporters in the Philippines.

Diamond Star Agroproducts has two facilities in the country. The facility in Manila caters to all the mango operations of the company. In contrast, the Davao facility, established in 2007, serves all the other fruits it exports. Both facilities have VHT facilities. The company has 22 persons working in the Philippines, with 15 in Davao and seven in Manila. Diamond Star is heavily involved in the post-harvest, assembly, fresh mango trade, and global trade segments of the mango value chain. They also support the input supply and production segments of the value chain.

### *Intermediary Roles*

Although Diamond Star is a private firm, the company has in its lifetime performed several intermediary roles. Table A5.14.1 provides a summary of its innovation intermediary role performance.

Diamond Star performs the brokerage, consultancy, and resource provision roles almost equally. For brokerage, its main action is providing opportunities for Philippine mango growers to access the Japanese and other export markets. As a subsidiary company, Diamond Star allows its growers to access foreign supermarkets and opens the opportunity for institutional sales. Unlike other exporters that may only sell to supermarkets, mangoes sold by Diamond Star in Japan are directly bought by restaurants.

However, to broker sales to the export market, Philippine growers will need to comply with the MRL and other requirements of foreign markets. Diamond Star provides this information to them through its in-house technicians. They visit their suppliers to monitor and teach what chemicals may or may not be used and how much of each may be applied. During the harvest season, Diamond Star's practice is to send several sample pieces of mangoes per production batch of each their suppliers to chemical laboratories in Japan to check whether the fruits will pass the MRLs. Once they do, Diamond Star purchases their required quantity from their suppliers.

Table A5.14.1

*The Intermediary Organization Roles Performed by Diamond Star Agroproducts Inc.*

Broker	Consultant	Mediator	Resource Provider
<ul style="list-style-type: none"> <li>• Purchases are subject to passing minimum residue limits for Japan</li> <li>• Leases VHT and other facilities to other exporters in the Philippines</li> <li>• Provides access to the export market to growers</li> <li>• Started exporting mangoes to other countries as well</li> <li>• Brought two trusted suppliers to Thailand to learn mango growing techniques there</li> <li>• Halted mango exporting for about two years after Japan's positive list was issued</li> </ul>	<ul style="list-style-type: none"> <li>• Provides chemical list allowed for Japanese export</li> <li>• Staff visits growers they have ordered from to monitor chemical usage and to provide advice to achieve requirements</li> <li>• One of the companies that set the sizing and packaging standards for mango exporting in the Philippines, especially for Japan</li> </ul>	<ul style="list-style-type: none"> <li>• Collaborates with their head and sister offices for knowledge-sharing</li> </ul>	<ul style="list-style-type: none"> <li>• Leases VHT and other facilities to exporters</li> <li>• Have previously provided mango bags, plastic crates, and credit to partner mango growers</li> <li>• Stopped providing more resources apart from technical exporting advice as most of the growers they provided for do not follow through</li> </ul>

*Note.* The data in this table was compiled based on interviews with Diamond Star representatives and secondary desk research done by the researcher.



Holding between 60% to 80% of the fresh mango export share from the Philippines in Japan, the company has also been crucial in setting the sizing and packaging standards for those hoping to export to Japan. Moreover, Diamond Star also sets the standard in how fresh mangoes must be packed when transported from the different points in the Philippines to their VHT facility.

With the drop in mango exports to Japan, the Diamond Star has since started to lease its VHT facilities to other mango exporting companies in the Philippines. The representatives claimed that not doing so would put the company in the red. Furthermore, they stated that leasing their VHT facilities would sometimes generate more income than their total mango exports to Japan in a year.

In the early 2000s, the company also used its resources to provide fruit wraps or bags and plastic crates for their mango growers. According to the company representatives interviewed, there were also points when they provided capital for their growers. The growers were to use the money for farm inputs and ensure that they can care for the mangoes to achieve the Japanese requirements. However, the experience did not yield the desired results and only led to further losses as they could not purchase the necessary supply to recoup the investment. They since then stopped providing any more material support to mango growers.

In contrast, Diamond Star still provides material support to its growers of other fruits. As per the representatives, the company provides inputs like fruit bags, packaging, and irrigation pumps to their banana and papaya growers. These growers continuously meet their requirements and completely follow the advice provided by the Diamond Star technicians.

Diamond Star, however, did not wholly give up on its mango growers. Between 2017 to 2018, they sponsored a one-week trip to Thailand for two of their most trusted mango suppliers. They visited their Thailand branch's mango growing orchards to learn how Thai growers produce their mangoes during the trip. According to the company representatives, one of the two growers tried to adapt the techniques they learned during the trip but to little success. The growing techniques and culture in the Philippines, they said, were too different and underdeveloped compared to those used in other countries. Diamond Star hopes that the government helps the mango industry modernize its techniques to have a better stand in the global market.

As a note on mediation performance, Diamond Star collaborates with its head and sister offices to bring and share knowledge from abroad into the Philippines. The most positive developments are found in their papaya and banana products.

#### *Intermediary Key-Capabilities*

In recent years, it appears that Diamond Star has been performing more innovation intermediary roles for its other fruit exports than mangoes. However, one cannot discount the company's vital role in developing the Japanese export market for Philippine mangoes. In many regards, Diamond Star has built its key-capabilities to perform several of its innovation intermediary roles successfully. Table A5.14.2 presents a summary of how Diamond Star builds or has built its necessary key-capabilities.

Table A5.14.2

*The Intermediary Organization Key-Capabilities Built by Diamond Star Agroproducts Inc.*

External Networking	Internal Communication	Knowledge-Building	Management
<ul style="list-style-type: none"> <li>Started as a joint venture with a Filipino company, then on their own by 2007</li> <li>Part of a mango exporter's association in the Philippines, but the association is not active</li> <li>Goes from town to town to look for more mangoes to purchase</li> <li>Access to institutional buyers in Japan and other countries</li> <li>Sales in Japan expanded towards foreigners in Japan</li> </ul>	<ul style="list-style-type: none"> <li>Head and sister offices in Japan, Australia, Hawaii, and Thailand</li> <li>Close relationship with DA-BPI for quarantine and export certification</li> <li>Has roughly ten trusted suppliers whom the company always visits and buys mangoes from but has over a hundred possible suppliers</li> <li>The hiring of Filipino staff in the Japan office</li> </ul>	<ul style="list-style-type: none"> <li>Knowledge-sharing between head and sister offices</li> <li>Experience in VHT facility development allowed the company to expand</li> <li>Staff experienced in mango-growing and other crops</li> <li>Knowledge in exporting other fruits allowed them to export other fruits from the Philippines</li> </ul>	<ul style="list-style-type: none"> <li>Will hire persons that have experiences or knowledge in the fruits they export</li> <li>Sends staff to sister offices to learn growing techniques in those countries</li> <li>Can easily adjust to Japanese requirements as their head office can contact them immediately</li> <li>Currently, the Japan office has a Filipino staff they hired to ease the language barriers and hopefully be able to relay market demand when the staff gets to visit their suppliers in the Philippines</li> <li>Has two facilities in the Philippines: Luzon facility for mangoes, and Davao facility for other fruits</li> <li>Manager in the Philippines is Japanese</li> </ul>

*Note.* The data in this table was compiled based on interviews with Diamond Star representatives and secondary desk research done by the researcher.

One common factor for all four key-capabilities is Diamond Star Agroproducts' connection to its head office in Japan and its affiliated branches in Australia, Hawaii, and Thailand. As mentioned by the company representatives several times during the interview, the Philippine branch would not have been successful if it were not for the base and sharing of knowledge between the different offices. Learning the requirements in Japan and relaying these to their growers was at the base of the Philippine branch's capability building. The experience of exporting other fruits from other countries was also easily translated into the Philippines that now exports several other fruits.

Its connection to its affiliate offices is not only limited to knowledge-building capabilities but also its management capabilities. Besides sending two of its trusted Filipino growers to learn in Thailand, the office also sends its technical staff to their other branches to train growing techniques. These are subsequently shared with their growers, but, as discussed, for the case of mangoes, Diamond Star feels that most of the growers do not follow what they recommend.

Another critical management capability characteristic the Philippine offices have is that the overall manager is Japanese. By being Japanese, the manager allows the subsidiary to understand and connect to the head office more efficiently. Being a subsidiary company also aids in communication between the overseas offices. Unlike other exporters that may treat import buyers as clients, Diamond Star can provide directives more effortlessly, which allows the Philippine branch to adjust quicker.

Moreover, additional development in internal communication capabilities for the Philippine branch is the hiring of a Filipino staff in the Japan head office. According to the Japan head office representative, the hiring of the native staff was strategic. It allows the Filipino staff to learn and understand the Japanese market and relay this information to their staff and growers without worrying about a language barrier. The representative also mentioned that the staff also expanded their network by selling their fruits directly to foreigners in Japan. The company found a new customer base in the growing Southeast Asian population looking to eat fruits from their homelands.

The Philippine branch builds its network of suppliers by combing through villages before the start of the growing season to look for more mango supply. During the harvest season, they may have hundreds of possible suppliers. However, only ten are considered their most trusted mango suppliers that have consistently delivered the quality and adhere to the Japanese standards. Although they supply between 40 to 50 tons of mangoes during the peak months, these trusted suppliers alone cannot meet the total demand.

Regarding Diamond Star's relationship with other organizations in the Philippines, the representatives mentioned that they have a close relationship with the Bureau of Plant Industry (BPI). This relationship is necessary to sustain as the BPI is the government agency responsible for granting quarantine certifications for export. The country manager mentioned that the Philippine branch is also affiliated with the mango exporter's association but adds that the association is not active. The company also has relationships with other mango exporting companies. These companies lease Diamond Star's VHT facilities for their export operations.

### *Challenges*

The first great challenge that Diamond Star faced for its Philippine mango exports is Japan's positive list in 2006. Experiencing several violations, the company decided to stop its mango exports for about two years to allow their growers to adjust the chemical use. They also used the time to search for new suppliers capable of achieving the Japanese standards. In addition to these, Diamond Star also

started exporting other viable fruit products to Japan, eventually setting up a facility in the Davao region in 2007.

Following this, Diamond Star has been struggling to export mangoes to the more lucrative Japanese market. Not many growers comply with the Japanese government's requirements. The company still tries its best to teach and persuade growers to hit the Japanese standards, but not many follow their advice. A significant reason behind this is the higher effort associated with producing for the Japanese market. Other foreign market opportunities that do not require such high restrictions are also available to growers. Another reason is the congruently high local demand for mangoes. To export to Japan, Diamond Star competes with more easily accessible foreign markets and local competition from large mango processors and the local consumer market. In response to these challenges, Diamond Star has been exporting to other foreign markets and leases its VHT facilities to earn more income.

The company faces several industry structure obstacles too. Comparing mangoes to their other fruit exports, the company representatives mention that many mango growers do not own the trees under their care. Unlike other fruit growers, mango growers are limited by what they may do to sustain the tree. Furthermore, Diamond Star found that many of those who own their trees are only interested in seeing that these only bear fruit and not in a more sustainable perspective. Moreover, the company firmly believes that Philippine growing techniques are very much outdated. The representatives mention that growing techniques in the Philippines have not changed since they began exporting mangoes in the late 1980s. Unlike the Philippines, other countries have mechanized operations and use more advanced techniques. They hope that the entire industry revamps its ways to be able to compete in the global market. As it stands, comparing Philippine mangoes to those from other countries, the fruits that originate from the Philippines are among the most expensive. Although it may make up the price for its quality, to compete in the world market, Diamond Star believes that more needs to be done to drive production costs down.

### *Summary*

In its 40 years of exporting mangoes from the Philippines, Diamond Star Agroproducts have performed several intermediary roles. The most significant of these roles is access to the Japanese export markets. With its connection to its head office in Japan and affiliate companies in other countries, the Philippine branch brings knowledge from abroad into their local operations. Although the company has attempted to develop its partner growers' capabilities, the institutional and cultural challenges limit its success in innovations in the value chain's upstream portions. Although the company has moved towards exporting other fruits, Diamond Star continues to persuade growers to follow their advice. The company hopes that, soon, they may export more mangoes to Japan once again.

## **Appendix 5.15 Profairtrade Development Enterprise, Inc. (PDE)**

### *History and Work*

The beginnings of this social enterprise began in 1969 when Fr. Shay Cullen, an Irish missionary priest, was assigned to the Parish of St. Joseph in Olongapo City, Philippines. At that time, Fr. Shay witnessed the sexual exploitation and trafficking done on women and children in the area. To combat this sad reality, Fr. Shay established the People's Recovery, Empowerment, and Development Assistance (PREDA) Foundation in 1974. The foundation's primary purpose was to protect women and children from exploitation and provides legal assistance, shelter, and therapy for the abused.

Another displaced group the foundation supports are children in conflict with the law. Just the same, the foundation provides legal assistance and shelter for these children.

In 1975, Fr. Shay established the Profairtrade Development Enterprise (PDE) to sell handicrafts that the children under their care made. By doing so, they fund a part of their services and support. In 1993, PDE expanded its assistance to small mango farmers. The organization would disrupt the value chain by procuring mangoes directly from the farmers at prices above what commercial traders would offer the mango producers. PDE partnered with a large fruit processing company to produce dried mangoes and other processed mango products. These products are exported to their international partners to sell in the European and other markets.

