2019 年 6 月 5 日

博士論文審査結果報告

Report on Ph.D. / Doctoral Dissertation Defense

National Graduate Institute for Policy Studies (GRIPS)

Professor Atsushi Sunami

審査委員会を代表し、以下のとおり審査結果を報告します。

On behalf of the Doctoral Thesis Review Committee, I would like to report the result of the Doctoral Dissertation Defense as follows.

<table>
<tr><td>学位申請者氏名
Ph.D. Candidate</td><td colspan="3">Kenneth Charles Evensen</td></tr>
<tr><td>学籍番号
ID Number</td><td colspan="3">DOC14152</td></tr>
<tr><td>プログラム名
Program</td><td colspan="3">科学技術イノベーション政策プログラム
Science, Technology and Innovation Policy Program</td></tr>
<tr><td rowspan="5">審査委員会
Doctoral Thesis Review Committee</td><td>主査
Main referee</td><td>角南　篤
SUNAMI, Atsushi</td><td>主指導教員
Main Advisor</td></tr>
<tr><td>審査委員
Referee</td><td>隅藏　康一
SUMIKURA, Koichi</td><td>副指導教員
Sub Advisor</td></tr>
<tr><td>審査委員
Referee</td><td>桑原　輝隆
KUWAHARA, Terutaka</td><td>副指導教員
Sub Advisor</td></tr>
<tr><td>審査委員
Referee</td><td>高木　佑輔
TAKAGI, Yusuke</td><td>博士課程委員会委員長代理
Acting Chairperson of the Doctoral Programs Committee</td></tr>
<tr><td>審査委員
Referee</td><td>元田　浩
MOTODA, Hiroshi
大阪大学　名誉教授</td><td>外部審査委員
External Referee</td></tr>
<tr><td>論文タイトル
Dissertation Title
(タイトル和訳)※
Title in Japanese</td><td colspan="3">Optimizing International Science & Technology Collaboration through Scientometric Studies

科学計量学を用いた国際共同研究の最適化</td></tr>
<tr><td>学位名
Degree Title</td><td colspan="3">博士（公共政策分析）Ph.D. in Public Policy</td></tr>
<tr><td></td><td colspan="3"></td></tr>
<tr><td>論文提出日
Submission Date of the Draft Dissertation</td><td>2019 年 2 月 4 日</td><td>論文審査会開催日
Date of the Doctoral Thesis Review Committee</td><td>2019 年 3 月 19 日</td></tr>
<tr><td>論文発表会開催日
Date of the Defense</td><td>2019 年 3 月 19 日</td><td>論文最終版提出日
Submission Date of the Final Dissertation</td><td>2019 年 4 月 10 日</td></tr>
<tr><td>審査結果
Result</td><td colspan="3">合格
Pass　　不合格
Failure</td></tr>
</table>

※ タイトルが英文の場合、文部科学省に報告するため、和訳を付してください

Please add a Japanese title that will be reported to MEXT.

1. 論文要旨 Thesis overview and summary of the presentation.

An innovation system is constituted by creation, diffusion, absorption, and utilization of knowledge. In order to understand these activities, where they occur within the system and how it functions as a whole should be analyzed. Previous studies already recognized the need for the systematic study of the causes and determinants of activities within an innovation system which allows for the development of theories about the relations between the variables within the system. The dissertation focuses on the human component in the conduct of International Science and Technology (S&T) collaboration within a mission-oriented S&T enterprise. The dissertation adds to the existing body of knowledge by analyzing the activities of Program Managers funding basic science overseas who are part of a Military Service's Science & Technology Enterprise within the United States Department of Defense. Taking advantage of his job position, the candidate successfully got permission to obtain the data that constitutes a complete originality of the dissertation.

The actors within a mission-oriented S&T Enterprise conducting International Basic Science Collaboration include Program Managers (PM) who seek out science to fund, Primary Investigators (PI) found in academia or industry whose job is to conduct the research, and the bench scientists who reside in the enterprise who rely upon knowledge generated outside of the enterprise to further their efforts. How well the enterprise creates, diffuses, absorbs and utilizes knowledge is dependent upon complex human interactions, structured processes, personalities, and capabilities. Among the human resources concerned, most of the previous studies on innovation system focuses on ability of scientists, such as PI and bench scientists, but the dissertation rather focuses the PM as seeking out the science outside of the enterprise for funding is an critical step in International Basic Science Collaboration. It constitutes an originality of the dissertation.

