

The Role of the Buyer in the Upgrading of Rural Enterprises in Thailand: Lessons from 13 Silk-Weaving Enterprises in Pak Thong Chai District, Nakhon Rachasima Province

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Abstract

This paper asks what role the buyer plays in the upgrading of rural-based enterprises. To answer this question, I took 13 silk-weaving enterprises in Pak Thong Chi District of Nakhonrachasima Province, Thailand as a case study and examined the role of one large buyer called Jim Thompson. In-depth interviews with the managers of 13 silk-weaving enterprises who were former subcontractors of Jim Thompson revealed that Jim Thompson played an important role in upgrading these enterprises. After these 13 enterprises became subcontractors of Jim Thompson, they were able to upgrade their products and production processes. In order to ensure a sufficient supply of quality products, Jim Thompson established mechanisms which helped its subcontractors to enhance their production capacity. These mechanisms included co-working, regular visits, and provision of detailed feedback and guidelines.

Introduction

In Thailand, rural industry has been regarded as an alternative to tackle such rural economic problems as unemployment, poverty, rural-urban inequality, and out-migration. Starting from the Third National Economic and Social Development Plan (1972–1976), policies have been directed toward industrial decentralization and rural industrial development mainly by providing incentives for firms locating in peripheral areas and launching several packages to improve productivity of rural firms (Panpiemrus 1988; Walton 1996). However, after several decades of implementation, such policies have proved to be unsuccessful. Some studies show that industries still concentrate around Bangkok and its vicinities and a few provinces along the eastern coast (Poapongsakorn, 1995; Kittiprapas 1999). Moreover, although case-studies have confirmed the importance of rural industry in terms of employment and income generation, they cast some doubt on the potential of rural industry to enjoy long-term growth and productivity improvement due to the fact that Thai rural industries in general still lack advanced knowledge, technologies, and efficient organization (Romijn 1987; Parnwell and Khamanarong 1990).

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This paper aims to explore the factors that contribute to rural industrial upgrading. It takes silk-weaving enterprises in Pak Thong Chai (hereafter, PTC), a District in Nakhon Rachasima Province (hereafter NR), Thailand as a case study. The silk-weaving industry in PTC can be considered as a good example of how rural-based traditional enterprises can successfully upgrade, despite their limited access to new knowledge and technologies. According to one research, in the 1960s, PTC's silk production system was not different from other areas in the Northeast: producers relied on traditional technologies and produced small pieces of cloth for their own consumption or for trading within the community. A modern industrial system had not yet been established at that time (Samuthakub et al. 1994: 25–27). However, now PTC is well-recognized as the center of silk-woven fabrics. In 2006, of 187 silk-weaving enterprises in NR, 147 were located in PTC and in 2007 the value of PTC's silk-woven products was 2,934.2 million baht, accounting for about 18% of gross provincial manufacturing product of NR (16,136 million baht) (DCD 2008).

In the context of Thai rural industrial development, I argue that we need to find a case where rural enterprises have grown beyond traditional or seasonal non-farm enterprises, and then draw lessons from their successful experience. This paper, therefore, aims to broaden our understanding of Thai rural industry and provide pointers for its development by analyzing PTC silk-weaving enterprises.

Before moving to a case study, it is important to review three bodies of literature which provide a rich evidence of how rural industry can grow and upgrade. First, literature on *rural industrial organization* (Hayami 1998; Itoh and Tanimoto 1998; Ono and Kikuchi 1998) shows how important the putting-out system is in the process of rural industrialization. Based on the experience of East Asian countries, this body of literature argues that in a situation where technology and production activities are divisible, factor market dualism is prevalent, risk-minimising mechanisms are effective, or government policies are conducive to promoting market competition, then the urban-based and modern enterprises tend to contract out works to rural enterprises in order to mobilize a cheap and skilled labour force. These conditions also support the development of labour-intensive and small-scale rural enterprises. Though providing an insightful idea on rural industrial growth, this literature does have a notable drawback: it claims that, through putting-out arrangements, local resources (e.g. cheap skilled labour) will be optimally maximized, but does not discuss the particular types of upgrading that occur after a putting-out arrangement has been established.

