An Inquiry into the Rapid Growth of the Garment Industry in Bangladesh

KHONDOKER ABDUL MOTTALEB
National Graduate Institute for Policy Studies, Tokyo

TETSUSHI SONOBE
Foundation for Advanced Studies on International Development, and
National Graduate Institute for Policy Studies, Tokyo

I. Introduction

The phenomenal growth of the garment industry in Bangladesh is widely known, due in no small part to the popular book by Easterly (2002) and an earlier paper by Rhee (1990). The industry now ranks among the largest garment exporters in the world. It accounts for 75% of the country's export earnings and provides ample job opportunities for females.

The export-oriented garment industry started from scratch 3 decades ago. Since its exports were negligible in those days, the country was not subject to export restrictions under the Multi-Fiber Arrangement (MFA), which attracted the attention of Daewoo Corporation of South Korea, one of the rising garment manufacturers suffering severely from the quota system. The company planned to develop a production base in Bangladesh and teamed up with an indigenous new enterprise called Desh Ltd. in 1979. Desh sent 130 new employees to Daewoo's factory in South Korea, where they participated in an 8-month intensive training course covering diverse topics from sewing skills to factory management and international marketing. Within a few years, however, almost all the trainees had left Desh to start their own garment businesses (Rhee 1990). Easterly (2002, 147–48) comments: "This explosion of garment companies started by ex-Desh workers brought Bangladesh its $2

billion in garment sales" in the late 1990s. By 2007–8, the industry was earning more than $10 billion.

Like the Bangladesh of 3 decades ago, garment industries in sub-Saharan Africa are now given favorable treatments, such as duty-free and quota-free access to the U.S. market provided by the African Growth and Opportunity Act (AGOA). What can be done for the garment producers in Africa to allow them to take full advantage of such a helpful situation? Existing studies of the Bangladeshi garment industry agree with Easterly (2002) and Rhee (1990) that a central role in the industry's development was played by technology transfers from abroad (e.g., Quddus and Rashid 2000; Hoq 2004; Khan 2004; Mlachila and Yang 2004; Rahman 2004; Siddiqi 2005).

This article uses primary data of garment manufacturers and traders in Bangladesh to investigate further the role and mechanism of technology transfers. While Rhee (1990) describes vividly the technology transfers that occurred in the early stage of the industry's development, his study does not cover the recent period. From the description provided by Easterly (2002), one may have the impression that the proliferation of manufacturers was the major way in which the industry has grown. In the proliferation process, the Desh-Daewoo trainees established their own factories and taught their workers, who later started their own factories and disseminated the knowledge originally from Korea. While this is true, it is not the whole story. Many of the original Desh-Daewoo trainees did not become garment manufacturers but instead became garment traders acting as intermediaries between manufacturers and foreign buyers. The subsequent proliferation of local garment traders suggests that their activities have been useful for the development of the industry. A question arises as to what roles local traders play in industrial development in developing countries. The economic literature is silent about this question.[1] In an attempt to examine what role local traders play, we collected data of traders as well as manufacturers.

The export-oriented garment industry in Bangladesh today is large not just in terms of the number of manufacturers (over 4,000), but also because these enterprises are large in size. During the last 3 decades, the export-oriented garment industry in other countries, such as the Philippines, has experienced prosperity and then a sharp decline. This fact suggests that there is an interesting story not just about the beginning of the industry but also about the subsequent development process. According to Gereffi (1999), Schmitz

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[1] The roles of agricultural traders in counteracting the imperfections of market institutions are extensively discussed by Fafchamps (2004) and Hayami and Kawagoe (1993). To our knowledge, however, there are few studies of local traders in industries in developing countries.

and Knorringa (2000), and Bazan and Navas-Aleman (2004), opportunities for continuous learning are built into operation within the global commodity chain, and it is up to local suppliers, such as garment manufacturers in Bangladesh and the Philippines, whether they learn advanced skills and know-how. What are the determinants of enterprises' continuous learning from abroad? One answer is the profitability from learning, which will in turn depend on labor costs and other conditions. In search of the fundamental determinants of the profitability, we attempt to identify the entrepreneur's background attributes that affect the enterprise performance.

Since information on entrepreneurs is unavailable from secondary data, we conducted personal interviews with them. It was, however, difficult to meet with entrepreneurs, especially with traders, because they are always moving from place to place. It is no wonder that empirical studies of traders are scarce. Our data indicate that traders provide manufacturers with services by using specific skills that newly established manufacturers tend to lack, and that manufacturers reduce their dependence on traders as they learn such skills. These findings suggest that the division of labor between traders and manufacturers has facilitated the reproduction of manufacturers and the formation of a cluster. Our data of manufacturers indicate that not just enterprise size but enterprise growth depends greatly on the general human capital of the entrepreneur. We conjecture that highly educated entrepreneurs have been attracted to this industry by the high profitability that was boosted initially by the Desh-Daewoo infusion of Korean skills and know-how.