Officially, PDE's registered name is Profairtrade Development Enterprise, Inc. However, many more know their enterprise as Profairtrade or PREDA Fair Trade. In its years of existence, the organization has gone through several business status changes. It is now registered as a sole proprietorship business. The enterprise was a previous member of the World Fair Trade Organization and the Organic Certification Center of the Philippines. They recalled their memberships after deciding to receive their fair trade and organic certifications from the Germany-based Naturland and Naturland Fair instead. Although it is a private sector firm on paper, PDE's work makes it act more like an NGO or a social enterprise. It is a self-sustaining business that is not profit-seeking but rather profit-sharing. It distributes its profits by providing a portion to the PREDA Foundation, as Fair-Trade Premiums to their mango grower partners, and to fund their community development projects.

Currently, PDE has six employees who have been working with the enterprise and foundation for at least ten years. They are partners with 361 farmers in Luzon island, with a large portion being indigenous people (IP) of Aeta descent. Furthermore, they are partners with 122 more farmers in the Davao region. Specifically, mango farmers in Davao are fair-trade farmers. The IP mango growers are both fair-trade and organic farmers.

All the mangoes they purchase are for processing for the export market. The organization also procures other fruits and vegetables from their partner farmers but in lower quantities. As a certified Fair-Trade organization, PDE provides an additional Php 2.00 per kilogram of mango sold by their partner farmers on top of their farmgate price. PDE is present in almost all parts of the mango value chain, from input supply to marketing and global trade. As of November 2021, PDE is exploring the possibility of processed organic bananas and sweet potato products.

### *Intermediary Roles*

Throughout its lifetime, PDE has enabled several innovations for its partners. The most significant of these is the access to the international market and fair-trade premiums that provide their partner farmers additional income and livelihood opportunities. Furthermore, PDE has performed several innovation intermediary roles. Table A5.15.1 provides a summary of the organization's role performance.

Of the four intermediary roles, PDE performs brokerage, mediation, and resource provision the most. For the consultant role, although the organization does not actively provide consultancy of their expertise, the representatives interviewed mentioned that they are open to inquiries regarding their work. Examples of what they consider consultancy are requests for interviews by researchers or inquiries regarding organic farming methods or fair-trade principles. Another related form of consultation that the PDE provides is orientations or seminars on fair trade. These are usually conducted during the first few visits PDE staff have with new partner farmers or communities.

Table A5.15.1

*The Intermediary Organization Roles Performed by Profairtrade Development Enterprise*

Broker	Consultant	Mediator	Resource Provider
<ul style="list-style-type: none"> <li>• Group certification for organic and fair trade</li> <li>• Provides training on enhanced processes to improve natural or organic farming of IP partners; also trains inter-cropping</li> <li>• Provides access to an assured buyer and the world market</li> <li>• Purchases mangoes at higher or at the prevailing market price; double the price for some mangoes from the IP communities</li> </ul>	<ul style="list-style-type: none"> <li>• When visiting farmers for the first time, they provide an orientation on fair trade principles and organic farming</li> <li>• Open to researchers and people inquiring about their organic farming methods and fair-trade principles.</li> </ul>	<ul style="list-style-type: none"> <li>• Does necessary applications and processes on behalf of partners for group certification for organic and fair trade</li> <li>• Commitment signing to fair-trade principles between farmers and PDE</li> <li>• Immediate payment for purchased mangoes</li> <li>• Conducts monitoring and area visits</li> <li>• Transparency in records and validation with processor partner</li> <li>• Communities recommend who may serve as local inspectors</li> <li>• Mediates between partner importers, local packaging producers, and processor</li> </ul>	<ul style="list-style-type: none"> <li>• Access to PDE assistance and partnership is free as long as they adhere to standards set</li> <li>• Group certification for organic and fair trade</li> <li>• Provides fair-trade premium on top of buying price</li> <li>• Annual tree planting event in almost all serviced areas</li> <li>• Provision of some farm inputs if necessary</li> <li>• Provides educational assistance, home improvements, community toilets, water systems; may cater to individual requests of partners</li> <li>• Provides non-agricultural training and seminars: women and children's rights, responsible parenting, IP Rights Act</li> </ul>

*Note.* The data in this table was compiled based on interviews with PDE representatives and secondary desk research done by the researcher.

As a broker, the most significant innovation brokered by the PDE is market access through the organization's assured and fairly-priced mango purchases. Through the purchases by PDE, the mango farmers are also given access to the world market and gain fair trade premiums from PDE's sales with its partner importers abroad. PDE also provides better prices for the farmers as the organization adheres to prevailing market prices or offers prices that favor farmers. According to the representatives, before partnering with PDE, the IP farmers used to sell their Pico-variety mangoes to commercial traders for Php 40.00 to Php 50.00 per sack<sup>24</sup>. Upon learning this, PDE sought to provide these IP farmers a better deal and offered Php 6.00 per kilogram of Pico mangoes. At 50 kilograms a sack, IP farmers stand to earn Php 300.00, a six- to eight-fold increase versus commercial traders. An additional incentive for farmers to sell to PDE is the fair-trade premium they will receive on top of the purchase price. The organization follows a buy-all principle where PDE does not discriminate against size or blemishes between mangoes<sup>25</sup>. Since all their mangoes are for processing, PDE is less strict with the mangoes' physical appearance. Furthermore, PDE has agreements with their partners that their mangoes will all be bought at the same price regardless of quantity. Doing so assures their partners of sustainable income even during periods of overproduction.

Another significant innovation provided by PDE is access to organic and fair-trade certifications of their products. Currently, PDE has Naturland and Naturland Fair group certifications. Having a group certification allows their partner farmers access to these too. To ensure and manage these standards, PDE set up an internal control system that monitors their partner farmers' adherence to the fair-trade principles and organic farming methods. A large part of this internal control system involves several site visits, training, and seminars with their partner farmers and communities, and the appointment of an internal inspector for each community.

PDE does not just buy the mangoes from their partner farmers. They also provide training on natural or organic farming methods, proper farm and mango tree management, proper pruning, creating natural fertilizer, and fair-trade principles. Apart from these, PDE also provides training on inter-crop farming and its management and provides their partners' seeds and saplings of other fruits and vegetables. Since PDE fully supports organic or natural farming methods, they do not want their certified organic areas to spray their trees with flower inducers. To make up for the biennial fruiting of mango trees produced in this natural way, PDE brokers additional sources of income and food for their partner farmers.

Since PDE relies on its partnership with farmers and IP communities, PDE actively performs mediating roles to keep a good relationship between itself and its current or new partners. Often, PDE will be the one who initiates contact with probable partner communities. For example, when they were looking to expand in the Davao region, they requested linkage support from their processing partner to look for farming communities they could support. Since the period they began their operations, several other groups of farmers and IPs approached them to ask to be part of PDE's list of partners.

When first meeting and partnering with communities, PDE will first provide an orientation on fair-trade principles. After being assured that their potential partners understand these, PDE requires them to sign a commitment as a form of agreement between the two parties. These agreements may not necessarily be in the form of physically signed paperwork. However, they may be in other forms, such as setting up a tarpaulin containing the principles in the village center. Upon their

---

<sup>24</sup> A sack carries approximately 50 kilograms of these mangoes.

<sup>25</sup> The representatives add that mangoes not suitable for processing will not be bought. These mangoes are those that are rotten or those that have sustained significant damage from falling from their trees.

agreement and commitment, PDE asks the community to nominate one of its members as a local inspector. These nominated persons will work with PDE to monitor the progress and work of their partner farmers. To be eligible, the person needs to be easily contactable and knows how to read and write. They are also provided with additional training and seminars that delve deeper into organic farming and fair-trade methods and principles and on how the monitoring should be done. Moreover, suppose the community that PDE partners with is not yet organized. In that case, its staff will aid the community in creating a farmer organization for its partners.

To reduce possible conflicts on mango sales, PDE's immediately pays for what they purchase upon meeting. PDE and its partners decide on a meeting or buying station beforehand. During the harvest season, meet there to exchange the cash and mangoes. For their Davao operations, their partner farmers meet with representatives from the partner processor instead of PDE. PDE, the partner processor, and partner mango growers keep separate records of purchases to help in validating and triangulating the correct number of mangoes sold. The recording is what is used as the basis for the fair-trade premium payments to the farmers.

As a requirement for fair-trade certification, these fair-trade premiums are paid in person by PDE staff who visit the community. These instances are also used as avenues for relationship-building between PDE and its partner communities. Apart from the premium distribution visit, PDE visits each community a minimum of four times a year. These visits include one seminar, one monitoring visit, an inspection, and a tree planting activity. PDE would often invite or allow their PREDA donors to visit their partner communities with them for community immersions or help in their development projects.

Regarding the processed mango products PDE sells, these are not under a PDE brand. Instead, these products are under the brand of their partner importers from Europe and other countries. PDE mediates these partnerships by providing access to organic or fair-trade mangoes then receives the orders and specifications from each of their partner companies. They further mediate between their partner companies and local packaging providers or printers to label the products. These are then sent to the PDE partner processors for production. When new products or partners are established, PDE first sends samples to their foreign partners for testing in their laboratories. If adjustments in a product's specifications are necessary, this information is relayed to PDE and the partner processor.

The most significant resource provision PDE provides is the additional fair-trade premiums. Apart from this, the organization provides farm inputs, seeds, and saplings to produce other fruits and vegetables to support their partner farmers during the off-season of mangoes. Although PDE is a business, it is not necessarily profit-seeking. Instead, it shares its profit to develop its partner communities with other projects. As per the representatives, PDE provides several projects for their partners. One crucial assistance they provide is scholarships for a child of every partner farmer family, as long as the child passes the necessary school requirements. Apart from that, PDE also provides some help for home improvements, building communal toilets, and water access systems for communities that do not have these.

Moreover, their partner communities gain access to the resources and expertise available from the PREDA Foundation. These communities are given seminars on women and children's rights, responsible parenting, and the Indigenous Peoples' Rights Act through the foundation. PREDA Foundation also provides legal assistance and therapy when necessary.



### *Intermediary Key-Capabilities*

The PDE has built and continues to build its necessary key-capabilities to perform all its roles successfully. A summary of the organization's key-capabilities is provided in Table A5.15.2.

One essential external networking capability the organization has is its partners outside of the Philippines. These partners purchase the mangoes and other products from PDE partner communities and also share the cause of PDE and the PREDA Foundation. Because of its work, PDE and the PREDA Foundation have received multiple international awards and recognitions. The foundation has even been nominated thrice for the Nobel Peace Prize. These add to the ever-growing reputation of both organizations and get their name heard by potential partners. Moreover, for PDE, the organization's reputation has also spread across the Northern Luzon and Davao region. Although the organization often initiates contact with its partner communities, they have also been approached by other mango farmers and IP communities. Currently, however, the organization is still discerning on its expansion. Nonetheless, suppose PDE does expand its network. In that case, the representatives say that their focus would be partnering with more IP communities as the organization is looking towards growing its organic mango products.

As a fair-trade and certified organic organization, PDE has also been a part of several certification groups. Previously, they were members of the World Fair Trade Organization and the Organic Certification Center of the Philippines. Around 2017, PDE decided to recall its membership from those organizations and focus on receiving its certifications from Naturland and Naturland Fair. A more significant part of their foreign partners is based in Germany and other parts of Europe.

For their internal communication capabilities, PDE does several things to keep a harmonious relationship with their partners continuously. First, the organization sees to it that they visit their partner communities several times a year, not only for monitoring but to provide other forms of support and activities. The PDE also partners or has ties with the Department of Agriculture (DA) to purchase farm inputs for their partners and the organization's annual tree planting events. Third, as a self-sustaining business, PDE shares its profits to its partner farmers in the form of fair-trade premiums and community development projects. Fourth, the organization maintains a good relationship with its foreign partners by being their representative in the Philippines. By acting as such, PDE ensures that the products meet the standards and certifications required for exporting to other countries.

According to the representatives, being successful in their work requires building trust and keeping promises to their partners. One of the representatives cites how their partner Aetas have a deep sense of honor in keeping their word. When an Aeta community promises that they will sell their produce to PDE months before harvest season, the Aetas will not look for others to sell too regardless of what others offer as they have already committed to PDE. To build trust with the Aetas, PDE honors their promise by purchasing all the mangoes at a fair price and can sustain the life of the Aeta farmers. Another form of trust-building done by PDE is immediate payment upon purchase of the mangoes. Unlike other traders that make post-date payments, PDE understands that their partners require the payment immediately since producing and harvesting mangoes take several months.

Table A5.15.2

*The Intermediary Organization Key-Capabilities Built by Profairtrade Development Enterprise*

External Networking	Internal Communication	Knowledge-Building	Management
<ul style="list-style-type: none"> <li>• Several partners outside of the Philippines</li> <li>• Finds new partners through word-of-mouth; other farmers approach them first</li> <li>• The current focus is partnerships with IP communities since they use more natural farming methods</li> <li>• Used to be part of the World Fair Trade Organization and the Organic Certification Center of the Philippines</li> <li>• Now part of the Naturland and Naturland Fair group for organic and fair trade certifications</li> </ul>	<ul style="list-style-type: none"> <li>• Shares profit with the PREDA Foundation, payments for Fair-trade Premiums, and used for community development projects</li> <li>• Currently partnered with 361 farmers in Luzon and 122 farmers in Davao</li> <li>• DA as a partner for farm inputs</li> <li>• Mediates for foreign partners who purchase processed mango and other products</li> <li>• Conducts monitoring and visits; in constant communication through local inspectors who are part of the communities</li> <li>• Necessary to build trust and keep their word to their partners</li> </ul>	<ul style="list-style-type: none"> <li>• College graduates; staff that are agriculturists, especially those who engage with farmers</li> <li>• Institutional knowledge is deeply entrenched, with employees staying with PDE for 10 to 20 years</li> <li>• Knowledgeable of fair trade and organic farming practices</li> <li>• Developed an internal control system to ensure that they meet organic and fair trade standards</li> <li>• Studied IP laws and culture</li> <li>• It has been a long time since the staff received training for themselves but wants to receive training to update their knowledge on organic farming</li> </ul>	<ul style="list-style-type: none"> <li>• Six employees; ‘youngest’ employee, has been with PDE for ten years</li> <li>• Two main mango stations: Davao for fair trade; Bataan and Zambales for fair trade and organic</li> <li>• Self-sustaining through processed mango business</li> <li>• Employs participatory approach in relating with farmers and IP communities</li> <li>• Validates records from partners to build transparency</li> <li>• Build capability of local inspectors through training</li> <li>• Set up not as a profit-seeking organization but as an NGO that will support farmers and the PREDA Foundation</li> </ul>

*Note.* The data in this table was compiled based on interviews with PDE representatives and secondary desk research done by the researcher.