Second, the *industrial cluster (IC)* literature provides a useful concept of *collective efficiency* for the analysis of industrial development. Based on this concept, IC scholars maintain that by geographical and sectoral agglomeration, firms can enjoy external economies in terms of availability of specialized suppliers, skilled workers, and knowledge spill-over (Schmitz and Nadvi 1999). Moreover, when firms are concentrated in a particular location, it increases the possibility that they will cooperate and thus enhances mutual learning, information sharing, and collective problem solving which are conducive

for upgrading (Knorringa, 1999; Nadvi, 1999). With some references on the rural traditional industrial sector, IC scholars (Sandee and Rietveld 2001: 150) argue that 'through collaboration, clustering allows small-scale enterprises to grow in riskable steps by sharing costs and risks'. Similarly, Barkley and Henry (1997) illustrate how clustering can help rural firms strengthen their networks, encourage industrial reorganization, and enhance efficient use of public resources. The drawback of the IC theory lies in the fact that the interactions of firms are not merely limited in a particular location, rather, firms exist in many environments and interact with various actors outside the cluster. Learning and upgrading, therefore, not only occur within the cluster but also from interactions with distant actors (e.g. buyers and customers) (Okada 2007)

Finally the *global value chain* (GVC) literature argues that local enterprises can upgrade through integrating into a value chain and establishing business relationships with large buyers (Humphrey Schmitz 2002: 12; Schmitz and Knorringa 2000). According to GVC scholars, when large firms begin to concentrate on higher value-added functions and leave less profitable activities to small firms in developing countries, they face serious problems in ensuring sufficient supplies of high-quality products. Instead of sourcing from arm-length markets, they establish business relationships with small producers. However, to ensure that suppliers can meet their demands, they help to upgrade the production capacities of their suppliers, and through the so-called 'learning-from-buyer' process, suppliers can upgrade products, production processes, or can even move to higher value-added functions (Tokatli 2007; Gereffi and Memedovic 2003). Although the GVC literature has attracted much interest from development scholars recently, the scope of these studies seems to be limited to the export sectors where global buyers play a very important role in managing the production networks. In particular, less attention is particularly paid on the rural-based industrial sector. In this paper, I select PTC silk-waving enterprises for investigation due to the fact that PTC District not only contain many small silk-weaving enterprises, but it is also the location of a silk firm called Jim Thompson (hereafter JT), which is the largest silk firm in Thailand and is the only firm that fully integrates the whole processes of silk production, from sericulture to garment making. In 2006, JT exported 453 million baht (Manager 2007) or about 75.7% of Thailand's export of silk-woven products in that year (598.69 million baht). The subcontracting relationship between JT and its 13 former subcontractors is the subject for investigation for this paper, which asks, 'What role does the buyer play in the upgrading of rural-based enterprises?'

The paper is organized as follows. Section 2 describes the data collection and analytical methods. Section 3 discusses the concept of upgrading and how it is used in this paper. Section 4 illustrates the historical context relevant to the case study. Sections 5 and 6 examine the nature of the upgrading after the setting up of the subcontracting arrangement and the mechanisms that are relevant for upgrading, respectively. Section 7 compares JT's former subcontractors with those enterprises that were never involved in such a subcontracting arrangement in terms of economic performance. The

conclusion is given in Section 8.

2. Methods and materials

This paper is based on two rounds of fieldwork. The first fieldwork was conducted during August and September 2007, using in-depth interviews with 40 silk-weaving enterprises randomly selected from a list of members of Pak Thong Chai Silk Association and with JT's personnel manager and technicians. The second fieldwork was conducted during August and September, 2008 by re-interviewing the same 40 enterprises and JT's personnel manager and technicians. Due to the fact that data were not systematically recorded by rural entrepreneurs, the data used in this paper are based mainly on the recollections of current owners or managers of sample enterprises. The data can be further divided into two types: first, qualitative and descriptive data about an enterprise's development since it was established; second, data about current characteristics and performance of sample enterprises which are quantitative and used for statistical analysis.