The rest of the article is organized as follows. Section II reviews the historical development of the garment industry in Bangladesh. Section III advances hypotheses about the mechanism of the sustained growth of this industry. Section IV discusses the data and variables, which is followed by the presentation of the details of the findings in Section V. Section VI summarizes the findings and discusses the implications.

II. Brief History

When Desh Garment was established in 1979, the government hardly recognized the potential of the garment industry. In 1982, however, the government began to provide various incentives to the garment industry, such as the duty-free import of machinery, bonded warehouse facilities, and cash incentives (e.g., Quddus and Rashid 2000; Siddiqi 2005). Textile and garment companies in South Korea and other newly industrialized countries (NIEs) in east Asia followed Daewoo into operations in Bangladesh and the training of Bangladeshi workers and managers. As a result of its rapid growth, this industry was brought under the MFA quota system in 1986. The system,

TABLE 1
GROWTH OF THE GARMENT INDUSTRY IN BANGLADESH

Fiscal Year	Number of Garment Factories	Employment (Million Workers)	Export Value (Billion US$)	% of Garments in the Country's Export Earnings
1983–84	134	.04	.03	3.9
1987–88	685	.28	.43	35.2
1991–92	1,163	.58	1.18	59.3
1995–96	2,353	1.29	2.55	65.6
1999–2000	3,200	1.6	4.35	75.6
2004–5	4,107	2.1	5.17	74.2
2007–8	4,740	2.5	10.7	75.8

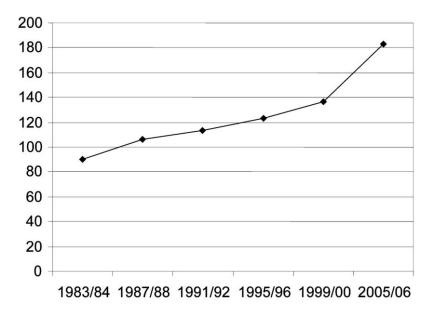Source. Bangladesh Export Promotion Bureau (2005); BGMEA (2008); BKMEA.
Note. In Bangladesh, the fiscal year starts in July and ends in June.

however, is said to have favored Bangladeshi producers because it protected them from foreign competition and because a more generous export quota was given to Bangladesh than to India and Sri Lanka (e.g., Mlachila and Yang 2004; Saxena and Wiebe 2005; Siddiqi 2005).

From the late 1980s through the 1990s, the center of gravity of the industry shifted from foreign ventures to indigenous producers and traders, who increased exports to large retailers and branded marketers in Europe and North America. These customers create new designs at their headquarters and sell the products under their own brands through their own distribution channels. They subcontract production to suppliers in developing countries. Working to the specifications set by global buyers has helped some local suppliers in Asia and Latin America upgrade production processes and product lines and even obtain advanced know-how, such as designing, marketing, and branding (e.g., Gereffi 1999; Tewari 1999; Schmitz and Knorringa 2000; Bazan and Navas-Aleman 2004).

In 1994, the international community decided to abolish MFA gradually. The phased abolition of the quota system began in 1995 and was completed in 2005. Because the quota elimination allows global buyers to import as many garments from their favorite suppliers as they like, the phase-out of the quota has increased competitive pressure on suppliers. Bangladesh has been a winner in this race. As shown in table 1, the number of garment producers, their employment and export value, and the share of garment export in the country's total export earnings continued to increase from 1983 to 2008. Although not shown in the table, garment traders, who help to intermediate between local producers and global buyers, have also increased in number.

The emphasis on quick delivery due to the intensified competition has put the producers of woven garments, such as shirts and pajama sets, at a disadvantage compared to producers of knitwear, such as polo shirts and sweaters

Figure 1. Real manufacturing wage index in Bangladesh, 1983–84 to 2005–6 (1969–70 = 100). *Sources*: Bangladesh Bureau of Statistics, *Statistical Yearbook of Bangladesh* (various issues); Rahman (2009).

in Bangladesh. This is because the woven garment producers depend heavily on imported woven textile, which is prone to delays in delivery, whereas the knitwear producers have an abundant and quick supply of domestically produced yarn and fabrics (Siddiqi 2005). The knitwear sector has grown much faster than the woven garment sector since 1995. In 2007–8, the knitwear sector earned more export revenue than the woven garment sector for the first time.

Global buyers fear that trade unions, nongovernmental organizations (NGOs), human rights groups, and consumers' associations in developed countries may accuse them of encouraging their suppliers in developing countries to run sweatshops and use child labor. To avoid such accusations, they required local suppliers to follow codes of conduct regarding product safety, labor standards, working environments, and child labor issues (Humphrey and Schmitz 2004). In Bangladesh, the garment industry has undertaken large investments in equipment in order to comply with these codes of conduct (e.g., Rahman 2005).