Through macro-level analysis, it is understood that the strategic goals of the DoD for funding

basic science overseas is to improve U.S. capabilities, accelerate the pace of U.S. research and development, and leverage emerging global opportunities. An operational analysis of a Military Service's S&T Enterprise reveals that the enterprise operates as a competitive marketplace for new knowledge creation which is intended to meet the warfighter's requirements. This constant pressure for results has created a scientific and engineering ecosystem with foundational underpinnings dependent upon the creation, diffusion, absorption, and utilization of new knowledge. The operational analysis provided the context to the environment in which the PM's function and allowed for the creation of evaluation mechanisms to determine whether various engagement models were more effective in meeting the strategic goals.

A micro-level analysis of a PM's actions and interactions in selecting knowledge to create, a bibliometric study of the generated knowledge, and an analysis of the diffusion mechanisms and impact on the enterprise were resultant from the nesting of strategic, operational and tactical level analysis. The studies showed that the engagement model does seem to have an impact on the selection of high-quality science as well as how efficiently knowledge diffuses within the enterprise. Program managers working within the international S&T offices performed their duties under one of two models: the subject matter expert model or the shared equity model. Program managers under the subject matter expert model are considered experts in their field and have considerable leeway in deciding which primary investigators and which projects get funded. The shared equity program managers must find a scientist or engineer back in the S&T Enterprise who is interested in the research before funding any primary investigator overseas. There was a statistical difference in the time devoted towards selecting projects to fund between the two engagement models.

The dissertation also revealed that overseas program managers do not have any great insight into the selection of emerging research areas. By thoroughly analyzing the DoD's innovation system from the strategic down to program manager level activities, the dissertation revealed that

it is possible to identify quantifiable mechanisms which allow those providing governance and management of international S&T investments the insight required so that they may achieve an optimal outcome.

2. 審査報告 Notes from the Doctoral Thesis Review Committee (including changes required to the thesis by the referees)

The members of the doctoral thesis review committee made the following questions which are followed by the candidate's responses and the subsequent revisions in the dissertation:

- Question 1

Does the type of engagement model play any role in the selection of high impact science for a mission-oriented S&T Enterprise?

The data seem to support that the program managers from the control group and the two international models select research that has an impact on the field equivalent to or higher than that of similar papers published in the same WOS subject area during the same year.

The type of engagement model does seem to play a role in the success of the international program managers. Those operating under the shared equity model outperformed the program managers working within the subject matter expert model by having a larger percentage of papers falling within those same frequency percentages.

- Question 2

Of the science selected for funding, do overseas engagements identify emerging opportunities early?

It does not appear that the overseas science office program managers have any great insight into selecting emerging research areas. Less than 10% of the high impact science selected by the overseas offices showed the distinctive rapid growth rate of an emerging area. Additionally, only 27% of the projects funded were from countries which might have had a technical headstart in the funded research area.

- Question 3

Are there discernable characteristics, demographics and professional approach differences between program managers working under various engagement models?

With a significance value set at .05, the comparison revealed that in 12 out of 15 areas there were no significant differences in the professional backgrounds of the basic science office program managers and the overseas science office program managers. The differences were the number of projects, the dollar value and the number of peer-reviewed papers. The stateside office's program managers outperformed on these three.

- Question 4

Are there any key characteristics of a successful engagement model which identify impactful science and scientists early?

In comparing the portion of time devoted as a whole to selecting research thrusts, selecting projects, managing projects, and distractions, chi-square testing revealed that there were no significant differences between the program managers of the stateside basic science offices and the overseas science offices as a whole.

The control group program managers are forced to spend more time selecting science for funding as a result of the more formal and established processes required by their organizations. The shared equity model program managers spend even more time since they are trying to satisfy their customer requirements. Program managers
operating within the subject matter expert model have the most leeway in selecting science but ironically devote the least amount of time toward the selection of science.

The study did not reveal any critical characteristics offering a definitive reason why one program manager was more successful than another.

- Question 5

Do international engagement models affect knowledge diffusion and knowledge absorption within a mission-oriented S&T Enterprise?

The shared equity model provides more opportunities for managers and bench scientists to accelerate their efforts by leveraging external researchers and funding. The subject matter expert model, on the other hand, is a more passive model in which those who are tracking for scientific cognizance do so with little to no input in shaping the science.

The shared equity model thus creates a market environment driven by the customer's benefit from the proposed research. A market-like force, under the shared equity model, creates a more efficient allocation of resources through cost sharing of S&T investments overseas.

The members of the committee reached conclusions that revisions should be made following these comments, and that the main advisor would check a revised version within about a week after its submission.

3. 最終提出論文確認結果 **Confirmation by the Main Referee that changes have been done to the satisfaction of the referees**

About two weeks after the defense, the revised version submitted by the candidate was sent to the committee members. The main adviser checked the revised version. On April 10th, 2019, the final version was submitted and the main adviser found it satisfactory.

4. 最終審査結果 **Final recommendation**

The doctoral thesis review committee recommends that GRIPS award the degree of Ph.D. in Public Policy to Mr. Kenneth Evensen.