I analyze the data in two ways. First, 40 sample enterprises are divided into two groups: JT's former subcontractors (13) and enterprises which are not JT's former subcontractors (27). The dynamics of 13 JT's former subcontractors are discussed in terms of technology, work organization, products, and performance to see how these variables have changed after they became JT's subcontractors. Throughout this paper, I use the code JTFS to denote the term JT's former subcontractors and use the code SE-(1, 2, ..., 13) to denote each of 13 JT's former subcontractors, as it is a simple way of making reference. Second, in order to check whether the subcontracting arrangement with JT was significant for upgrading, I compare the characteristics and performance of the 13 JT's former subcontractors (hereafter, JTFS) and 27 enterprises which were never involved in JT's subcontracting arrangement (called non-JTFS). The independent T-test and non-parametric Mann-Whitney test (M-W test) are used to test whether the differences which exist between these two groups are statistically significant.

3. The concept of upgrading

This paper follows the concept of upgrading used in GVC literature. According to Humphrey and Schmitz (2002: 12–13), upgrading can take four forms:

1. Process upgrading: Transforming inputs into outputs more efficiently by reorganizing the production system or introducing superior technology;
2. Product upgrading: Moving into more sophisticated product lines;
3. Functional upgrading: Acquiring new functions to increase the overall skill content of activities such as design or marketing;

4. Inter-sectoral upgrading: Moving into new productive activities.

This paper specifically focuses on process and product upgrading. It does not discuss functional and inter-sectoral upgrading because these types of upgrading usually take place after a firm has succeeded process and product upgrading already. For rural-based small enterprises which use traditional production methods and produce low-quality products, it is very difficult to expect functional and inter-sectoral upgrading. Therefore, to investigate the upgrading of rural silk-weaving enterprises, I only take process and product upgrading as points for discussion.

In this paper, process upgrading refers to the improvement of production methods and machines/tools by: first, replacing traditional machines or tools by the superior ones; second, improving methods of production as well as quality control (QC) in order to increase both quantity and quality of products; and third, reorganizing the production system for better supervision and control. Product upgrading is identified as the improvement in patterns and designs of products, making them more sophisticated, or diversifying the range of product.

4. A brief history of silk production in Nakhon Rachasima (NR) Province

It can be said that the history of silk industry development of NR began in the 1900s (Kasikosol 1998). Between 1901 and 1912, King Chulalongkorn (Rama V) made an effort to upgrade the rural silk industry by hiring a team of Japanese experts to supervise a range of silk production activities, from mulberry growing, silkworm rearing, yarn reeling, to silk weaving. The aim was to transfer Japanese silk production technologies to Thai officials and farmers.¹ Between 1901 and 1907, there were 18 Japanese silk experts who served as supervisors for technology transfer. In order to facilitate such technology transfer, the government established supporting institutions, namely the Department of Silk Technology and the Silk Technical School in Bangkok.

The government selected NR as a center for disseminating new technologies to other areas in the Northeast region. In 1904, it established the Division of Silk Technology (DST) in NR. The government also imported yarn reeling and weaving machines and related equipments from Japan and installed them in the DST. During 1904–1912, the DST provided several training courses related to sericulture, yarn reeling, and weaving to rural people who wanted to learn new technologies. By 1909, 1,258 people had attended such training courses. These people were expected to spread new technologies throughout NR (Kasikosol 1998: 64).

However, after having been implemented for more than 10 years, the government came to think that rural silk development project had not been as successful as expected. The cost of running the project exceeded revenue for every year between 1901 and 1912. By 1912, the government had totally spent 1,235,169 baht but received only 74,672 baht from selling silk yarn, fabrics, and cloths (Kasikosol 1998: 85). More importantly, rural residents were still reluctant to learn new methods. The

number of people who attended the training courses was much less than government had expected. Therefore, in 1912, the government decided to abandon the whole project (Kasikosol 1998: 84–86).