Still, wages are low in Bangladesh. As figure 1 shows, the real wage index, which was 100 in 1969–70, remained largely the same in the early 1980s. It rose slowly in the next 15 years to 140, and rapidly in the early 2000s. According to the Japan External Trade Organization's (JETRO 2009) com-

pilation of investment cost information, an ordinary factory worker in Dhaka is paid less than half the wage compared to her counterpart in the Philippines. The labor cost difference may partly explain why garment production has been rising in Bangladesh and declining in the Philippines. In Turkey, however, wages are much higher than in the Philippines, but garment production has been growing as rapidly as in Bangladesh. It is clear that labor cost is not the only determinant of the development of the garment industry.

III. Growth Mechanism

We agree completely with other authors that the Desh-Daewoo training kick-started the garment industry in Bangladesh. The thorough training of 130 experts formed a mass of specific human capital with high skills not only in production techniques but also in factory management, international procurement, and international marketing (Rhee 1990). For those with high levels of general human capital and abundant financial capital, the massive infusion of specific human capital meant that their production functions shifted upward substantially. According to our interview with one of the 130 Desh-Daewoo trainees, highly educated people and wealthy families in Bangladesh were not at all interested in the garment business or any kind of manufacturing in those days. However, looking at Desh's good start in exporting, some of them changed their minds and decided to supply their resources to the garment industry: that is, financial capital and high levels of general human capital.

Among those who had received good training, some had sufficient financial capital to establish their own garment factories, and others became garment traders or worked for other manufacturers as managers.[2] It is probable that traders worked with those manufacturers who started garment manufacturing without sufficient specific human capital. Traders' services would have been primarily related to but not limited to marketing. Traders who had received better training could provide a variety of valuable services to client manufacturers. With the help of traders, a large number of manufacturers were able to start production and export without wasting time on trial and error, which would otherwise have been needed to find their way into foreign markets. The collaboration with traders also reduced the risk of manufacturers' bankruptcy. As manufacturers acquired specific human capital, they would reduce their dependence on traders and increase direct transactions with foreign buyers. Traders would divert their resources away from such graduating manufacturers to newly established manufacturers.

[2] Those who received formal training abroad were highly educated because only trainees who were fluent in English were given such opportunities.

Easterly (2002, chap. 8) refers to Romer's (1986) model of endogenous economic growth to explain the two special attributes of knowledge: one is that knowledge leaks, and the other is that the same knowledge can be used repeatedly without causing rivalry. He uses the anecdote of the Bangladesh garment industry to illustrate how the nonrivalry and spillovers of knowledge as a production input lead to external increasing returns. In our view, transactions between traders and manufacturers are an important channel of knowledge spillovers, and external increasing returns arising from knowledge spillovers are strong where traders and manufacturers are agglomerated, because their proximity to each other in an agglomeration reduces transaction costs, thereby encouraging transactions, as the theoretical model developed by Becker and Murphy (1992) predicts.[3]

Turning to the growth of individual enterprises, a general observation is that a growing enterprise has increasingly complex flows of cash, credit, and debit, an increasing number of workers, and an increasing number of transacting partners. Thus, management matters to enterprise growth (Bloom and Van Reenen 2007). Moreover, the global garment chains keep pressure on local suppliers to shorten delivery time, improve quality, and reduce unit costs (Gereffi 1999; Schmitz and Knorringa 2000). Thus, enterprise growth will depend on the pace at which the enterprise learns advanced skills and know-how. When the enterprise is small, the entrepreneur can devote much time to learning. As the enterprise grows further, however, the entrepreneur needs to hire managers and experts and delegate authority to managers because time and capacity are limited (Aghion and Tirole 1997; Hart and Moore 2005). As a result, the enterprise's organizational learning no longer depends directly on the entrepreneur's learning ability but on his or her selection of managers and experts as well as the quality of his or her guidance to them. Whether it is the entrepreneur or their team that learns continuously, his or her general human capital should affect the learning speed, which should be an important determinant of the enterprise growth.

This industry seems to have grown rapidly for 3 decades through a virtuous circle involving continuous learning from abroad and active investment, which strengthen each other's positive effect. In our view, the creation of the virtuous circle was facilitated by the massive entry of wealthy and highly educated entrepreneurs to the industry, which followed the initial intensive technology transfer from Korea. Their general human capital would later help continuous

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[3] Agglomeration economies arising from industrial clusters are not limited to reduced transaction costs and knowledge spillovers. For example, Ruan and Zhang's (2009) case analyzes the virtuous circle involving new entry and the division of labor in a cashmere sweater cluster in China.

organizational learning of advanced knowledge of production, marketing, and management from abroad. Their wealth would help them put the knowledge into practice and expand production. If the initial technology transfer had been done on a smaller scale, it might not have boosted the profitability of the garment business enough to attract such persons to the industry. A question, however, arises as to whether the high education level of entrepreneurs matters really as we have discussed. Besides, we are interested in investigating whether our story about traders' roles in industrial development is true. To answer these questions, we conducted surveys of 100 knitwear producers and 40 traders in Dhaka and neighboring Narayanganj and Gazipur districts from December 2005 to March 2006.