For their knowledge-building capabilities, the PDE is well versed in organic and fair-trade practices and has only grown in these throughout the organization's existence. Their employees are college graduates, and their field staffs are agriculturists. Furthermore, the staff took the time and effort to learn and understand the laws and culture of their IP partners to better interact with them. In terms of their training, the representatives mentioned that they would like to receive more training for their growth. When asked what kind of training they want, the representatives said they would like training to develop further and update their knowledge in organic farming. They want to ensure that they can consistently achieve the standards required for organic certification.

The organization's institutional knowledge is also quite entrenched. All their employees have stayed with the company for at least ten years, with several working with PDE beyond 20 years. Although there are only six employees in PDE, the organization has translated its knowledge of organic and fair-trade practices and principles into an internal control system. The creation of their internal control system has been critical to achieving group certification. Following the system ensures PDE that all their partner farmers follow the required practices and principles. Doing so allows them to monitor and adhere to certification standards successfully.

The internal control system of PDE also shares several management capabilities. To successfully implement their internal control system, PDE requires the help of community-nominated local inspectors. These local inspectors are trained and retrained by PDE staff twice a year to properly monitor and address issues regarding organic farming and adherence to fair-trade practices. These local inspectors must be able to read and write and must be readily contactable by PDE. These inspectors act as the representatives of PDE while they are not in the area. As an incentive, the local inspectors are given an honorarium for their work and bonus premiums for every crate of mangoes delivered during the pick-up dates.

An additional part of PDE's internal control system is the validation of production and sales records of their partner farmers. During the harvest season, each party records how much they purchased or sold to one another. PDE then collates these for verification. This data is used to calculate how much fair-trade premiums each farmer receives.

Before production, PDE also calculates the production capacity of each farmer to assess how much mangoes they may expect during the harvest season. The production capacity data also allows PDE to check whether farmers are trying to take advantage of the system by providing more mangoes than they can produce. There was an instance in the past when a farmer was selling more than what was calculated earlier. This discrepancy immediately raised red flags for PDE. Upon questioning the farmer, they learned that the farmer had taken a portion of others' harvest and passed these as their own. To prevent similar incidents in the future, PDE changed its policy to not purchase beyond the production capacity of its partner farmers.

Another essential management capability that needs to be discussed is the nature of the organization. Although PDE is a duly registered business, the way the organization works is more like an NGO with the support and aid aspect of its work ahead of everything else. PDE may more aptly be understood as a social enterprise. However, the representatives emphasize that PDE is not profit-seeking but profit-sharing. As mentioned, PDE was established to support the activities and services of the PREDA Foundation apart from its own.

PDE employs a participatory approach when dealing with its many partner farmers and IPs in running its business. When discussing agreements, especially for their community development projects, PDE requires their partners to provide a counterpart in these projects and programs and not

be simply beneficiaries. Undergoing a participatory approach, the representatives claim, gives their partners a sense of responsibility and ownership in the partnership, projects, and programs.

### *Challenges*

In PDE's close to 30 years of experience working with mango farmers, they encountered several obstacles. Some of these challenges are relatively new and are still being dealt with. Others are experiences that taught PDE valuable lessons that developed their organization's focus further.

The biggest challenge they currently face is the effects of climate change on mango production. Mangoes are very sensitive to the weather and do not do well with rain. Due to climate change, several partner mango growers experienced inclement rainy weather during the summer seasons when it should not occur. Because of this, their mango trees dipped in production or were if unsuitable viability even for processing. PDE then could not buy the mangoes from their farmers, or if they could, PDE could not attain the demanded quantity. To address this issue, PDE is looking towards expanding its partnership with other farmers. However, according to the PDE agriculturists interviewed, they claim that the rainy weather is usually location specific and not over encompassing entire regions. With that, they are still able to support several of their partner farmers. Moreover, the PDE agriculturists are also studying how other affected areas are coping with the changes in climate and sharing the best coping practices across their many partners.

Another challenge they face is the culture and background of their IP partners. As a vast majority of them are not well educated, PDE often needs to repeatedly conduct training and seminars for their Aeta partners to remember and learn these. Although the nominated local inspector can read and write, not everyone in the communities can do this.

The lack of educational attainment is also highlighted during the annual external audits for organic and fair-trade certification. The PDE agriculturists cite how their IP partners do not usually interact with people outside their community and are pretty hesitant to talk to new persons. During these audits, the examiners will often ask the IPs to gauge their understanding and ability to adhere to organic and fair-trade standards and principles. At times, especially for highly technical questions, the IP farmers are unable to provide answers. For these instances, the PDE staff discuss with the external auditors ahead of time to simplify their questions and understand how the IPs' educational attainment is not exceptionally high. More often, the auditors understand their circumstances.

To further address the lack of educational attainment, PDE set up its internal control system to better help its partner farmers adhere to organic and fair-trade practices and principles. One example of their control measure has local inspectors to check on the growing practices of their community members. In addition to the internal control system, PDE offers a long-term solution by providing scholarships for the children of its partner farmers, especially those desiring a college education. The funds for its scholarship and other educational assistance come from their profit and donations by individuals.

Another IP-related challenge PDE faced is political and family issues within the IP communities. As these communities have unique cultures and laws, tackling these issues like how most of society resolves their issues may prove unwise. The PDE staff took the time and effort to better study the different and communally specific IP laws and cultures to understand their partners' situations and perspectives. When political and family issues impede mango farming practices, PDE staff mediate by helping the community discuss and resolve these issues. Most especially when interacting with IPs, it is vital to learn and understand their identity, culture, and laws.

Other challenges, or, in these cases, unsuccessful experiences faced by PDE, allowed them also to focus their products and support. When asked whether they exported fresh mangoes, one representative recalled an experience several years back where they attempted to do so. PDE attempted a trial shipment of fresh organic mangoes by simply placing the mangoes straight in the export packaging and sending it to the ports for export. The project was unsuccessful as the organization faced several issues. One of these issues was that the mangoes ripened rather too quickly. After this attempt, PDE no longer thought of exporting fresh organic mangoes. If they were to export fresh mangoes, they might need to add other processes and chemicals to delay the ripening process. Forcing to do so may risk their organic certification. So, PDE gladly decided to focus on producing processed mango products.

Another unsuccessful experience of PDE was an infrastructure project for an Aeta community. For that project, PDE helped fund and procure the materials necessary for several houses, a guest house, and a classroom for one of their partner communities. Although the buildings were erected, the project did not prove fruitful for several reasons. Although the community provided physical labor as its counterpart, PDE ended up subsidizing the cost of labor, raising the entire project's cost. This issue, however, was not entirely a negative one. The organization understood the need for the Aetas to earn money since they were sacrificing their livelihoods to build the buildings. Second, upon completion and awarding of the houses, some owners decided to sell their houses to outsiders. Even worse, some outsiders forcefully took over the houses and drove their owners away. Third, and possibly the most painful of reasons, the lot PDE built the infrastructures on was not eventually rewarded to the IP community claiming its land rights. Unfortunately, the area is no longer accessible to PDE nor the Aetas that once claimed the area. Following this experience, the organization no longer did similar large-scale infrastructure projects and instead focus on smaller but impactful projects like communal toilets and water delivery systems.

### *Summary*

PDE has continued to serve as an innovation intermediary for its partner farmers and IP communities throughout its existence. The organization has been able to broker several innovations by providing access to foreign and assured markets, product processing, community organizing, and group certifications. Moreover, PDE mediates between several partners to create a good working relationship with one another. Additionally, PDE and the PREDA Foundation provide their partners with several other resources that aid their human and communal development. They provide educational assistance, communal toilets, legal assistance, and seminars on their human, gender, and IP rights. To successfully do its work, PDE continuously builds and sustains its network of partners by being honest in its actions. As a testament to their work, the organization has received several praises and awards internationally. PDE approaches their partners with a participatory approach to show that their partners always have a say in the decisions they take with PDE. Despite its challenges, PDE continues to develop itself by learning from the past to improve and provide further support to their partner farmers and IPs. Then until now, the organization persists in its profit-sharing ideals to give more sustainable and impactful opportunities and outcomes for their partners.

## **Appendix 5.16 Agricultural Training Institute (ATI)**

### *History and Purpose*

The Agricultural Training Institute (ATI) was established in 1987 upon the Department of Agriculture (DA) reorganization through Executive Order No. 116. Under the reorganization of the DA, the Bureau of Agricultural Extension, the Philippine Agricultural Training Council, and the

Philippine Training Centers for Rural Development merged to form the ATI. For the DA, the ATI acts as its training and extension arm. Currently, the ATI has 16 Regional Training Centers and an International Training Center on Pig Husbandry.

As per their website, the ATI houses 173 employees. The composition of their employees is a mix of agriculturists focused on training, demonstration, and technical advisory work; development communicators and media experts developing information education campaign materials; and administrators for daily office tasks. Having advanced degrees is not necessary when hiring but becomes a requirement for a promotion. To train its staff, ATI has them attend the training programs that the institute provides for its stakeholders and clients to gain the necessary knowledge and skills to generate and deliver its agricultural extension. Moreover, the institute sponsors its staff to attend management and other skills development workshops and other agencies' training. Several organizations mentioned by the representative include the Development Academy of the Philippines, the Civil Service Organization, and the Asian Institute of Management. The ATI shares and allows its staff to take scholarships or advanced degrees locally and from foreign universities for further study opportunities.

In agri-food business value chains, the ATI's work may be found chiefly in the input supply, production, post-harvest, and product processing segments. Although they do not directly provide any inputs in each segment, the organization supports the agricultural sector with training that may enable process innovations and product innovations. The institute also covers a wide variety of agricultural products. One key difference with ATI's extension and training work with other organizations is ATI's target audience. Their targets are not the farmers but rather the local government unit extension workers, farmer organizations, and farmer leaders. In essence, ATI is a training hub for trainers to build their knowledge and skills in agricultural technologies to provide successful extension work.

The ATI offers training programs on agricultural production, post-harvest processing, and value-adding product processing for innovation and upgrading. Although the institute's primary target is trainers, the ATI also supports establishing learning sites where individual farmers may receive training. According to the representative interviewed, these learning sites may further develop into larger schools of practical agriculture and, eventually, partner with the Department of Tourism to include farm tourism in their operations. For individual farmers who cannot go to these learning sites, the ATI offers a School on the Air Program. These are radio programs designed to deliver the institute's modules.

Furthermore, the ATI offers online courses and videos for individual farmers or groups to use. Through its e-extension platform, social media pages, video streaming channel, and knowledge resource centers, the ATI makes its training courses and information readily available to its stakeholders. The ATI also partners with local government units to establish Farm Information Services within municipal grounds. This service acts as a mini library of technologies available for farmers to use, and the materials provided are often translated into the local dialect of the area. Finally, the ATI is developing a new Digital Farming System program set to launch in 2021.

#### *Intermediary Roles*

As the training and extension arm of the DA, the ATI acts as an intermediary organization. It performs its innovation intermediary role somewhat uniquely by training local extension workers and transforming farmer organization leaders into capable pseudo-extension workers. Table A5.16.1 presents a summary of their role performance as an innovation intermediary.

Table A5.16.1

*The Intermediary Organization Roles Performed by the Department of Agriculture – Agricultural Training Institute*

Broker	Consultant	Mediator	Resource Provider
<ul style="list-style-type: none"> <li>• Since 2013, training programs are set to help farmers achieve GAP certification for high-value crops or TESDA NC2 certification for organic agriculture</li> <li>• Enables innovation through training of trainers (i.e., municipal agriculture technicians) and establishment of learning sites</li> <li>• Crafts training and action plans with those trained for long time development</li> <li>• Enables multi-platform learning through their e-extension website, radio programs, and Farm Information Services library</li> <li>• From Arms-to-Farms initiative (de-arming rebels and providing the means necessary for an agricultural livelihood)</li> </ul>	<ul style="list-style-type: none"> <li>• Provides extension and training services and consultancy to farmer groups, municipal extension workers, or farmer leaders</li> <li>• May request for external consultants/experts if their current staff cannot provide what is requested</li> <li>• Help set the standards and certifications necessary for agricultural products</li> </ul>	<ul style="list-style-type: none"> <li>• Orchestrates national extension network of the government</li> <li>• The lead agency for the extension component of the Rice Competitiveness Enhancement Fund</li> <li>• It helps farmers and other stakeholders get connected to relevant government offices for other support necessary</li> <li>• Links farmers and other stakeholders with possible buyers but does not meddle in price mediation</li> </ul>	<ul style="list-style-type: none"> <li>• Provides technical advisories, information-education campaign materials, actual and farm demonstrations, radio programs in local dialects</li> <li>• Provides online training and videos, especially during the pandemic</li> <li>• May provide financial aid for extension-related work (e.g., building a training center or subsidies for training)</li> <li>• It does not provide any material support apart from those required during the training but will link participants to the relevant offices that may provide these</li> </ul>

*Note.* The data in this table was compiled based on an interview with an ATI representative, feedback from other interviews, and secondary desk research done by the researcher.