There is no report to examine to what extent the twelve-year project helped upgrade rural silk industry; but according to some studies (DAE 1965; Samuthakub 1994; Kasikosol 1998), after 1912, the rural silk industry in NR (as in the rest of the country) was no more than a cottage industry in which rural households engaged in silk production seasonally as an off-farm activity for household consumption or for small trade with their neighbours. The labor force survey of Thai population in 1915 showed that out of labor force of 56,517 in NR, there were 29,614 (52.4%) persons engaged in weaving (Kasikosol 1998: 107). However, the production of silk-woven fabrics and cloths was done mainly in the individual household by applying traditional methods inherited from their ancestors (Kasikosol 1998: 121). Before the 1960s, silk-weaving industry in PTC was not different from the whole NR province (note that PTC is a district in NR Province) (see Samuthakub et al. 1994: 25–26). This indicates that the efforts made by the government failed to transfer Japanese silk technologies to rural areas. The situation did not change until the 1960s, at which time the upgrading of products and production processes took place at some PTC silk-weaving enterprises. The following section will discuss how such upgrading took place.

5. Upgrading in PTC's rural silk-weaving industry due to subcontracting relations

From my fieldwork, I found that the silk-weaving industry in PTC started to change in the late 1960s when a group of PTC enterprises established subcontracting relationships with JT. The following subsections discuss, respectively, how JT established subcontracting relationship with PTC enterprises and what elements of upgrading took place after such relationship was established.

5.1 The establishment of subcontracting relationship between JT and PTC producers

JT was established in 1948. Until 1982, JT did not have its own production site, but just focused on design, quality control, and marketing. Between 1948 and 1965, JT purchased all silk fabrics from home-based weavers in a small community in Bangkok called Ban Krua community. But once JT had successfully established itself in the silk textile market, it needed to produce more sophisticated products on a larger scale to respond to increasing market demands. Ban Krua community alone was no longer capable of responding to such needs.² JT had to look for more suppliers and it thus chose PTC producers.

JT chose PTC producers despite their lack of advanced production technologies for some reasons. First, after surveying several areas, JT found that silk production in PTC was undertaken on a larger scale than in any other areas. As skilled weavers were highly concentrated in this district, it would not

be difficult for JT to find a sufficient number of suppliers.³ Second, silk production was more commercialized in PTC than in other areas. In PTC, there existed some local entrepreneurs who coordinated production processes under a putting-out arrangement and sold their products in both local and distant markets (e.g. Bangkok). JT considered these entrepreneurs as potential suppliers.⁴

In fact, JT did not have many choices in selecting subcontractors because the silk-weaving industry in Thailand at that time was underdeveloped and unorganized. Rural people only took silk production seasonally as their off-farm activity. It was thus difficult to expect a year-round supply of products.⁵ PTC was the only place where silk production was more concentrated and organized than other areas. Before subcontracting relations were established, JT sold its business ideas to PTC entrepreneurs. This led to an agreement between JT and PTC entrepreneurs that JT would concentrate on product development and marketing and PTC entrepreneurs must do according to JT's advices and helps.⁶ At first, there were 10 PTC entrepreneurs who established subcontracting relationships with JT. The number of subcontractors increased as JT market expanded. In 1987, the number of subcontractors was at peak (27) before it started to decline after that (Table 1).

It should be noted that the nature of subcontract between JT and its 13 subcontractors is different from that used widely in modern industrial organizations which rely more on a written contract for lawful enforcement. The subcontracting arrangement between JT and 13 subcontractors was not based on official contract; rather, it was based on a set of purchasing orders. The conditions (e.g. delivery time and characteristics of fabrics) might vary from order to order, but normally a new purchasing order would be continued after a previous order had been completed. For example, JT might put an order of 10,000 meters of a particular design of silk-woven fabric to one subcontractor