IV. Data

We selected the sample enterprises randomly from the member lists of three associations: the Bangladesh Garment Manufacturers and Exporters Association (BGMEA), the Bangladesh Knitwear Manufacturers and Exporters Association (BKMEA), and the Bangladesh Garments Buyers Association (BGBA). Since we could not meet entrepreneurs at eight factories, our sample consists of 40 traders and 92 knitwear manufacturers. They provided us with recall information on the number of workers, production and costs, export revenues in 1998, 2000, 2002, 2004, and 2005, as well as information on their educational and occupational backgrounds.[4] For simplicity, we refer to the knitwear producers in the sample as manufacturers. Note that they do not represent woven garment manufacturers. By contrast, the traders in the sample were selected randomly regardless of their specialization, and most sample traders deal in both woven garments and knitwear. Of the 92 sample manufacturers, 37 produce sweaters and cardigans, while the remaining 55 produce polo shirts and T-shirts.

The sample entrepreneurs' background attributes are summarized in table 2. Both the traders and manufacturers went to school for 15 years on average, and about 60% of them went to school for 16 years or more.[5] These numbers are very high, compared with the education levels of entrepreneurs in the garment and other light manufacturing industries in east Asia reported by Sonobe and Otsuka (2006), Vietnam by Nam et al. (2009, 2010), and Ethiopia and Kenya by Sonobe et al. (2009, 2011). The high education level of entrepreneurs is characteristic of the Bangladeshi garment sector. Note, however, that the highly educated became interested in the garment business only after

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[4] Since every sample firm keeps records, the recall data on financial variables are accurate.
[5] In Bangladesh, it takes 16 years for a student to receive a specialized degree.

TABLE 2
MEANS OF ENTREPRENEURS' BACKGROUND ATTRIBUTES DATA

	Traders	Manufacturers
Number of sample entrepreneurs	40	92
Age (in 2005)	43.0	44.7
Years of schooling	15.2	15.0
Percentage of entrepreneurs with 16 years or more education	60.0	58.7
Years of prior experience in garment trading before starting the current business	4.0	3.8
Years of prior experience in garment production before starting the current business	2.1	3.6
Percentage of entrepreneurs who worked at a foreign venture before starting the current business	32.5	NA
Years of prior experience in other sectors before starting the current business	NA	2.0
Percentage of entrepreneurs who received formal training in garment business abroad	17.5	6.5
Years of operation of the current business	9.8	6.8

Note. "NA" indicates that data are not available. Few sample traders had worked in other sectors, and few sample manufacturers had worked at foreign ventures.

the Desh-Daewoo technology transfer. It is probably that comparably sizable technology transfers shifting production functions substantially upward rarely take place, and accordingly the highly educated are rarely attracted to the manufacturing sector in other developing countries.

By "years of prior experience in garment trading," which appears in the middle of table 2, we mean the number of years the entrepreneur engaged in the garment trading business, as a worker, manager, or unpaid family worker, prior to the establishment of his or her own garment business. Similarly, "prior experience in garment production" is the number of years the entrepreneur worked at a garment factory before starting his or her own garment business, and "prior experience in other sectors" is the number of years the entrepreneur worked in a nongarment sector. The second row from the bottom of table 2 shows the percentage of entrepreneurs who received formal training in Korea and other foreign countries.[6] We regard these entrepreneurs as the recipients of good prior training and distinguish them from the other sample entrepre-

[6] Three traders and two manufacturers in the sample received intensive training in South Korea and Singapore. Among them is one of the 130 Desh-Daewoo trainees. United Nations Development Programme provided support for the training of three sample manufacturers in Europe. Similarly, the Association for Overseas Technical Scholarship (AOTS) of Japan supported the training of a sample trader in Japan. Three other sample traders and one sample manufacturer received intensive training in China, Taiwan, and Sri Lanka at their own expense.

TABLE 3
MEANS OF THE TRADER DATA BY PERIOD OF ENTRY

	By 1994	1995–99	2000 and Onward
No. of traders in the sample	16	16	8
No. foreign trading houses	1	3	1
Number of workers:			
1998	16.0		
2002	22.6	17.0	
2005	27.6	20.2	20.2
Export earnings (million US$):			
1998	4.3		
2002	4.4	3.4	
2005	4.6	6.0	3.4
% traders hiring foreign experts:			
1998	31.3		
2002	37.5	18.8	
2005	43.8	18.8	12.5
Percentage of traders making samples:			
1998	68.7		
2002	81.3	62.5	
2005	81.3	87.5	37.5
Percentage of designs reengineered:			
1998	8.8		
2002	11.3	33.8	
2005	24.4	41.3	12.5
Percentage of traders who own a garment factory:			
1998	31.3		
2002	50.0	37.5	
2005	50.0	68.7	37.5

neurs below. The education levels of these entrepreneurs with good prior training tend to be higher than the sample average.[7]

Tables 3 and 4 present data on the size and activities of the trading and manufacturing enterprises, respectively. Since new entrants tend to be smaller in size than incumbent enterprises, it is difficult to see how rapidly enterprises grow if enterprises of very different ages are mixed. This is why these tables divide the sample enterprises into three cohorts: those established in 1994 or earlier, between 1995 and 1999, and between 2000 and 2005. These tables clearly indicate that the manufacturing enterprises have grown much faster than the trading enterprises.