As an innovation intermediary, the central role that ATI performs is that of a broker. ATI provides multiple avenues for farmers, extension workers, universities, and private sector organizations to learn and build their agricultural competencies through its numerous training programs. According to their website's list of programs, ATI offers commodity-based programs for rice, cassava, corn, high-value crops, organic agriculture, urban agriculture, and livestock. The ATI crafts training action and development plans specific to farmer organizations to address their needs. According to the representative, since 2013, ATI ensures that its training programs help achieve Good Agricultural Practice (GAP) certification for high-value crops and Technical Education and Skills Development Authority National Certificate II for organic agriculture.

The ATI training programs are primarily provided for local or regional government unit extension workers, farmer organizations, and farmer leaders. The institute makes its programs reach farmers through training and diffusion provided by the groups that ATI trains. To make these programs available to farmers, the ATI establishes learning sites across the country. Moreover, the institute allows multi-platform learning through mobile agricultural extension applications, radio programs, and its Farmer Information Services in local government units. It also manages the DA's e-extension portal, allowing users to take free online courses on agricultural production and other related extension training programs.

One final significant brokerage action that the ATI representative highlighted was ATI's From Arms-to-Farms program. With the disarmament of former rebels in conflict areas of the Philippines, the institute took a crucial role in providing training for these individuals, shifting towards sustainable agricultural livelihoods.

As the organization provides training programs, the ATI's consultancy role is somewhat tied to its brokerage work. For a great majority of its programs, these are given for free. Similarly, farmers who require consultation regarding agricultural production or linkage assistance may ask ATI for free. Furthermore, as a consultant, the ATI also helps set the standards and certifications for agricultural production in the country.

When asked about the expertise of their staff, the representative mentioned that most are capable enough to provide the training programs they offer. Nevertheless, the ATI does not shy away from requesting external consultants or trainers from the academe or other government agencies if necessary. Interviewed representatives from public research institutes shared how ATI or other agencies request them to be speakers for specialized training programs across the country.

As a mediator, the ATI's central role is to orchestrate the government's extension network. A prime example of this is acting as the lead agency for the extension services component of the Rice Competitiveness Enhancement Fund. Under this component, ATI will be tasked with designing and delivering various rice-related training programs that will increase the local farmers' competitiveness, develop farm schools, and provide training scholarships.

Another form of mediation the ATI performs is linkage assistance to its stakeholders. According to the ATI representative interviewed, providing linkage support has been significantly growing compared to its other roles. The institute understands the limits of what it may provide and will help its stakeholders get in touch with the relevant government agencies that provide the material support they may need. An instance of this is the linkage assistance with the Department of Tourism to transform learning sites into farm tourism areas. Furthermore, the ATI will help in linking its stakeholders with potential produce buyers. However, the representative mentioned that the institute would not meddle in price mediation when linking markets together.



Finally, as a resource provider, ATI provides a vast array of technical advisories and information-education materials through various platforms. Before the pandemic of 2020, ATI does more actual field and farm demonstrations but has recently moved towards many online demonstrations and seminars. A significantly important facet in their resource provision is translating its information-education materials and training programs to local dialects.

Apart from access to their network and training, ATI may also provide financial assistance to establish communal use training centers or subsidize training programs. Although material support is not often given, a budget for providing these may be available depending on how the training program is developed. However, the ATI also does its best to find other DA-related programs that may provide funding for materials or inputs that their stakeholders may require. Moreover, through its regional counterparts, the institute incessantly requests that farmers enlist in the DA's Registry System for Basic Sectors in Agriculture to ensure that they will be able to avail of the DA's support.

### *Intermediary Key-Capabilities*

To perform its roles, the ATI builds on its key-capabilities. Table A5.16.2 provides a summary of how the institute has built and continues to build its key-capabilities.

For its external networking capabilities, the ATI continues to build this through the further provision of its training programs, building its relationship with new or current stakeholders. The institute and other DA-affiliated offices host an annual consultative meeting with the private sector of different commodity groups and industries to learn their most current needs. Learning these allows ATI to prepare for their training program lineup for the year. The ATI usually partners with rural-based organizations and agriculture-related international organizations in developing its extension networks. Finally, the organization expands its network reach through its Farming Information System in local government units, radio programs, social media pages, video streaming channels, and e-extension website.

As the agricultural extension network orchestrator, the ATI oversees and manages the country's national extension program. The institute is connected and has constant communication with all related DA-affiliated agencies and its provincial and municipal counterparts. One challenge that agricultural extension in the Philippines often exhibited was its overlapping nature and function between the different DA agencies. Building internal communications required proper delineation of tasks between ATI and the other offices. The agencies did just that and now have more precise mandates when it comes to agricultural extension. The ATI focuses primarily on the capacity-building and training of local extension workers, farmer groups, and farmer leaders. On the other hand, other organizations provide the direct to farmer training programs.

The ATI has built a solid base for its knowledge-building capabilities by hiring a pool of agriculturists and extension workers as employees. The entire organization keeps up to date with the latest agricultural technologies and processes through the DA-wide information sharing system. The DA immediately forwards developments to relevant offices. Furthermore, the ATI learns of its stakeholders' most current needs through the annual consultation with the private sector from different agricultural industries. Finally, the ATI stores and shares all its knowledge through its e-extension website and knowledge resource centers.

Table A15.6.2

*The Intermediary Organization Key-Capabilities Built by the Department of Agriculture – Agricultural Training Institute*

External Networking	Internal Communication	Knowledge-Building	Management
<ul style="list-style-type: none"> <li>• Annual meeting with the private sector to learn of their needs</li> <li>• Provides training programs for farmer groups, local extension workers, and farmer leaders</li> <li>• Expands network reach through their Farming Information System in local government units, radio program, social media pages, video streaming channel, and e-extension website</li> <li>• Partners with rural-based organizations and agriculture-related international organizations</li> </ul>	<ul style="list-style-type: none"> <li>• Oversees and manages national extension program</li> <li>• Connected with all DA offices and municipal/provincial counterparts</li> <li>• Delineation of training tasks between ATI and other offices: ATI focuses on farmer groups, local extension workers, and farmer leaders; while other DA offices go direct to the farmers</li> </ul>	<ul style="list-style-type: none"> <li>• Their pool of agriculturalists and extension workers make the base of their knowledge</li> <li>• Keeps up to date with the DA's information-sharing system</li> <li>• Hosts e-extension website and knowledge resource centers that houses courses and knowledge generated from agricultural research offices</li> <li>• Learns current needs of industries through annual consultation with the private sector</li> </ul>	<ul style="list-style-type: none"> <li>• Manages accreditation of learning sites</li> <li>• Allows staff to attend ATI training programs and those provided by other organizations</li> <li>• Always conducts pre and post-test of training</li> <li>• Sets aside budget for unforeseen occurrences (e.g., the sudden increase in training on food safety and handling due to COVID-19)</li> <li>• Monitors progress of those trained even after training sessions</li> <li>• Holds a very high standard to the training sessions they provide; considers a training a failure if overall evaluations fall below 3.75 to 4 out of 5</li> <li>• Supportive leadership in the institute is necessary for successful program delivery</li> <li>• Changes in leadership and their subsequent policy changes require more adjustment than necessary</li> </ul>

*Note.* The data in this table was compiled based on an interview with an ATI representative, feedback from other interviews, and secondary desk research done by the researcher.

For its management capabilities, the representative focused more on how ATI conducts its training. For its training programs, the representative mentioned that ATI monitors the progress of its participants as they go through the organization-specific training programs crafted. When conducting these, ATI will always provide pre and post-training tests to ensure that their participants learned. Apart from that, the institute holds an exceptionally high standard in its training evaluations. From the five-point scale they use, the minimum score they will accept is 3.75 to 4. Suppose any part of the evaluation form falls below the set threshold. In that case, ATI considers those portions as a failure on their part. During these occurrences, ATI will adjust its training programs to address those points of failure.

Another management capability they employ is budgeting for unforeseen training needs. Although their training program schedules are based on the annual consultations, ATI understands that circumstances may change in the middle of the year. Hence, the organization sets a budget for these unforeseen events. An excellent example of this is offering food safety and handling training due to the more stringent demands for food safety during the COVID-19 pandemic. More of these training programs were requested after the consultations. ATI used its contingency budget to prepare for and conduct more of these training programs.

An activity that employs ATI's internal communication and management capabilities is the accreditation of learning sites they establish. Annually, these learning sites need to renew their accreditation with the institute to ensure they can deliver with utmost quality.

In developing its staff, the ATI provides several opportunities for professional development. ATI sends its staff to attend training programs they provide to stakeholders to learn the necessary agricultural and technical skills and knowledge. During these programs, the staff under training will join as a participant. Furthermore, training and further study opportunities provided by other organizations are shared with staff. When possible, ATI will shoulder the costs necessary to attend these.

Finally, when asked about necessary key-capabilities, the representative mentioned the importance of leadership in the organization. Specifically, the representative discussed how supportive superiors and managers enable a motivated team to deliver their work. When a leader seems more authoritarian than democratic, the representative noticed that staff would work merely for compliance rather than out of service or passion for what they do.

### *Challenges*

As the agricultural extension arm of the DA, the biggest challenge the ATI faces is the devolution of agricultural extension to local government units, more famously known as the Mandanas Ruling. This challenge, however, was foreseen as the Local Government Code of 1991 already clearly mandated that agricultural extension will be the task of the local and provincial governments. Through the years, the task has been transferred to these units. By 2024, full devolution of the agricultural extension will fall to them. Knowing this, the ATI has already shifted from being the organization providing the training for farmers to the organization that provides training and develops the local extension workers. However, the direct effects of the Mandanas Ruling on personnel are not yet apparent. The representative mentioned that they are still waiting for the Implementing Rules and Regulations of the ruling. What is somewhat apparent, the representative continues to say, is that their regional counterparts may be the most affected as their items will likely be dissolved. Although local government units will absorb these people in their organizations, the looming threat of local politics playing a hand in hiring is ever-present and feared.

Like local politics, institutional politics and bureaucracy from within also present several obstacles. The representative recalls how their different organizational leaders manage teams differently, resulting in either a motivated team or a team working for the sake of compliance. Apart from how leaders manage the institute, changes in organizational leadership also lead to policy changes. Although these are normal in any organization, when leaders are replaced every few years or stay short-term, the staff find difficulties in the constant readjustment necessary in policies and working styles.

Regarding the training programs they provide, the interviewed representative mentioned that they will always base their success on their evaluations at the end of each training program. Using a five-point Likert scale, they consider their training a failure if the overall evaluation score falls below 3.75 to 4. If these instances occur, the office immediately reassesses based on what items scored low. One example provided was not having a speaker or trainer provide the session in the future if their rating fell between the score thresholds.

Another challenge that the ATI continues to face and resolve is the accreditation of learning sites. According to the representative, they have experiences of several learning sites failing to renew certifications with ATI and still provide training programs. The lack of certification creates several risks. For one, ATI may be unable to certify the participants that attended training programs from non-accredited learning sites. Moreover, these learning sites may be unable to request additional support from the institute for as long as they remain unaccredited. The ATI continues to request that these learning sites renew their certifications on time.

Finally, a challenge that the ATI faced was the physical restrictions caused by COVID-19. As agricultural extension relied on face-to-face demonstrations, the ATI prepared for this by setting up the e-extension website in the late 2000s. The ATI regional training centers also have several computers with broadband internet connections that farmers may use to access the e-extension website. With the onset of the pandemic, the website has seen a growing user base and enrollment in its online courses. Simultaneously, the ATI hosts online training and seminars via their social media accounts and on their YouTube channel.

### *Summary*

The ATI is the DA's network orchestrator for its extension and training programs. The organization has evolved from providing its services to all stakeholders to focusing on capacitating the provincial and municipal agricultural extension workers and transforming farmer organizations and leaders into pseudo-agricultural extension workers through the years. Apart from being a conductor, ATI performs its brokerage roles through the numerous training programs it hosts, both in-person and online. The organization also provides free information, consultations, linkage assistance to those that request any of these. The ATI also builds its capabilities through its interaction with its stakeholders and partner agricultural development implementors. Moreover, ATI holds its training with high standards by setting a higher-than-normal evaluation score as a requirement for the organization to claim it was successful.

The ATI has also faced several structural and unforeseen challenges but has always been ready to address these obstacles as best they can. The institute has and continues to adjust its work and organization to the call of the times, ensuring that they meet the most urgent needs for agricultural extension, and their programs reach those that need it the most.

## **Appendix 5.17 Philippine Center for Postharvest Development and Mechanization (PHILMECH)**

### *History and Purpose*

The origins of the Philippine Center for Postharvest Development and Mechanization (PHILMECH) took root in 1978 when then-President Ferdinand Marcos issued Presidential Decree 1380. Through the decree, the government created the National Postharvest Institute for Research and Extension. Initially, the institute was set up in Taguig, Metro Manila. In 1986, it transferred to its current location within the Central Luzon State University compound in Muñoz, Nueva Ecija. In 1992, the institute was transferred under the purview of the Department of Agriculture (DA). It then experienced a formal name change in 1997 as the Bureau of Postharvest Research and Extension. Finally, in 2010, under the government rationalization program mandated through Executive Order 366, the institute was officially changed to PHILMECH.