Table 1 Trend in JT's performance and its relations with subcontractors

	Year											
	1967	1977	1982	1986	1987	1992	1997	1998	2002	2004	2006	2008
<u>Performance indicators</u>												
1.Sales ¹	31.2	n.a.	n.a.	455	n.a.	n.a.	n.a.	1,450	n.a.	2,340	2,604	n.a.
2.Output ²	n.a.	n.a.	631	n.a.	818	1,549	1,156	n.a.	1,123	n.a.	n.a.	904
3.Number of technicians	n.a.	3	3	n.a.	7	11	17	n.a.	18	n.a.	n.a.	18
4.Labor ³	n.a.	n.a.	150	n.a.	300	700	1,000	n.a.	1,700	n.a.	n.a.	2,000
<u>Relation with subcontractors</u>												
5.Output from sub. ⁴	n.a.	n.a.	600	n.a.	720	800	267	n.a.	187	n.a.	n.a.	30
6.Output from sub.(%) ⁵	100	100	95	n.a.	88	51.7	30	n.a.	20	n.a.	n.a.	3.3
7.Number of sub. ⁶	10	17	17	n.a.	27	17	10	n.a.	2	2	1	1

Source: Author's interviews, except data on sales which is from Bunditkul (2005).

Note: (1) Numbers 1=Annual sales in million baht; 2=Total hand-woven silk fabrics in thousand yards per year; 3=Number of persons employed in silk fabric production processes; 4=Silk fabrics from subcontractors in thousand yards per year; 5=Proportion of hand-woven silk fabrics sourced from subcontractors as percentage of JT's hand-woven silk fabrics; and 6=Number of subcontractor enterprises. (2) In 2008, data are up to the end of August.

and ask that subcontractor to deliver 2,000 meters every month. After this order was fulfilled, the new order would immediately come with new designs and new conditions (SE-7). This kind of practice and persist without written contracts and lawful enforcement. The duration that JT promised to buy products varied from 15 years (in the case of SE-4 and SE-9) to 38 years (SE-7). The average of 13 JTFS that I interviewed is 22 years.

Although JT established its own factory in 1982, subcontractors still played important roles as the main suppliers of silk-woven fabrics. From Table 1, the proportion of hand-woven silk fabrics that JT sourced from subcontractors was 100% before 1982, and still occupied a major part until 1992. This indicates that JT depended on subcontractors for products, while subcontractors depended on JT in terms of marketing, product development, and better production methods.

In terms of performance, JT enjoyed constant growth since it was established. Sales grew from less than 31.2 million baht in 1967 to 2,604 million baht in 2006 (211.4% annually). The number of persons employed in silk fabric production processes constantly increased from 150 in 1982 to 2,000 in 2008 (47% annually). Output (hand-woven silk fabrics) increased from 631,000 yards in 1982 to 1,123,000 yards in 2002 (3.9% annually). By the end of August 2008, JT already produced 904,000 yards, which accounts for 80.5% of the whole-year output in 2002. Additionally, the number of technicians also increased from three in 1982 to 18 in 2008.

Table 1 also shows that JT's output sourced from subcontractors have constantly declined in both absolute and relative terms since 1992. Such a decline is due to two important factors. First, the demand for JT's products in both domestic and export markets rapidly dropped between 1993-94 because of two events: the political riot in Thailand in 1992 and slack demand in foreign markets following the first Gulf War.⁷ JT had to stop some production lines and stop purchasing from subcontractors. Some subcontractors had gone bankrupt. When JT recovered from recession after 1995, many subcontractors already produced for other buyers and, though they received orders from JT again, they learnt not to depend too much on any single buyer. Second, after getting involved in JT's subcontracting arrangement for many years, subcontractors became potential competitors for JT in many product lines. In the period between 1982 and 1992, which is said by all 13 JTFS to be the boom period for PTC's silk-weaving industry, there were many buyers seeking business relations with them. Consequently, JTFS started to produce for other buyers, although all of them claimed that they produce for JT the most. Out of 13 JTFS, five started to export through export agents and eight established retail stores in the tourist market places. As a result, JT stopped outsourcing new and sophisticated product designs and stopped providing further knowledge and technologies to these subcontractors due to the fear of losing its competitiveness. Products that were outsourced were only those outsourced before. However, even though in the recent years the long-term subcontracting relation has almost ended, almost three decades of such relation had brought about upgrading in products and production processes, which are discussed below.

5.2 Elements of upgrading

This section shows that after the sample 13 enterprises started their business with JT, the upgrading took place in terms of: first, the acquisition of new machine/tools; second, change in the organizational form of work; third, change in product designs and patterns; and finally, improvement in methods related to yarn-dyeing, weaving, and job-checking.