Five traders in our sample are foreign-owned, as indicated in the second row of table 3.[8] None of the sample manufacturing enterprises are foreign ventures. With the small number of foreign ventures in our sample, the impacts

[7] Among the six such manufacturers, the lowest education level is 16 years of schooling, and the mean is 17.3 years.
[8] Their office headquarters are located in foreign countries, even though the heads of their Bangladesh offices are Bangladeshi except for one, who is Italian.

TABLE 4
MEANS OF THE MANUFACTURER DATA BY PERIOD OF ENTRY

	By 1994	1995–99	2000 and Onward
No. of producers in the sample	25	34	43
Number of workers:			
1998	734.0		
2002	1,287.0	677.6	
2005	1,662.4	1,306.3	939.7
Value added (million US$):			
1998	3.1		
2002	4.6	3.0	
2005	6.3	3.6	3.1
Percentage of export value handled by traders:			
1998	51.9		
2002	42.0	60.8	
2005	34.2	54.4	59.6
Percentage of manufacturers with an international certificate:			
1998	12.5		
2002	64.0	45.8	
2005	76.0	66.7	34.9
Percentage of manufacturers hiring foreign experts:			
1998	4.2		
2002	20.0	8.3	
2005	32.0	12.5	18.6

of foreign direct investment, if any, are impossible to analyze with our data. In the garment industry in Bangladesh, a long-run tendency is that foreign enterprises have been replaced by indigenous enterprises as service providers, manufacturers, and material suppliers (e.g., Quddus and Rashid 2000; Siddiqi 2005; Yamagata 2006). The proportion of trading houses that hire foreign experts in marketing is high among relatively long-established trading houses and low among newly established trading houses, which may be another indication of this industry's decreasing dependence on foreign human capital.

While all traders are engaged in international procurement, marketing, and merchandising, a limited number of traders provide high-valued services such as sample making and design reengineering. The sample-making service involves making counter samples on behalf of a manufacturer following the sample or specifications set by its buyer abroad. On inspecting counter samples submitted by local suppliers, the global buyer decides with whom to place the order. Traders provide this service because some manufacturers are incompetent or too busy to make a satisfactory counter sample. As shown in table 3, the majority of traders have equipment and staff for sample making. The design reengineering service involves modifying designs sent by global buyers to local suppliers, in order to make them more attractive to consumers or easier to produce in large quantities. When a manufacturer is allowed by the

global buyer to reengineer a design but cannot do so satisfactorily, he or she may ask a capable trader for help. Some traders reengineer some of the designs they handle. The average percentage of designs reengineered is shown in table 3.

Table 3 ends with the data on the entry of the traders into manufacturing. If the three cohorts are mixed, slightly more than half of the traders were engaged in garment manufacturing in 2005. According to our interviews with traders who owned factories, their products are exported through their own trading houses. Thus, if a trader starts operating a garment factory, his or her export sales revenue increases. The trading houses that were established between 1995 and 1999 had a high average of sales revenues in 2005 because as many as 68.7% of them had started manufacturing.

Turning to the manufacturing side, table 4 presents data on manufacturers' employment, value added, and dependence on traders. The dependence is measured in terms of the percentage of the value of products that the manufacturer exported not directly to foreign buyers but indirectly through local traders. This variable, which we call the export value handled by traders, went down over time within each cohort and is smaller among older cohorts. These observations lend support to our argument that the manufacturers reduce their dependence on traders as they learn skills and know-how that they did not have when they started production.

Global buyers that specialize in high-quality segments of the world garment market tend to prefer dealing directly with local manufacturers, rather than through traders. This is probably because direct transactions allow tight control of local manufacturers in terms of product quality, delivery time, and the codes of conduct. For local manufacturers, direct transactions with these demanding buyers involve large investments in equipment, buildings, and training workers but are profitable since only a limited number of local manufacturers in the world can satisfy these buyers' needs. According to our informants, an increasing number of manufacturers in Bangladesh are obtaining certificates from international auditing bodies such as the International Organization for Standardization (ISO), installing the latest machines, and tightening quality control by hiring foreign experts, in order to attract global buyers' attention. The data on international certificates and foreign expert employment shown in table 4 are consistent with such trends.