This public research institute is the DA's research arm focused on generating technologies for postharvest and processing agriculture and fishery industries. The center has multiple divisions catering to a variety of work. The divisions that focus on R&D and its diffusion are the PHILMECH's Agricultural Mechanization Division; Bioprocess Engineering Division; Food Protection Division; Laboratory Services Division; Socio-economic Research and Policy Research Division; Enterprise Development Division; Technology Management and Training Division; Applied Communication Division; and the Facility Management and Field Operations Division. As per their 2019 Annual Report and the representative interviewed, the center has 186 employees, of which 137 are permanent employees. Of its permanent employees, about 30% have advanced degrees. Of these, 16 have doctoral degrees. Moreover, PHILMECH has three ISOs on quality, environment, and health and safety.

To conduct its work, PHILMECH receives a majority of its budget from the annual General Appropriations Act. Besides its annual appropriation, the institute also applies for research grants from other government agencies such as the Bureau of Agricultural Research or the Department of Science and Technologies' research councils. They may also receive additional R&D funding through their collaborative projects with private or international organizations. According to the representative, they have had research projects with organizations from South Korea, Japan, Australia, the US, and Canada.

As the agency leading postharvest and machinery development for agricultural industries, PHILMECH has developed several machinery and food processing technologies. According to the representative, the most significant are compact corn mills, compact rice mills, and mechanical dryers. These three technologies are available in the market and even procured and distributed by DA field offices to corn and rice farmers nationwide. Apart from these, several other PHILMECH-generated technologies developed for rice are biomass-fed and multiple fuel biomass furnaces or heating systems, moisture meters, a computer vision system to aid in grain sorting, a type of storage bag for rice stocks. Particularly for mangoes, several of the technologies PHILMECH developed are the far-infrared and convection heating system for dried mango production, pectin production from mango peels, and various treatments for shelf life extension of fresh and processed mangoes. The institute's technologies for high-value crops include their multi-commodity solar tunnel dryer, evaporative cooler, a tramline system for hauling of crops from isolated areas, and the development and implementation of the National Cold Chain Program.

Aside from developing technologies, PHILMECH also provides extension work by promoting these to farmers and providing training in the use and maintenance of its inventions. The institute also provides marketing and operational support to its technology adopters or stakeholders

through its Extension Support, Education, and Training Services (ESETS). Given its mandate and work, one may find PHILMECH participating and supporting the production, postharvest processing, assembly, milling, processed food products, and marketing segments of agri-food business value chains.

### *Intermediary Roles*

As a public research institute, PHILMECH performs several innovation intermediary roles. Table A5.17.1 provides a summary of the center's intermediary role performance.

As a technology generator, PHILMECH's primary role is that of an innovation broker. The organization itself develops and markets its technologies to accredited manufacturers who may sell these to farmers or farmer groups. Besides farm and postharvest machinery, PHILMECH also develops food processing technologies and conducts bioprocess engineering research. When it brokers its technologies, PHILMECH also includes training on the use and maintenance of its machine technologies to adopters. For adopters that purchase their technologies from accredited manufacturers, PHILMECH also provides similar training upon request.

As per the representative, adopters usually initiate contact with the institute regarding possible technology adoption. The representative further says that PHILMECH does not necessarily actively look for potential adopters. Instead, PHILMECH will develop technologies based on industry or target beneficiaries' needs. When deciding on R&D, its researchers and engineers first need to justify why they will develop such technologies. According to the representative, its technology generators undergo a process that first asks to rationalize the need to modify, redesign or fabricate new inventions over those that already exist in the market. Following this, its staff needs to assess the applicability, adaptability, practicality, and affordability of the technology they hope to develop.

Another form of brokerage that PHILMECH does is supporting market access by sponsoring its technology adopters in local expos to showcase their products and services. This support is not limited only to those that manufacture machinery but also includes firms that adopted food processing technologies. The support in market access is only partly a show of the institute's resource provision and consultancy roles. Their ESETS Cluster provides extension support to help their technology adopters in getting their new products to the market. As of the interview, the representative relays that PHILMECH has so far only sponsored local expos but hopes to enter their technology adopters in foreign expos in the future.

In performing its consultancy role, PHILMECH is very open to requests and inquiries for technology consultation by industry stakeholders, especially farmers and farmer groups. When requests are made, PHILMECH will invite them to their facility or send a representative to the inquirer's office to introduce and discuss viable technologies. Apart from technology advice, PHILMECH also provides expert technical advice on various topics such as machinery use and maintenance, Good Agricultural Practices (GAP), Good Manufacturing Practices (GMP), food safety, pest management, food shelf-life extension, engineering advice, among others. The representative mentions that their staff is very willing to extend their expertise to their clients. Examples of the forms of consultancy the institute may provide are coaching and mentoring on financial and operational management as their client tries to bring their new products to the market.

Table A5.17.1

*The Intermediary Organization Roles Performed by the Philippine Center for Postharvest Development and Mechanization*

Broker	Consultant	Mediator	Resource Provider
<ul style="list-style-type: none"> <li>Generates and promotes farm machinery, food processing technologies, bioprocessing technologies</li> <li>Usually approached first by potential adopters</li> <li>Sponsors adopters to showcase their products and services during expos</li> <li>Always has training for use and maintenance of machine and processing technologies for adopters</li> </ul>	<ul style="list-style-type: none"> <li>Provides coaching and mentoring on financial and operational management when farmer groups adopt their technologies</li> <li>Open for technology consultation; will either visit the client or invite them to PHILMECH</li> <li>Provides expert advice on machinery use and maintenance, GAP, GMP, food safety, pest management, food shelf-life extension, and other topics as long as they have experts on these</li> <li>Part of the working group that helps set standards in agricultural production</li> </ul>	<ul style="list-style-type: none"> <li>Always lists staff as inventors in intellectual properties</li> <li>In licensing agreements, charges for licensing fees and royalty fees; may waive royalty fees for first adopters</li> <li>Always has an MOA with collaborators for clear delineation of responsibilities in R&amp;D collaborations</li> </ul>	<ul style="list-style-type: none"> <li>Heading the provision of rice farm machinery under the RCEF</li> <li>May share human resources to other agencies, organizations, or private sector</li> <li>Does market matching and sponsors adopters in product expos</li> <li>Testing new R&amp;D modality where PHILMECH does the pilot promotion of technologies immediately after laboratory testing to hasten R&amp;D turnaround</li> <li>Provides grains drying services through the PHILMECH Drying Center</li> </ul>

*Note.* The data in this table was compiled based on an interview with a PHILMECH representative, feedback from other interviews, and secondary desk research done by the researcher.

PHILMECH is also part of the government technical working groups that set different crops and practice standards. Together with representatives from other government agencies and the private sector, the technical working groups have developed Philippine National Standards that farmers and manufacturers may follow to achieve better productivity. According to the representative, the Philippine National Standards use global and regional standards as their basis. As much as possible, the local standards harmonize with the global ones. However, the representative is sure that all Philippine standards adhere to ASEAN standards. PHILMECH participates in setting agricultural standards like GAPs and setting and encouraging the acquiring of GMP, food safety, appropriate machine designs and specifications, among others.

PHILMECH performs its mediation role during R&D collaborations and as it generates and promotes its technologies. For its R&D collaborations, the institute always begins with a Memorandum of Agreement or Terms of Reference between partners. These documents house each party's duties and responsibilities in the partnership to ensure smooth conduct of the project and avoid conflict.

For R&D collaborations and its projects that produce patentable technologies, PHILMECH always ensures that the researchers, scientists, and engineers that created the invention are listed as the technology inventors. Moreover, PHILMECH provides a portion of the royalty fees received from sales of its technologies as incentives to its staff. When licensing technologies, technology adopters must agree to pay for a licensing fee and royalty fees. According to the representative, to encourage first adopters, PHILMECH may choose to forego the royalty fees, subject to the approval of the technology generator, to get the technology into the market. Such was the case for the process of producing pectin from mango peels.

For resource provision, PHILMECH shares several of its resources. First, it allows its employees to go on secondment. Other agencies or international organizations have temporarily hired PHILMECH staff to tap their expertise for their projects. Second, PHILMECH provides grain drying services for farmers using its Drying Center. Third, its ESETS Cluster also provides technology promotion and market matching services to help its technology adopters look for potential markets. Moreover, the division also conducts feasibility and market studies for adopters to encourage others to adopt their technologies. Related to its new technologies, PHILMECH recently changed its R&D modality to include earlier promotion of its technologies under development by conducting pilot tests as a form of promotion.

Another form of resource provision the PHILMECH currently performs is distributing rice farm machinery under the mandate of the Rice Competitiveness Enhancement Fund (RCEF). Heading the mechanization component of the RCEF, PHILMECH sets the technical specifications for machinery that will be purchased through the fund and procures the equipment for distribution to qualified farmer groups and organizations. Although they generate rice-related machinery, the equipment procured through the RCEF does not necessarily have to be PHILMECH-generated technologies. Instead, PHILMECH looks at commercially available machinery and equipment such as transplanters and combined harvester-threshers. Similar to how it brokers technologies, PHILMECH provides the training for the use and maintenance of these. Within the next six years of the RCEF distribution, PHILMECH may also distribute its compact rice mills.

#### *Intermediary Key-Capabilities*



To successfully perform all its intermediary roles, PHILMECH requires several key-capabilities. Through the years, PHILMECH has built these and is continuing to develop more of its key-capabilities. A summary of its intermediary key-capability building is shown in Table A5.17.2.

As a show of its external networking capabilities, PHILMECH expands its network by publishing its R&D results and new technologies on various media platforms. Its wide presence allows potential adopters to learn of their latest developments hoping that they get in touch with PHILMECH. Moreover, PHILMECH joins product and technology expos to showcase their technologies. During these expos, they also invite or sponsor their current technology adopters to show their technologies' potential and aid their adopters in looking for potential clients. Furthermore, PHILMECH also produces market and feasibility studies for their technologies. These are provided to potential and current adopters to encourage them in licensing PHILMECH-generated technologies.

When searching for possible collaboration partners, PHILMECH also checks on the credibility of their would-be partners. With its good reputation, PHILMECH wants to show others that it is a credible partner. Similarly, PHILMECH also expects the same level of credibility and dedication to work from their potential collaborators. This expectation holds for projects that are offered to them or those that PHILMECH begins. When beginning projects that include components that PHILMECH does not have expertise in, they will actively search for a collaborator.

For its internal communication capabilities, one of its most significant is the institute's openness in sharing all the details of their research results to their technology adopters. As the representative says, manufacturers can build things if they provide the blueprints. However, there are certain aspects of how machines are made that require more technical advice and knowledge. Moreover, the non-technical or non-technological support provided by their Enterprise Development Division allows PHILMECH to foster better relationships with its adopters. The continuous collaboration with previous and current researcher partners also demonstrates the credibility, dedication, and trust that PHILMECH receives and gives.

Within the organization, PHILMECH motivates its researchers, scientists, engineers, and staff to actively promote their technologies through the opportunity of receiving royalties from their technologies. Although PHILMECH will own the rights to the patents of technologies developed, the organization recognizes the value of compensating its workers for their work.

As repayment for its support, PHILMECH requests statements, anecdotes from, and documents success stories of its partners. These are submitted and reported to the DA or the Department of Budget and Management during their annual evaluation. Moreover, they invite successful adopters to speak of their experiences working with PHILMECH during technology promotion events.

For its knowledge-building capabilities, PHILMECH has an intellectual properties office that manages its library of technologies. According to the representative, the PHILMECH IP office has a very close relationship with the Intellectual Property Office of the Philippines. In managing its IPs, PHILMECH previously only applied for patents for its machinery technologies. Lately, however, the institute began applying for process patents for its bioengineering and food product processing technologies.

Table A5.17.2

*The Intermediary Organization Key-Capabilities Built by the Philippine Center for Postharvest Development and Mechanization*

External Networking	Internal Communication	Knowledge-Building	Management
<ul style="list-style-type: none"> <li>• Publishes R&amp;D results and technologies developed on multiple media platforms</li> <li>• Joins product and technology expos</li> <li>• Does feasibility studies and market research for potential adopters</li> <li>• When collaborating, will approach other organizations for portions of R&amp;D that they do not have the expertise in</li> <li>• When collaborating, looks at the credibility of delivering the tasks necessary of their potential partners</li> <li>• Continuous collaboration with previous and current partners show an excellent reputation to new partners</li> </ul>	<ul style="list-style-type: none"> <li>• Distributes royalties of technologies to staff that contributed to its development</li> <li>• Does feasibility studies and market research for their technology adopters</li> <li>• Open to sharing all details of research results and technologies with adopters</li> <li>• Continuous collaboration with previous and current partners show credibility and trustworthiness</li> <li>• Requests for statements and success story pieces from partners and technology adopters; invite them as speakers for technology promotion</li> </ul>	<ul style="list-style-type: none"> <li>• About 30% of the staff have advanced degrees; 16 with Ph.D. degrees</li> <li>• Strong technical and scientific foundation; have several agricultural engineers and food scientists</li> <li>• Transfers knowledge to younger staff through mentoring</li> <li>• Has own intellectual property rights office</li> <li>• Open to feedback from the public to allow them to learn and revise knowledge when needed</li> <li>• Continuous learning and career advancement of all PHILMECH permanent staff</li> <li>• Documents success stories of adopters</li> </ul>	<ul style="list-style-type: none"> <li>• 186 employees with 137 permanent positions</li> <li>• Most permanent position staff stay long with PHILMECH</li> <li>• Risk of losing skilled contractual employees because no permanent positions are available</li> <li>• Has a human resources development section that helps staff pursue advanced degrees and training opportunities</li> <li>• Receives funding from GAA, R&amp;D collaboration, and research grants</li> <li>• PHILMECH owns patents; started patenting processes</li> <li>• Not allowed to mass produce inventions</li> <li>• Has an Enterprise Development Division</li> <li>• Passion for supporting their stakeholders</li> <li>• Prioritizes technology development of DA banner crops</li> <li>• Has three ISOs</li> </ul>

*Note.* The data in this table was compiled based on an interview with a PHILMECH representative, feedback from other interviews, and secondary desk research done by the researcher.