(a) Acquisition of new machine/tools

On becoming subcontractors of JT, 13 sample enterprises faced new demands from JT: first, they had to produce a larger volume of fabrics within a specified period; second, they needed to produce a longer piece of fabric with the same characteristics (e.g. same colour, pattern, and texture). It was necessary to replace the traditional handlooms, which were widely used before 1967, with the superior machines/tools. JT introduced the so-called flying-shuttle looms to its subcontractors for the following reasons: first, the flying-shuttle loom is smaller than the traditional one, which made it easier for subcontractors to increase the number of looms in a limited space of the workshop; second, the flying-shuttle loom has a capacity to weave longer fabrics than the traditional one, which made it easier to control for constant characteristics along a piece of fabric. Third, the flying-shuttle loom has the capacity to weave faster than the traditional one. The capacity of the flying-shuttle loom to weave silk fabrics is as fast as 100–120 wefts per minute, which mean that it can weave 2–3 yards of fabrics in one hour, while the traditional loom take about one hour to weave one yard.⁸ Therefore the capacity of new weaving machine is about two or three times higher than the traditional one.

Aside from the flying-shuttle loom, JT also introduced spinning machines to its subcontractors. Before 1967, subcontractors used hand-spinning tools to perform this job, but when more purchasing orders from JT came, silk yarns had to be spun into beams more quickly than before. This made hand spinning no longer appropriate. The spinning machine is more advantageous than the hand-spinning tool in that; firstly, it can spin much faster than the latter, as it uses a motor, and secondly, it can spin silk yarns into several beams at the same time, while hand-spinning machine can only do it one by one. In fact, motor-spinning machine can spin as many as 80 beams of silk yarn simultaneously and take only one minute to finish the job, while hand-spinning is limited to one beam per minute. Therefore, the new machine is about 80 times faster than the traditional one.⁹

JT's technicians played important roles in transferring the new technologies to subcontractors. First, they brought these machines from Bangkok and demonstrated how to operate them. Second, they helped install these machines in subcontractors' workplaces and trained subcontractors how to operate them.¹⁰ Although JT did not provide credit to buy new machines for these 13 subcontractors, all of them similarly said that they were willing to install new machines after they observed that the capacity of the new machines was much higher than the traditional ones. More importantly, because JT guaranteed to buy all outputs, subcontractors found it cost-effective to install new machines. For example, the owner of SE-1 mentioned that around the late 1960s her enterprise invested around

100,000 baht to buy new machines, but this investment was covered within one or two years by JT's purchases of her products.

(b) Change in the organization of work

Before entering JT's subcontracting arrangement, 13 JTFS relied on putting-out system. They carried out only bleaching and dyeing activities in their workshops and put out other jobs (e.g. winding of warp-yarn, spinning of weft and warp yarns, wrapping, and weaving) to homeworkers who were paid on a piece-work basis. Under this putting-out arrangement, homeworkers enjoyed flexible working conditions because they worked in their domestic premises and were not forced to finish the job in a limited time and not directly supervised by the putter-out. However, after subcontracting relations with JT were established, those JT's former subcontractors replaced the putting-out system with a factory system. This was done for several reasons: first, as subcontractors of JT, they needed to produce high-quality fabrics to meet quality standards set by JT otherwise their products would be rejected; second, they had to produce a large volume of fabrics in a limited time and deliver to JT within a specified delivery date. Under the putting-out system, it was difficult for those subcontractors to follow up the production activities. They, therefore, built a factory and concentrated all production activities in-house so that they could easily supervise the whole production processes.¹¹

In fact, JT also encouraged its subcontractors to build factories since it was easier for JT's technicians to supervise production processes in one place than in dispersed home-based workshops. Moreover, JT allocated a purchasing order to each subcontractor by considering their production capacity, based on its observation of how well the production activities were organized.¹² This indirectly forced subcontractors to build up their factories in order to secure purchasing orders from JT. In some cases, JT even provided financial support for entrepreneurs who wanted to expand their businesses or enlarge their factories.¹³

Under the factory system, weavers were closely supervised by their employers, which helped improve productivity because they became more disciplined on their work. For example, JTFS claimed that factory workers could produce about 180–200 yards per month on average, while home-based weavers could produce only about 90–120 yards of silk fabrics per month. The lower productivity of the latter is due to their being unsupervised by their employers.