V. Regressions

In this section, we use regression models to summarize the data. We begin by characterizing the traders who provide higher valued services for manufacturers and who handle exports on a larger scale. The results are presented

in the first five columns of table 5. The dependent variable is the fraction of designs reengineered in columns 1 and 2, a binary response variable indicating whether the trader provides sample-making services in columns 3 and 4, and the logarithm of the export value of the trader in column 5. The regressors are the variables representing the trader's background attributes and year dummies. In columns 1, 3, and 5, linear regression models with random effects are employed. For each regression, the Hausman specification test statistic does not reject the hypothesis that the random- and fixed-effects model estimates do not differ systematically. In column 2, the two-limit Tobit model is used because the fraction of designs reengineered, the dependent variable, has positive probability mass at 0 and 1. In column 4, a probit model is used because of the binary response nature of the dependent variable. Throughout tables 5 and 6, the t- and z-statistics reported are obtained by using the standard errors that allow for intragroup correlation.

The estimates shown in columns 1 and 2 of table 5 indicate that the traders who received formal training, those who worked at foreign ventures before assuming their current positions, and those who operated garment-trading houses for longer periods tend to reengineer designs more often than other traders. This service is also provided by foreign-owned trading houses relatively often. From columns 3 and 4, it is seen that formally trained traders with long experience in operating a trading house are more likely to provide sample-making services. Unlike the provision of design reengineering services, however, the provision of sample-making services is not associated with the entrepreneur's experience in working at a foreign venture and the foreign ownership of the trading house. This is probably why design reengineering services are provided by a smaller number of traders than sample-making services.

In column 5, the dependent variable is the logarithm of the value of export handled by the trader. It is expected that the traders providing high-valued services tend to achieve high export value. Indeed, three of the four variables associated closely with the high-valued service provision have positive and significant coefficients in the export value equation. Moreover, experience in garment marketing and production prior to becoming an entrepreneur is far less important for both the provision of high-valued service and export value. The year dummies have no significant coefficients in column 5, which indicates that the traders' average export value did not grow during the period under study.

In columns 6 and 7, the dependent variable is the fraction of the manufacturer's export value handled by traders, which measures the extent of the dependence of the manufacturer on traders. A linear regression model is used

TABLE 5
SYMBIOTIC RELATIONSHIP BETWEEN TRADERS AND MANUFACTURERS

	Traders' Service Provision and Export Value					Manufacturers' Dependence on Traders	
	Fraction of Designs Reengineered		Sample Making		ln (Export Value)	Fraction of Manufacturer's Export Value Handled by Traders	
	RE (1)	Tobit (2)	RE (3)	Probit (4)	RE (5)	RE (6)	Tobit (7)
Years of schooling	−.004 (−.21)	−.03 (−.46)	.03 (.66)	.05 (.34)	.05 (.35)	−.07*** (−3.41)	−.16*** (−2.99)
Prior formal training	.28*** (2.76)	.59** (2.58)	.40** (2.39)	1.58* (1.75)	.72** (1.98)	−.08 (−.60)	−.17 (−.50)
Age	−.01 (−1.50)	−.02 (−1.16)	−.01 (−.46)	−.04 (−.87)	−.05 (−1.36)	−.004 (−1.01)	−.01 (−.49)
Years of prior experience in garment marketing	−.01 (−.98)	.02 (.56)	−.0002 (−.01)	.03 (.45)	.04 (.77)	−.004 (−.74)	−.01 (−.81)
Years of prior experience in garment production	−.02 (−1.60)	−.01 (−.33)	−.02 (−1.08)	−.07 (−1.03)	.03 (.85)	−.004 (−.59)	.001 (.07)
Experienced in working at a foreign venture	.16*** (2.62)	.41** (2.40)	−.17 (−1.23)	−.65 (−1.40)	.24 (.70)		
Years of prior experience in other sector						.004 (.54)	.01 (.48)
Years of operation	.01*** (2.58)	.04* (1.82)	.04*** (3.14)	.13*** (2.74)	.15*** (3.34)	−.03*** (−3.91)	−.06*** (−2.83)

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	1	2	3	4	5	6	7
Foreign-owned firm	.79***	1.67***	.12	.59	1.07***		
	(12.33)	(6.35)	(.83)	(1.04)	(2.77)		
Producing sweater						−.28***	−.67***
						(−3.83)	(−4.01)
Year 2000 dummy	.01	−.03	−.03	−.01	−.03	.06	.15
	(.79)	(−.67)	(−.40)	(−.06)	(−.15)	(1.43)	(1.37)
Year 2002 dummy	.02	−.02	−.08	−.18	−.02	.08	.14
	(.81)	(−.22)	(−.74)	(−.56)	(−.08)	(1.50)	(1.09)
Year 2004 dummy	.05	.04	−.07	−.19	.06	.05	.13
	(1.18)	(.30)	(−.49)	(−.46)	(.16)	(.73)	(.93)
Year 2005 dummy	.09*	.14	.0003	.07	.13	.04	.12
	(1.66)	(.93)	(.00)	(.16)	(.31)	(.52)	(.78)
Constant	.23	.19	.26	.52	14.2***	1.90***	3.45***
	(.76)	(.22)	(.29)	(.19)	(6.03)	(6.10)	(4.17)
Number of observations	176	176	176	176	176	341	341
Left-censored		107					114
Right-censored		19					83
Hausman test χ^2	3.48		2.43		6.80		
p-value	.63		.79		.24		

Note. Cols. 1, 3, 5, and 6 report the random-effects (RE) model estimates. Export value is measured in terms of current US dollars. Numbers in parentheses are z- or t-statistics based on standard errors that allow for intragroup correlation.