PHILMECH continues to build upon its base of knowledge as it allows and encourages its staff to pursue further studies. According to the representative, PHILMECH has 16 Ph.D. degrees and about 40 master's degree holders. These account for roughly 30% of their permanent staff. The representative further claims that many of their advanced degree holders received their education from foreign universities. Moreover, they also have several agricultural engineers and scientists of different backgrounds. Senior staff also mentor younger researchers to ensure that institutional and tacit knowledge is passed down and continues. As a research institute, the representative emphasized that PHILMECH has a robust technical and scientific foundation.

Overseeing staff development is the PHILMECH human resources development section. The section aids PHILMECH staff in their professional development by providing them opportunities for further studies. When calls for master's or doctoral applications or scholarships are found, the section disseminates the information to its staff. Apart from further studies, the human resources development section also manages the training opportunities available for their staff. PHILMECH, through this program, sponsors necessary fees for their staff to go on management, supervisory, or technical training and seminars. PHILMECH does not limit its staff to domestically available knowledge-building opportunities but allows attendance in internationally sponsored ones. Aside from learning through further studies and training, the representative mentioned that they also request feedback from the public and their adopters to improve their technologies and services.

PHILMECH has several management capabilities. In providing its technologies, PHILMECH is limited to licensing these out. As part of its mandate, the center is not allowed to mass produce any of the technologies they generate. In prioritizing R&D, PHILMECH will also prioritize technology development on crops which are banner programs of the DA. Finally, as a testament to building its management capabilities, PHILMECH has received an Integrated Management System certification.

One possibly innate capability that the representative mentioned several times over the interview was the passion and dedication shown by its staff in performing their work. According to the representative, passion for what they do is the most significant capability required to be able to be successful in generating technologies and diffusing these to adopters, especially farmers. The representative cites how some of their staff would use their finances to continue research work while waiting for the funds to come. Several are willing to forego royalty fees to get their technology used by others. For most of the PHILMECH staff, the representative proudly says, simply seeing their technologies adopted, used, and able to help someone gives them a strong sense of accomplishment.

### *Challenges*

In doing its research and extension work, PHILMECH has encountered several challenges. One of the most common obstacles they face is the expectation of farmers that the technologies and machinery are always dole-outs for them. Although PHILMECH does provide some free-of-charge technologies and machinery, the budget for these is often limited and earmarked or tied to particular programs of the DA. As per the representative, it is challenging to convey the message that the farmers or farmer groups need to pay for the technologies they need. Nonetheless, one solution PHILMECH offers is to link potential adopters to agencies that may provide funding for these, such as the Department of Science and Technology or the Department of Trade and Industry. In addition to aid in linkage, PHILMECH emphasizes to their adopters that they may request free technical assistance on applying and maintaining any of their technologies. PHILMECH engineers may help in setting up simpler technologies and machinery that do not require heavy investments.

PHILMECH has also encountered abuses of its free technical assistance. The representative recalls an incident that occurred several years ago when a person was interested in adopting a specific machine that PHILMECH was developing. At that time, PHILMECH had yet to apply for a patent on the machine. After learning about the machine, the supposed adopter filed for the patent themselves without the institution's knowledge. Upon completion of the technology, it was marketed to and produced, and sold by PHILMECH-accredited manufacturers. The person who filed for the patent then started to demand royalties and fees from PHILMECH and the manufacturers and eventually sued PHILMECH. During the litigation, PHILMECH was able to prove that the invention originated from their center. The patent was removed from the person and awarded to PHILMECH. Because of this experience, PHILMECH has been much more diligent in filing for its patents and now even filing for patents on production processes they developed.

Another challenge that PHILMECH encounters is the relatively long turnaround time for the completion of R&D projects. Most of the technologies they developed take anywhere between three to five years to complete as per the representative. For example, in designing machinery, researchers, engineers, and scientists first go through laboratory-scale experiments, then validation through field trials, then larger-scale pilot testing, and, finally, marketing the technology.

To speed up the process, PHILMECH, in the middle of 2020, decided to implement a new R&D modality. Instead of undergoing field trial validation after small-scale testing, PHILMECH now simultaneously promotes the technology while it is being pilot tested in the field. Like the previous modality, however, the hastened process is limited by the seasonality of agricultural products. Although aggressive pilot promotion may be done during the high season, these become more limited during the off-season.

In conducting these projects, however, PHILMECH also encounters another challenge in the risk of losing skilled contractual employees. As the number of permanent positions is limited in the institute, contractual employees will need to wait for a permanent employee to resign or retire before they are given an opportunity for a position. As per the representative, PHILMECH employees tend to stay and only leave the office upon forced retirement. In their experience, contractual employees may quickly transfer jobs, especially if they find or are offered ones that provide permanent positions. The resignation of these service contractors often creates challenges in ongoing R&D projects as they usually serve as assistants. Hiring takes a lot of effort and time, and once someone is hired, they will need to train them. Because of this, R&D projects experience delays.

### *Summary*

As the DA's postharvest and processing technology arm, PHILMECH has generated several essential inventions that allowed innovation in several agricultural industries. As an innovation intermediary, PHILMECH brokers its technologies to potential adopters and provides several support layers for their stakeholders. The institute also shares its expertise by providing technology and technical advice and secondment opportunities for its employees and partner organizations. When collaborating and providing technologies, PHILMECH mediates partnerships by ensuring clear agreements between parties to avoid conflict and smoothen relationships.

To successfully perform its roles, PHILMECH has built its key-capabilities. It expands and fosters its network by publishing its work on multiple media platforms and by providing opportunities for its adopters to market their products and services. Through the years, PHILMECH has also built its reputation as a credible, dedicated, trustworthy, and passionate organization through its multiple engagements with research collaborators and brokering technologies. As a research institute, the

organization has a solid knowledge base that it continues to build by providing its staff professional development opportunities and listening to their partners' feedback.

Despite its many challenges, PHILMECH continues its work to generate critical technologies to provide more value for its technology adopters, especially farmers.

#### **Appendix 5.18 Department of Science and Technology – Industrial Technology Development Institute (DOST-ITDI)**

##### *History and Purpose*

The Department of Science and Technology's (DOST) Industrial Technology Development Institute (ITDI) history dates to 1901 with the establishment of the Bureau of Government Laboratories composed of a biological and chemical laboratory, a science library, and the serum laboratory of the then Board of Health. In 1905, the organization was renamed the Bureau of Sciences, which, in 1958, became the National Institute of Science and Technology (NIST). In 1987, after the National Science and Technology Authority was reorganized as the Department of Science and Technology, NIST was renamed ITDI.

The ITDI's primary purpose is to conduct applied research to produce technologies applicable to industrial manufacturing, mineral processing, food processing, environment, mineral processing, and energy industries. The institute consists of five divisions: Chemicals and Energy, Environment and Biotechnology, Food Processing, Materials Science, and Packaging Technology. Apart from these five divisions, ITDI also the National Metrology Division heading the establishment and maintenance of the nation's standards of scientific measurement, the Standards and Testing Laboratory Division in charge of testing the composition and physical properties of a variety of products, and the Technological Services Division responsible for the promotion, diffusion, and transfer of ITDI-generated technologies.

As per their 2017 Annual Report, ITDI had 334 employees, but according to the representative, the institute had past 400 employees in 2020. Of these 400 staff, close to 300 are permanent employees while the remaining more than a hundred employees are contractual. A vast majority of its employees are scientists and researchers working in one of its divisions. Several of their scientists and researchers have advanced degrees in various fields, while a significant proportion of its staff is currently taking further studies. As a research institute, the ITDI understands the merit and need for advanced degrees and fully supports the pursuit of these by their staff. ITDI has a human resource development program that identifies who should either start their master's or doctoral degrees. Apart from further studies, ITDI also supports its staff by providing training opportunities for management or other work-related topics. These may be short-term or long-term training and may even be training conducted abroad. Suppose their human resource program cannot cover the training cost. In that case, ITDI will apply for subsidies or grants from other funding agencies.

Funding-wise, ITDI gets most of its budget from the annual General Appropriations Act. Apart from these, ITDI applies for research grants from other funding agencies, conducts collaborative research to share costs, and earns from licensing its technologies. Not all technologies, however, have a cost. Some of the technologies that ITDI identifies as public goods will be provided for free. For technologies that show great industrial application potential, ITDI also applies for patenting of these. The representative also mentioned that the institute is currently applying for PCTs for technologies it feels may have industrial applications abroad.

Specifically for the rice and mango industries, the ITDI diffuses and developed several processing technologies and innovations. For rice, they developed thermal dryers for paddy rice and provide processing technologies and training on creating rice-based beverages and local rice cakes (i.e., *suman*). They have developed a drum dryer, a vacuum dryer, and a thermal machine to process dried mangoes and other fruits for mangoes. Moreover, they provide processing technologies and training on creating mango candies, purees, and juices. The ITDI also provides training and technology packages for waste management or by-products. Furthermore, when promoting and diffusing technologies, the representative said that the Technology Services Division (TSD) always includes a business plan that will support the client using their technology.

However, more than these processing technologies, the representative claims that their packaging technologies are more often sought after by their clients. The ITDI's Packaging Technology Division. When clients approach them for packaging support, the ITDI designs and creates the suitable packaging required by the client's products, including even labeling the product. Once developed and approved, ITDI will teach the client the specifications of the packaging and how to produce it.

In agri-food business value chains, the ITDI participates and supports industries the most in the product processing and marketing segments. The institute creates technologies that food manufacturers may use to process new products. ITDI also supports the creation of packaging and labeling of products, and they offer business planning assistance.

#### *Intermediary Roles*

As a research institute, ITDI performs several innovation intermediary roles. The roles the institute performs are summarized in Table A5.18.1. Of the four intermediary roles identified by Partners (2007), ITDI performs the brokerage and resource provision role the most.

For brokerage of its technologies, this role is performed primarily by its TSD. According to the representative interviewed, their office joins and hosts several events to get their technologies closer to potential clients. One of the events the institute participates in is the annual DOST National Science and Technology Week. Previously, the event was held during the third or fourth week of July but is now held every fourth week of November. During this week, the entire DOST prepares a gamut of activities in line with the promotion of science and technology and their developed technologies.

Apart from this annual event, the ITDI also partners with the DOST – Technology Application and Promotion Institute (TAPI) regional counterparts to host Technology Transfer Weeks in various provinces. This event allows them to meet with potential clients in other regions of the Philippines specializing in specific industries. Furthermore, the ITDI also holds a Technology Transfer Day event for the public to openly meet and inquire about ITDI technologies. After these events, the ITDI conducts follow-ups with those that showed interest during the events. The ITDI may also contact individual companies that they feel may benefit from adopting their technologies. At times, they are also visited by walk-in clients who come by their facility to inquire.

Once a client decides to adopt technology from ITDI, they will need to submit a Letter of Intent to the institute to formalize their interest. The TSD will then set up a meeting between the client and the researchers of the division where the technology originates. At that point, a non-disclosure agreement (NDA) is signed by the client, then a technology licensing agreement once the terms are finalized. For their adoption, the ITDI will provide training sessions for the client on adopting or using the technologies.

Table A5.18.1

*The Intermediary Organization Roles Performed by the Industrial Technology Development Institute*

Broker	Consultant	Mediator	Resource Provider
<ul style="list-style-type: none"> <li>• Joins the DOST National Science and Technology Week to feature commercialization-ready technologies</li> <li>• Hosts regional Technology Transfer Week</li> <li>• Active in inviting or visiting potential clients</li> <li>• Hosts Technology Transfer Day</li> <li>• Public goods technologies are provided for free</li> <li>• Provides training and seminars on how to use their technologies</li> </ul>	<ul style="list-style-type: none"> <li>• Consults industry stakeholders during meetings to learn of their issues and needs and to market their technologies</li> <li>• Does technology consultation for individual companies</li> <li>• ITDI staff may be hired as consultants of private companies</li> </ul>	<ul style="list-style-type: none"> <li>• Coordinates with regional TAPIs for the Technology Transfer Week</li> <li>• Invites other government partners during stakeholder meetings</li> <li>• Signs Non-Disclosure Agreements with clients</li> <li>• R&amp;D partnerships always have agreements on IP-sharing; researchers always have a share in the IP</li> <li>• Helps link partners with funding agencies</li> </ul>	<ul style="list-style-type: none"> <li>• Provides a business plan to potential technology adopters</li> <li>• It also offers operations and merchandising support apart from the technology transfer</li> <li>• Helps link partners with funding agencies</li> <li>• May provide non-technology-based training (e.g., livelihood training)</li> <li>• Public goods technologies are provided for free</li> <li>• Provides training and seminars on how to use their technologies</li> <li>• Technology adopters or partners may use ITDI facilities to produce product samples for marketing purposes</li> </ul>

*Note.* The data in this table was compiled based on an interview with an ITDI representative and secondary desk research done by the researcher.

During the brokerage process, the ITDI also provides several other resources to support their clients. One is the provision of business plans that incorporate the identified technology into the client's business. Coupled with the technology transfer are operations support for using the technology and merchandising support for the product created. An example of the support ITDI provides may come in rental or use of ITDI facilities to produce product samples for marketing purposes.