One may argue that the factory system may become unnecessary if, under putting-out system, quality control is effectively introduced. This was not the case for 13 JTFS who mentioned some difficulties in introducing effective quality control under putting-out system. Firstly, lack of sufficient personnel prevented them from following up production processes and ensuring effective quality control. Before becoming JT's subcontractors, they rarely followed up production processes closely, but just acted as a coordinator of production processes and only went to homeworkers' workplace to pass intermediate inputs from one process to another. However, this practice became inefficient once they started to produce for JT. When JT placed a large purchasing order, these subcontractors needed

to increase the number of homeworkers and to ensure that homeworkers would take care of production processes more seriously than before. Consequently, they needed to follow up on the homeworkers more frequently. But as they lacked sufficient personnel, bringing production processes into one place was a better option because they could supervise numerous workers closely. Secondly, since homeworkers lived dispersedly in the villages far from PTC's center where JT's former subcontractors were located, close supervision of the production processes at the homeworkers' premises was difficult. Under this situation, the authority to make decisions about production methods and to supervise production processes was left to homeworkers because they owned machines/tools and worked at their houses. JTFS could only examine the attributes of the final products. This practice was no longer efficient under JT's subcontracting arrangement because if there was any defect JT would reject the whole piece of fabric. Thus, close supervision of production processes became necessary; and this could be done more easily under the factory system than putting-out system. Finally, the introduction of the factory system by subcontractors was also related to the introduction of the new technologies: flying-shuttle looms and yarn-spinning machines. According to SE-6, as both types of machines were new and expensive, she was reluctant to leave these machines with homeworkers. It was easier for her to check and control when these machines were concentrated in her factory.¹⁴

(c) Changes in designs and patterns of products

Before entering JT's subcontracting arrangement, JT's former subcontractors that I interviewed mainly produced the old-styled silk fabrics called '*Mudmee*' (Ikat), *Pa Puen* (plain-colour fabric) and *Pa Kaoma* (Cross-colour fabric), which could be found anywhere in the Northeast. Ranges of design and pattern were quite limited and were just to meet local demands. For example, SE-9 has mentioned that her main customers were local people who passed by and those customers usually preferred to buy two to four yards of *Madmee* or *Pa Puen* to make a piece of clothes. After establishing subcontracting relations with JT, JT introduced new patterns and designs to these subcontractors.

The nature of the markets in which JT was embedded is an important factor that explains characteristics of its product. As JT mainly targeted high-end domestic (e.g. the tourist market) and export markets in which fashion changed quickly and the life-cycle of a particular product was quite short,¹⁵ product designs had to be responsive to such highly fluctuating market demands. Accordingly, products that JT brought to subcontractors were very diverse. For example, JT's fabrics were cross diversified according to weight (light, middle, and heavy),¹⁶ colors, patterns, texture, and purposes (e.g. clothing, decorating, and home textile) which yield countless styles of fabrics.

All 13 JTFS were trained by JT's technicians. For example, when JT ordered a fabric of particular design, JT's technicians would demonstrate how to produce it. Later, after continuously learning new patterns and designs, JT's subcontractors were able diversify their products and markets to buyers other than JT. For example, the owner of SE-1 claimed that she received knowledge about modern

designs from JT which later enabled her to establish lucrative product lines such as heavy-weight home-textile fabrics used for decoration and furniture in hotel and restaurants.