* Significant at the 10% level.

** Significant at the 5% level.

*** Significant at the 1% level.

TABLE 6
PERFORMANCE AND CHARACTERISTICS OF MANUFACTURERS

	RE			OLS	
	ln (Value Added) (1)	ln (Current Number of Workers) (2)	International Certificate (3)	ln (Value Added in 2005) (4)	ln (Initial Number of Workers) (5)
Years of schooling	.15** (2.07)	.07** (2.02)	.08*** (5.09)	.19*** (3.75)	.02 (.38)
Prior formal training dummy	.10 (.27)	−.21 (−.96)	.26*** (2.86)	−.53 (−1.15)	.03 (.09)
Age	−.001 (−.09)	−.01 (−1.28)	−.01* (−1.72)	−.01 (−1.04)	.01 (.88)
Years of prior experience in garment marketing	.03** (2.14)	.02** (2.03)	.01* (1.67)	.01 (.64)	.034** (2.00)
Years of prior experience in garment production	.06*** (2.92)	.05*** (3.42)	.011* (1.71)	.04** (2.04)	.04** (2.08)
Years of prior experience in other sectors	.03* (1.65)	.03*** (3.12)	.014* (1.81)	.03* (1.84)	.01 (1.07)
Years of operation	.11*** (5.11)	.09*** (6.22)	.03*** (3.13)	.04 (1.36)	−.06** (−2.43)
Producing sweater	.76*** (3.02)	1.16*** (8.46)	.17* (1.93)	.57** (2.59)	.79*** (4.24)

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	(1)	(2)	(3)	(4)
Year 2000 dummy	−.19** (−1.99)	.05 (.76)		.12** (2.19)
Year 2002 dummy	−.13 (−.85)	.15* (1.75)		.39*** (5.79)
Year 2004 dummy	.03 (.17)	.26** (2.53)		.48*** (6.91)
Year 2005 dummy	.29 (1.59)	.42*** (3.49)		.47*** (6.15)
ln (value added in 2000)			.49*** (5.63)	
Constant	10.9*** (9.09)	4.41*** (7.86)	11.82*** (13.72)	4.47*** (6.78)
Number of observations	341	341	53	92
R^2			.69	.37
Hausman test χ^2	1.39	5.27		
p-value	.96	.50		

Note. Value added is measured in terms of current US dollars. Numbers in parentheses are *t*-statistics based on standard errors that allow for intragroup correlation.

* Significant at the 10% level.
** Significant at the 5% level.
*** Significant at the 1% level.

in column 6, whereas the two-limit Tobit model is employed in column 7 because of the probability mass at 0 and 1. These columns share the same qualitative results. Three variables have highly significant coefficients. The education level of the manufacturer is negatively associated with the depen- dence on traders. A possible explanation is that highly educated manufacturers can learn international marketing relatively quickly. The education level of an entrepreneur, however, may represent something other than his or her ability to learn. We will return to this point later. As we expected, the years of operation have a negative and highly significant coefficient, indicating that manufacturers reduce their dependence on traders as they mature. Another variable with a significant coefficient is the sweater production dummy. A reason why sweater producers depend less on traders seems to lie in the fact that sweaters are more fashionable items and, hence, sweater buyers tend to press their suppliers hard for quicker delivery and higher level quality control. Additional information on this result will be offered shortly.

Based on the estimates presented in table 5, the nature of the symbiotic relation between traders and manufacturers may be described as follows. Clients of traders tend to be newly established and less educated manufacturers. Traders with better training and experience provide clients with higher valued services and handle exports on a larger scale. Since the dependence of a manufacturer on traders declines as the manufacturer matures, the average operation size of traders has remained unchanged, even though the total export value of the industry has grown fast. In this way, traders have contributed to the prolif- eration of manufacturers.

Table 6 reports the regression results concerning the association between the manufacturers' performance and their background attributes. The first three columns present the random-effects model estimates, which are not systematically different from the fixed-effect model estimates according to the results of the Hausman test. In columns 1 and 2, the dependent variables are the logarithm of the value added and that of the number of workers. Since both are measures of enterprise size, it is little wonder that the two columns share similar qualitative results. Enterprise size is closely associated with the education level, prior experiences in garment marketing and production, and experience as an entrepreneur.