Apart from these, the ITDI also provides some technologies for free. If these are identified as public goods technologies, anyone may avail of them. The institute also provides information and training for these technologies. During the COVID-19 pandemic, the ITDI would often host webinars or online training about these free-to-use technologies. Furthermore, the ITDI also hosts non-technology-based training seminars like livelihood training. Although the ITDI does not provide funding or financial aid to its potential clients, the institute links them to other agencies or organizations that may provide financial assistance.

The ITDI also provides consultancy in the form of technology consultancy for individual companies. Staff may also be hired by consultants for private companies too. Another significant consultancy role the institute plays is the hosting of stakeholder engagements or meetings. Several times a year, the institute also calls for stakeholder meetings. For these meetings, they invite value chain actors and related government agencies that support the targeted industry. For example, they would include the Department of Agriculture (DA), LandBank of the Philippines, and the Department of Trade and Industry for meetings with agri-food industries. During these meetings, they showcase their available technology that may have applications for the specific industry they are meeting. They also learn of industry needs that their scientists and researchers may create technology to address these needs. Inviting the related supporting institutions shows that the ITDI understands that successful technology transfer and adoption also requires a good policy and support environment.

Moreover, the representative mentions that the ITDI works with a whole-value chain approach. In the case of their food processing technologies, they understand the critical role the DA plays as the head agency to develop the raw materials required for food processing. Having the DA attend these stakeholder engagements also provides the DA an idea and contacts to link producers with food manufacturing companies.

Hosting the stakeholder meetings also shows the mediation role performed by the ITDI. These meetings create opportunities for further relationship building between other government agencies and private sector actors. Another relationship and partnership the ITDI relies on and builds is with the TAPI. Their relationship is deepened as they host more Technology Transfer Weeks with the regional TAPIs in the Philippines. Another form of mediation they perform is mediation within their R&D collaborations with other organizations. Before the conduct of the research, the ITDI will make sure that all parties will agree on the IP-sharing rights of the technology that they will develop together. One point about these agreements that the representative highlighted is that the DOST scientists or researchers that contributed significantly to the technology will always be given a share in the IP of the technology.

For clients that decide to adopt their technologies, the ITDI requires an NDA to prevent any untoward incidents. For their clients who may lack the required technology investment, the ITDI will help link their clients with probable funding partners.



### *Intermediary Key-Capabilities*

As it enables innovation for its partners and clients, the ITDI also builds necessary key-capabilities to be more successful in its role performance. Table A5.18.2 provides a summary of the ITDI's key-capability building.

For its external networking, the ITDI continues to build its network primarily through its technology transfer activities like the Technology Transfer Week or Day and by taking part in the DOST Science and Technology Week. Apart from that, the institute continues to foster relationships by following up with those that showed interest during these events through mail or phone calls. Through its stakeholder meetings, the ITDI expands its network by involving old and new actors in the industry and other supporting agencies. Finally, being designated as the public research institute for industrial technology development allows others to easily connect to the institute as it is pretty well known.

For its internal communication capabilities, the institute keeps a record of its technology adopters and keeps a connection with them. When the ITDI joins or hosts technology transfer events, they invite early adopters to showcase their products and show how the ITDI-generated technologies aided in their success. Moreover, the ITDI ensures that it creates a good relationship with its regional partners and other government agencies so that the institute can count on their support in future events.

Continuing its internal communication capabilities, the ITDI provides its R&D collaborators first offer rights of technologies developed together. They will only offer the technology to the public if their collaboration partner declines the first offer right. Furthermore, the representative mentioned that for the first adopter of their technologies, ITDI would provide enough time for them to launch their product into the market before reoffering the technology to others.

Another important form of internal communication capability that the ITDI built was the relationship between the ITDI researchers and scientists with the TSD. According to the representative, before 2016, many scientists and researchers were hesitant to reveal all information regarding their research. To alleviate this problem, the TSD conducted consultations with the scientists and researchers and began exchange programs that allowed each office to understand the significance of either's work. As per the representative, they had scientists and researchers attending these technology transfer events to speak about and promote their technologies. Doing so allowed the scientists and researchers to learn what information clients look for and the importance of how to promote their technologies effectively. Since then, the relationship between the two sides has dramatically improved. Now, scientists and researchers are very open about the process of their studies and understand when their technologies are already possibly marketable or patentable. They openly relay these to the TSD, and this has significantly improved relations within the institute.

Table A5.18.2

*The Intermediary Organization Key-Capabilities Built by the Industrial Technology Development Institute*

External Networking	Internal Communication	Knowledge-Building	Management
<ul style="list-style-type: none"> <li>• Joins the DOST National Science and Technology Week and hosts other technology transfer activities and events</li> <li>• Invites or visits potential clients for their technologies</li> <li>• Does stakeholder meetings to learn of their issues and needs</li> <li>• Designated public research institute for industrial technology development</li> </ul>	<ul style="list-style-type: none"> <li>• Invites early adopters of DOST technologies during the DOST National Science Week to showcase technology application</li> <li>• R&amp;D partners are given first offer rights of technologies</li> <li>• Very close relationship with TAPI and other government agencies</li> <li>• Continues to foster relationships between DOST scientists and DOST staff that do the technology promotion</li> </ul>	<ul style="list-style-type: none"> <li>• Composed of scientists and researchers that specialize in various industries and technologies</li> <li>• Several have already obtained advanced degrees, but many more are taking further studies</li> <li>• Creates business plan for potential clients</li> <li>• Learns issues and needs through stakeholder and client meetings</li> <li>• Does technology feasibility studies</li> <li>• Whole-chain approach when developing and promoting technologies</li> </ul>	<ul style="list-style-type: none"> <li>• Close to 300 permanent employees</li> <li>• Has a human resource development program that identifies and plans on who should study</li> <li>• Staff may apply for long-term or short-term training</li> <li>• Receives funding from GAA or by applying through different research councils or funding agencies</li> <li>• Not all technologies are registered with the IPOPHL, but those that show promise are submitted for patenting</li> <li>• Technologies developed by ITDI are all non-exclusive</li> <li>• Complies to develop technologies indicated in the PDP</li> <li>• Staff dedicated to the work and not self-serving</li> </ul>

*Note.* The data in this table was compiled based on an interview with an ITDI representative and secondary desk research done by the researcher.

The ITDI has a solid foundation for its knowledge-building capabilities. These are specially strengthened by their scientists and researchers specialized in various scientific fields. Several have already obtained their advanced degrees, while many more are currently taking further studies. The ITDI also is not limited to the scientific field. Using a whole-value chain approach, they have employees skilled in marketing and business development. They apply these skills in crafting business plans for their potential clients. Apart from that, the ITDI also conducts technology feasibility studies to learn of the applicability and potential of ITDI-generated innovations. The institute also learns of needs and technologies to develop through their stakeholder and partner meetings. The ITDI does not only focus on the manufacturing or processing portions of value chains but understands the importance of other segments of the chain. With that understanding, the ITDI can provide other forms of support like funding linkage, collaborations with other agencies, and marketing support for their clients.

For management capabilities, one of the most important is the ITDI's human resource development program that tracks the professional development of its staff. As a research institute, the ITDI understands the value of having staff with advanced degrees. The ITDI provides opportunities for their employees to pursue further studies and apply for short-term or long-term training programs either locally or abroad. Furthermore, the representative emphasized how honest and not self-serving their staff are. Given the possibility of running away with the technologies and marketing these themselves, the ITDI staff show their dedication to their work by not giving in to those temptations.

For managing its technologies, the representative mentioned that all the ITDI-generated technologies are non-exclusive, meaning any interested firms may license these from the institute. When it comes to what technologies will be developed, the ITDI first allots effort in conducting R&D on technologies that are highlighted as priorities in the Philippine Development Plan. Succeeding these, they conduct R&D of technologies based on the needs of industries from the stakeholder engagements and their feasibility studies. Regarding the IP protection of its technologies, the representative mentioned that several but not all technologies are protected under the Intellectual Property Office of the Philippines. However, when the ITDI identifies promising technologies still under development, they immediately prepare to patent these. For technologies that show potential even outside the Philippines, the ITDI applies for PCT patents.

### *Challenges*

Throughout the years, the ITDI faced several challenges and obstacles and is still trying to overcome some of these. From the interview, it seems that the challenges are primarily external from the institute. In contrast, others are limitations of what the ITDI can conduct.

One of the more common obstacles to their work that also see the most failed technology brokerage experiences is the lack of readiness on the side of their partners or clients. Some of their clients may not be registered businesses yet or lack the facilities to house or use the technology they are interested in adopting. Others may lack funding or are unable to secure loans for the technology. When faced with these, the ITDI does its best to support these clients by linking them to agencies that may help address these deficiencies.

A similar obstacle they face is the lack of risk-taking behavior from partners that may adopt the technologies. The TSD does what it can to provide the would-be partner with all the knowledge and plans to help in their success. It, at times, may take very long before the client ever decides to adopt or not.

An organizational limitation the ITDI has is its inability to conduct human testing for applicable technologies like supplements and its limited marketing budget for products they developed. For both these cases, the ITDI overcomes these by partnering with organizations that may provide these processes. They partner with research laboratories or companies that may conduct human testing. They also partner with companies that may help fund or does market testing of products like taste testing of food products.

Another challenge they face is the change of management or political leaders within their partner organizations or institutions. There is the possibility that the new leaders or company managers may want to stop ongoing technology transfer agreements between the ITDI and their predecessor. For changes in political leadership, ITDI sends its staff to these areas to meet with the new leaders and discuss how they may continue with the agreements or projects. For changes in company management, they employ a similar strategy.

### *Summary*

The ITDI performs innovation intermediary roles consistent with other public research institutes studied in the literature. However, apart from their technology creation and brokerage, the ITDI also provides business planning, operations, and marketing support to their clients. The institute understands the importance of providing technologies and creating the space for their clients to develop with their technologies. The ITDI is open to sharing its work with others through various technology transfer events or consultations with individual firms or industry-wide meetings. In addition to these, the ITDI mediates partnerships by including other relevant government agencies in their stakeholder meetings. When collaborating with others, the institute ensures that IP rights are shared to all that provided a significant amount of themselves in the technologies they developed together.

In building its capabilities, the institute fosters its relationships with new and old partners alike. With a pool of experts, the ITDI is very rich in knowledge, not only in the sciences but also in business management. The staff are dedicated to their work and are backed by a very supportive human resource development program that provides them the opportunities for professional development.

As the ITDI builds more of its key-capabilities, the organization will see even more success and clients who adopt their technologies. With a whole-chain approach to addressing industry needs, the ITDI will pursue the development of technologies that will likely benefit these industries and others that rely on them for support.

## **Appendix 6: Interview Consent Form Template**

### **RESEARCH TITLE (TENTATIVE):**

Fostering Further Participation in Agri-business GVCs: A Multiple Case-Study on Intermediary Roles and Capabilities in the Philippine Rice and Mango Industries

### **DESCRIPTION OF THE STUDY:**

You are invited to participate in a research study on the role performance and key-capability building of intermediary organizations in the Philippine rice and mango industries. This study hopes to identify concrete policy and management recommendations for the Philippine government and other organizations that may effectively enhance the performance and capability-building of intermediary organizations to further support the participation and integration of MSMEs and farmers in their respective GVCs.

You will be asked to take part in a one to one and a half hour interview that will ask questions related to your knowledge on either the rice or mango industry and experience, and your organization that you are currently a part of.

The interview will be audio recorded with your permission and the recordings will be disposed of by the researcher once the study has been completed. Notes taken from the study by the researcher will be kept under file for possible future studies related to the topic of study.

This research will serve as the final output and is required for graduation for a doctoral degree in Science, Technology, and Innovation Policy from the National Graduate Institute for Policy Studies, Tokyo, Japan.

**TIME INVOLVEMENT:** 1 to 1 ½ hours

### **RISKS AND BENEFITS:**

This study is being done independently. Your decision to participate will not have any bearing on your relationship with the organizations mentioned in this study.

### **PARTICIPANT'S RIGHTS:**

1. You participation is voluntary.
2. You have the right to withdraw your consent or discontinue participation at any time without penalty or loss.
3. You may opt not to participate.
4. You have the right to refuse to answer particular questions.
5. The results of this research study may be presented at academic, scientific or professional meetings or published in scientific journals.
6. The results of this research study will be published as a Doctoral Dissertation or Thesis in the National Graduate Institute for Policy Studies.
7. Your individual privacy will remain confidential in all published and written data derived or coming from the study.
8. The researcher will send draft copies of sections related to your interview to confirm the correctness of what the researcher may have written.