The coefficient of the sweater dummy is positive and highly significant in both columns 1 and 2.[9] It is larger in column 2, which indicates that sweater production is more labor intensive than T-shirt and polo shirt production.

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[9] We ran regressions separately for these two types of producers and found that the coefficients are similar so that the data can be pooled.

Since Bangladesh is a labor-abundant country, it has a stronger comparative advantage in sweater production. Indeed, the sweater sector has recently been growing faster than the other knitwear sector in Bangladesh. Such a comparative advantage has materialized only recently, probably because of the difficulty in sweater production for export markets. The difficulty arises at least partly from the fact that sweaters are a fashionable item, which is associated with higher levels of quality control. Consistently, the producers of sweaters are more likely to have obtained international certificates, as shown in column 3 of table 6, to signal that they are able to satisfy customers' needs, and as we have already seen in table 5, the sweater producers are more likely to export directly to global buyers.

The coefficients on the year dummies in columns 1 and 2 indicate that while the average enterprise size did not grow in terms of value added during the period under study, it grew rapidly in terms of employment. In other words, their employment expansion was not accompanied by labor productivity improvement. Presumably, the employment expansion was a response to the recent tendency among global buyers to focus on local suppliers with large production capacity.

As shown in column 3, a manufacturer's acquisition of an international certificate is closely associated with his or her education level, prior formal training, and experience as an entrepreneur.[10] It is also associated, albeit less closely, with his or her age, prior experience in garment marketing and production as well as in other sectors, and product type. Thus, columns 1–3 indicate that large manufacturers tend to obtain international certificates. Note, however, that the prior formal training dummy has a positive and highly significant coefficient in column 3, whereas its coefficient is negligible in columns 1 and 2. These results suggest that the manufacturers who received good training tend to target quality-conscious buyers rather than volume-conscious buyers. The positive, significant, and increasing coefficients on the year dummies in column 3 indicate that the number of manufacturers with international certificates increased rapidly during the period under study.

Column 4 presents the estimate of a growth regression, which includes a lagged dependent variable, that is, the logarithm of the value added in 2000, on the right-hand side. An interesting result is that the entrepreneur's education level has a highly significant coefficient. Another is the positive and significant association between growth and prior experience in garment production. Since no sample manufacturer used to work as a garment factory

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[10] Although not shown in the table, the probit estimation produced qualitatively the same results as shown in col. 3.

worker, the manufacturers with prior experience in garment production gained the experience at factories owned by their family members or relatives. In other words, they are from wealthy families.[11] Thus, it is likely that the association between these experience variables and enterprise growth reflects the financial ability of the entrepreneur's family to finance enterprise expansion.

In a similar vein, one may question whether the association between high education and high growth is attributed to financial ability rather than the learning ability of highly educated manufacturers. To answer this question, the employment size in the first year of the manufacturer's operation is regressed on his or her background attributes in column 5. If highly educated entrepreneurs are from wealthy families, their enterprises would be large from the beginning. The years of schooling, however, have an insignificant coefficient, whereas the years of prior experience in garment production and marketing have positive and significant coefficients. These results shown in columns 4 and 5 suggest that highly educated manufacturers tend to achieve rapid enterprise growth primarily because of their high learning ability.

VI. Conclusions

This article has examined the successful development process of the Bangladesh garment industry and explored the keys to its success by using primary data on the garment manufacturers, trading houses, and the entrepreneurs operating these enterprises. A characteristic of this industry is the high average education level of entrepreneurs. The results of our regression analyses indicate that the high education of manufacturers and enterprise performance are closely associated. Presumably, this is because manufacturers have to upgrade their skills and know-how continuously in order to survive the intense competition in the world garment market and because the high levels of the general human capital of the entrepreneur are needed to manage an increasing number of managers and experts. The entrepreneurs' high education level is likely to be a major reason why this industry has continued to grow for the last 3 decades.

Three decades ago, university graduates seldom entered manufacturing business. A complete change in their mentality regarding occupational choice was brought about by the sharp rise in profitability in the garment sector due to the massive technology transfer from Korea. The garment workers who had acquired high levels of skills and know-how but could not afford to start their own factories started trading houses and helped those new manufacturers who lacked adequate marketing skills. The regression results indicate that even in

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[11] This argument does not apply to traders, since the traders with prior experience in garment production or marketing are mostly ex-workers of garment factories or trading houses.

the recent years, the traders who received formal training abroad have provided higher valued services for manufacturers and contributed more to the proliferation of manufacturers. We have also found that foreign-owned trading houses perform better than indigenous trading houses, which suggests that there still exist skills and know-how to be learned from foreign countries. Thus, technology transfer seems to be a long-term process, and its effect also seems to last over the long term. The findings of this article strongly support the proposition that sizable technology transfers, which include marketing, procurement, and management as well as production technologies, are critically important for the promotion of industrial development in developing countries.

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