### **CONTACT INFORMATION:**

If you have any questions, concerns, complaints about the research or wish to change or withdraw from the research, please contact:

Kevin Christopher L. Go

Phone Number: +63 917 849 0424

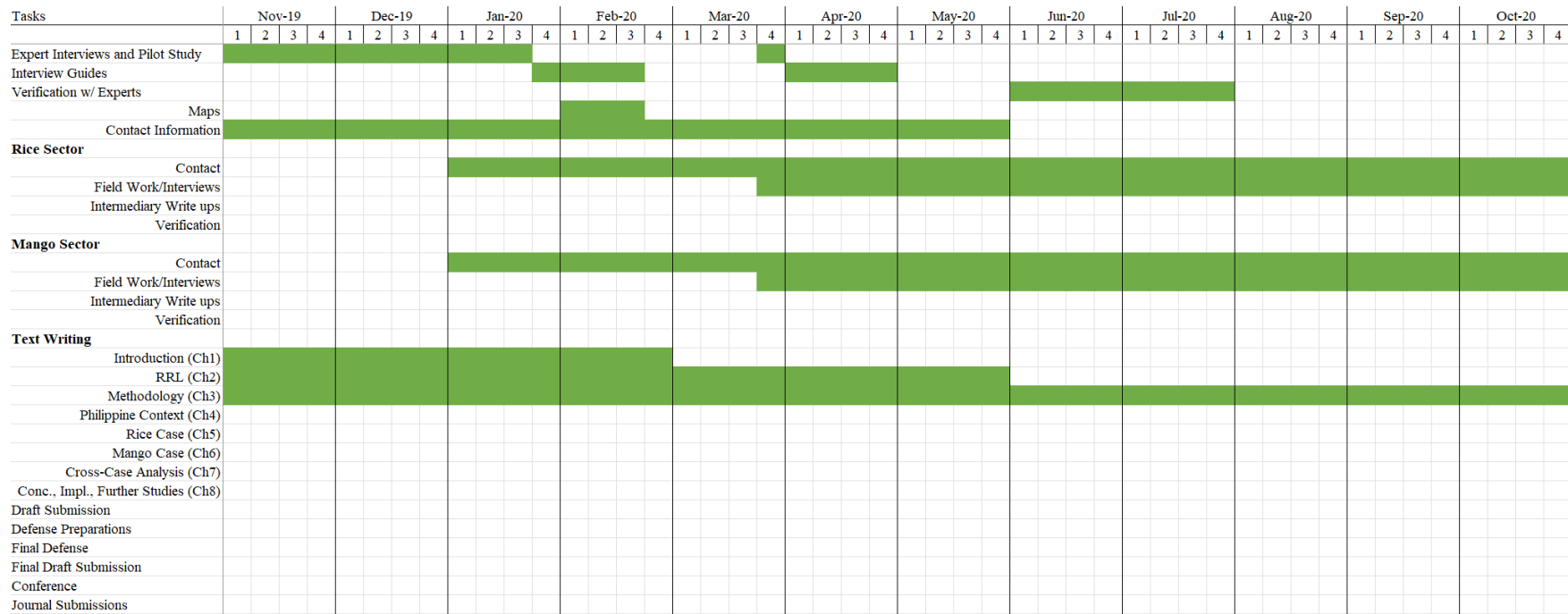
Email Address: doc18153@grips.ac.jp or kevinchristophergo@gmail.com

I have fully read and understood the study and what it entails. I, therefore, give my consent to be interviewed for this research.

Signature: \_\_\_\_\_ Date: \_\_\_\_\_

Full Print Name of the Participant: \_\_\_\_\_

## Appendix 7: Gantt Chart Schedule of the Dissertation Journey



Tasks	Nov-20				Dec-20				Jan-21				Feb-21				Mar-21				Apr-21				May-21				Jun-21				Jul-21				Aug-21				Sep-21				Oct-21			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4								
Expert Interviews and Pilot Study																																																
Interview Guides																																																
Verification w/ Experts																																																
Maps																																																
Contact Information																																																
Rice Sector																																																
Contact																																																
Field Work/Interviews																																																
Intermediary Write ups																																																
Verification																																																
Mango Sector																																																
Contact																																																
Field Work/Interviews																																																
Intermediary Write ups																																																
Verification																																																
Text Writing																																																
Introduction (Ch1)																																																
RRL (Ch2)																																																
Methodology (Ch3)																																																
Philippine Context (Ch4)																																																
Rice Case (Ch5)																																																
Mango Case (Ch6)																																																
Cross-Case Analysis (Ch7)																																																
Conc., Impl., Further Studies (Ch8)																																																
Draft Submission																																																
Defense Preparations																																																
Final Defense																																																
Final Draft Submission																																																
Conference																																																
Journal Submissions																																																

Tasks	Nov-21				Dec-21				Jan-22				Feb-22				Mar-22				Apr-22				May-22				Jun-22			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Expert Interviews and Pilot Study																																
Interview Guides																																
Verification w/ Experts																																
Maps																																
Contact Information																																
<b>Rice Sector</b>																																
Contact																																
Field Work/Interviews																																
Intermediary Write ups																																
Verification																																
<b>Mango Sector</b>																																
Contact																																
Field Work/Interviews																																
Intermediary Write ups																																
Verification																																
<b>Text Writing</b>																																
Introduction (Ch1)																																
RRL (Ch2)																																
Methodology (Ch3)																																
Philippine Context (Ch4)																																
Rice Case (Ch5)																																
Mango Case (Ch6)																																
Cross-Case Analysis (Ch7)																																
Conc., Impl., Further Studies (Ch8)																																
Draft Submission																																
Defense Preparations																																
Final Defense																																
Final Draft Submission																																
Conference																																
Journal Submissions																																



## Appendix 8: Philippine Employment Percentage Distribution by Major Industry Group

	2016	2017	2018	2019	2020
<b>Agriculture</b>	<b>26.8%</b>	<b>25.5%</b>	<b>26.0%</b>	<b>23.5%</b>	<b>24.5%</b>
Agriculture, Hunting and Forestry	23.6%	22.5%	23.6%	20.4%	21.2%
Fishing and Aquaculture	3.2%	2.9%	2.5%	3.1%	3.4%
<b>Industry</b>	<b>16.8%</b>	<b>17.4%</b>	<b>18.1%</b>	<b>18.9%</b>	<b>18.3%</b>
Mining and Quarrying	0.5%	0.5%	0.5%	0.4%	0.4%
Manufacturing	8.3%	8.3%	8.5%	8.4%	7.6%
Electricity, Gas, Steam and Air Conditioning Supply	0.2%	0.2%	0.2%	0.2%	0.2%
Water Supply; Sewerage, Waste Management and Remediation Activities	0.1%	0.2%	0.1%	0.1%	0.2%
Construction	7.6%	8.2%	8.7%	9.8%	10.0%
<b>Services</b>	<b>56.4%</b>	<b>57.1%</b>	<b>55.9%</b>	<b>57.7%</b>	<b>57.2%</b>
Wholesale and Retail Trade; Repair of Motor Vehicles and Motorcycles	18.9%	20.1%	19.8%	19.8%	21.0%
Transportation and Storage	7.5%	7.8%	7.9%	8.1%	7.1%
Accommodation and Food Service Activities	4.5%	4.3%	4.1%	4.6%	3.4%
Information and Communication	1.0%	0.9%	0.9%	1.0%	1.1%
Financial and Insurance Activities	1.2%	1.3%	1.2%	1.5%	1.5%
Real Estate Activities	0.6%	0.4%	0.5%	0.5%	0.4%
Professional, Scientific and Technical Activities	0.6%	0.6%	0.5%	0.7%	0.7%
Administrative and Support Service Activities	3.1%	3.7%	3.8%	3.8%	4.4%
Public Administration and Defense; Compulsory Social Security	5.7%	6.0%	5.8%	6.5%	6.1%
Education	3.4%	3.1%	2.8%	3.3%	3.7%
Human Health and Social Work Activities	1.3%	1.3%	1.2%	1.4%	1.5%
Arts, Entertainment and Recreation	1.1%	0.8%	0.9%	0.8%	0.5%
Other Service Activities (includes Activities of Households as Employers; Undifferentiated Goods and Services-producing Activities of Households for Own Use)	7.8%	6.8%	6.5%	5.6%	5.7%
Activities of Extraterritorial Organizations and Bodies	0.0%	0.0%	0.0%	0.0%	0.0%

Note. 0.0% indicates less than 0.05%. Data may not add up to 100% due to rounding up.  
Data source: PSA (2021b)

### Appendix 9: Philippine Rice Supply Utilization 1995-2020

	Supply				Utilization						
	Beginning Stocks	Production	Imports	Gross Supply	Exports	Seeds	Feeds and Waste	Processing	Ending Stocks	Total Net Food Disposable	Per Capita (kg/yr)
1995	1498	6894	264	8656	0	184	448	276	1422	6326	93
1996	1422	7379	867	9668	0	194	480	295	1793	6906	99
1997	1793	7370	722	9885	0	188	479	295	1979	6944	97
1998	1979	5595	2171	9745	<1	155	364	224	2279	6723	92
1999	2279	7708	834	10821	<1	196	501	308	2365	7451	100
2000	2365	8103	639	11107	<1	198	527	324	2166	7892	103
2001	2166	8472	808	11446	<1	199	551	339	2271	8086	104
2002	2271	8679	1196	12146	<1	198	564	347	2448	8589	108
2003	2448	8829	886	12163	<1	197	574	353	2362	8677	107
2004	2362	9481	1001	12844	<1	202	616	379	2051	9596	116
2005	2051	9550	1822	13423	<1	200	621	382	2094	10126	119
2006	2094	10024	1716	13834	<1	204	652	401	2253	10324	119
2007	2253	10621	1806	14680	<1	210	690	425	2172	11183	126
2008	2172	10997	2432	15601	1	219	715	440	2639	11587	128
2009	2639	10633	1755	15027	<1	222	691	425	2629	11060	122
2010	2629	10315	2378	15322	<1	214	670	413	3424	10601	114
2011	3424	10911	707	15042	<1	223	709	436	2631	11043	116
2012	2631	11793	1041	15465	<1	230	767	472	2524	11472	119
2013	2524	12059	398	14981	2	233	784	482	2126	11354	116
2014	2126	12405	1087	15618	1	232	806	496	2662	11421	114
2015	2662	11870	1478	16010	<1	228	772	475	3199	11336	112
2016	3199	11528	605	15332	<1	223	749	461	2765	11133	108
2017	2765	12607	885	16256	<1	236	819	504	2290	12407	118
2018	2290	12469	2002	16761	<1	235	810	499	2551	12665	120
2019	2551	12305	3118	17974	<1	228	800	492	2675	13779	128
2020	2,675	12,619	2,219	17,513	<1	231	820	505	2,332	13,624	125

## **Appendix 10: List of Locally Available Rice Technologies from the DA-BAR's Research and Development, and Extension Agenda and Programs 2016-2022 Report**

### *Crop Management*

- Pinoy Rice Knowledge Bank
- PRISM, an online rice information system that gathers, processes, creates, consolidates, records, and produces accurate, timely and location-specific data on rice crop status
- Rice Crop Manager application, a decision support tool for modern precision farming that provides farmers with personalized and location-specific crop and nutrient management recommendations
- Minus One Element Technique that determines soil nutrient deficiencies in actual field conditions
- Leaf Color Chart for measuring the intensity of a leaf's green color
- Palaycheck system and integrated crop management options for irrigated, rainfed, upland and abiotic stress-prone environments
- Mechanized dry direct seeding technology for drought-prone areas
- Reduced tillage technology, alternate wetting and drying technique or controlled irrigation, aerobic rice technology, water harvesting systems for smaller farms
- Palayamanan models that showcase integrated rice-based production or farming systems
- Information and studies on Philippine rice yield, production and marketing costs, crop management practices, and competitiveness; including comparative studies with selected Asian countries

### *Pest and Disease Control*

- Rice pest and disease diagnostic kits, pest management decision guides, weed management field guide
- Data on the crop injury intensity of emerging pests
- Ecological engineering approaches for pest management (bund agriculture)

### *Varietal Improvement*

- Higher-yielding varieties, and hybrid varieties resistant to or tolerant of biotic and abiotic stresses (droughts, floods, salinity, pests, and diseases)
- Data on genetic identity, grain quality profile and nutritional value of selected traditional rice varieties

### *Post-harvest Practices and Processing*

- Combine harvesters
- Fully fluidized bed drying system for high moisture content paddy
- Computer Vision System for rice quality analysis
- Rice hull gasifier engine pump system for optimum application in rainfed areas
- Rice products and processed rice product manufacturing (e.g., rice wine, rice bran oil, rice-based snacks)

### Appendix 11: Philippine Mango Supply Utilization 2000-2020

Year	Supply		Utilization			
	Production	Gross Supply	Exports	Feeds and Waste	Net Food Disposable, including for Processing	Per Capita (kg/yr)
2000	848328	848328	38996	48560	760772	9.94
2001	881710	881710	37131	50675	793904	10.19
2002	956033	956033	35515	55231	865287	10.88
2003	1006191	1006191	35779	58225	912187	11.25
2004	967473	967473	33663	56029	877781	10.62
2005	984342	984342	31269	57184	895889	10.51
2006	919030	919030	26170	53572	839288	9.65
2007	1023907	1023907	26338	59854	937715	10.59
2008	884011	884011	20845	51790	811376	8.97
2009	771441	771441	20381	45064	705996	7.76
2010	825676	825676	20115	48334	757227	8.13
2011	788074	788074	21151	46015	720908	7.60
2012	768410	768410	18440	44998	704972	7.30
2013	816378	816378	7886	48510	759982	7.74
2014	885038	885038	21112	51836	812090	8.13
2015	902739	902739	12981	53385	836373	8.24
2016	814055	814055	14343	47983	751730	7.28
2017	737032	737032	16116	43255	677661	6.51
2018	711660	711660	13562	41886	656212	6.21
2019	737938	737938	14212	43424	680303	6.34
2020	739250	739250	10658	43716	684876	6.30

**Appendix 12: List of Locally Available Mango Technologies from the DA-BAR's  
Research and Development, and Extension Agenda and Programs 2016-2022  
Report (Several technologies may apply to other fruits and crops)**

*Input Supply*

- Vermicomposting technology
- Production and provision of disease-free planting materials

*Production Systems*

- Adoption of integrated crop management and GAP for mangoes

*Pest Management*

- Integrated pest management
- Non-chemical based management strategies
- Automated Hot Water Treatment
- Light Trapping Technology
- Disease indexing
- Test protocols for mango pesticide residue detection

*Storage*

- Compendium of thermophysical properties of mangoes
- Ethanol vapor releasing system

*Value-Addition*

- Processed mango products for mangoes
- Food and non-food from mango waste and by-products (e.g., mango flour)

*Documentation*

- Mango production and marketing practices in the Ilocos Region