(d) Improvement in yarn-dyeing and weaving methods and job-checking technique

In terms of yarn-dyeing methods, before entering JT's subcontracting arrangement, JTFS used a traditional method inherited from their ancestors and were not worried much about the quality of products. Their yarn boilers were small and could boil only about a kilogram of silk yarn at once, sufficient only for weaving three to four yards of fabric. They use colors for dyeing from plants, which had the disadvantages of (1) fading easily; (2) taking a long time to dye; and (3) having limited number of color tones. They did not pay much attention to water quality or temperature for dyeing. For example, almost all of the 13 JTFS (except SE-5) said they mainly used low-quality water from canals for dyeing. After a subcontracting arrangement was established, JT persuaded these subcontractors to use the permanent chemical dyes and high-quality colors used in modern textile factories, instead of natural colors. Importantly, it taught these subcontractors about the advanced color mixture formulas: how to produce a particular color, what colors should be mixed, in what proportion, what chemicals should be used in the process. Apart from that, JT also introduced a new type of yarn boiler to these subcontractors, which had a capacity of large scale bleaching and dyeing. They also had a capacity to boil at least 10 kilograms of silk yarn, which was higher than the traditional small boilers that could boil on one or two kilograms. These new yarn boiler saved time that workers spent on dyeing because it could boil larger amount of yarn. For example, SE-7 claimed that if he used the traditional boiler he might have to boil 10 times to get the same amount, but this could be done only once using a new boiler. Moreover, large boiler made it easier to assure that a whole piece of long fabric would have consistent color and texture because longer yarns were boiled once.

In terms of weaving, 13 JTFS learned better weaving techniques to produce fabrics of more sophisticated patterns and of higher quality. In order to weave such fabrics, JT gave guidance and set rules for these subcontractors to follow. First, JT required these enterprises to use standardized tools such as the two-thousand-teeth reed which produces a more fastened texture. Before becoming JT's subcontractor, all but one (SE-5) of 13 JTFS used the one-thousand-seven-hundred-teeth reed which produced an unfitted texture. Second, in order to weave more sophisticated patterns, JT trained the owners and the weavers of these enterprises how to work with the flying-shuttle looms attached with more "healds", an important tool to create the pattern in the texture: the more sophisticated the pattern, the more healds required. Weavers needed to start from weaving with two healds and gradually shifted into weaving with more healds step by step. Moreover, JT's technicians also trained the weavers working for JTFS to "read the pattern". For example, since weavers had to weave based on models given by JT as an example, JT's technicians trained those weavers how weave the patterns or how to change and correct the patterns when any defect was found.

Additionally, JTFS also learned from JT job-checking method, a kind of quality control (QC).

According to 13 JTFS, QC activities usually took place in the production processes. The owners of these enterprises had to supervise their weavers closely to prevent or limit defects. Before delivering products to JT, the owners of these enterprises had to examine carefully again each piece of fabric. As JT also did not want to reject any order it made, it passed all the quality control guidelines to subcontractors in order to minimize defects. There were several guidelines applied to different types of fabric, which JTFS would be given in the form of check lists for checking their products item by item.¹⁷

It is important to note here that having been involved in JT's subcontracting arrangement not only brought about improvement in machines/tools, work organization, products, and production methods as examined above. It was also associated with growth in enterprise size and output of these 13 JTFS.

Table 2 shows the trend in size (measured by number of workers) of 13 JTFS throughout the period since the enterprises were established until 2007. In this table, 12 of 13 JTFS started as micro or cottage enterprises employing less than 10 workers.¹⁸ Most enterprises started to grow in the year they started business with JT or a few years later. For example, SE-1, SE-4, and SE-13 grew out of cottage enterprises in the year they became JT's subcontractors. Other enterprises (SE-2, SE-3, SE-7, SE-9, SE-10, SE-11, and SE-12) grew soon after they became subcontractors of JT.

Once these 13 enterprises started to grow after entering JT's subcontracting arrangement, they

Table 2 Trend in employment of JT's former subcontractors (measured in number of workers)

	Estab- lished	Enter JT's sub.	Exit JT's sub.	1962	1967	1972	1977	1982	1987	1992	1997	2002	2007
SE-1	1958	1967	1997	1	2 (▲)	2 (—)	2 (—)	4 (▲)	4 (—)	4 (—)	4 (—)	3 (▼)	2 (▼)
SE-2	1977	1980	1997	N.E.	N.E.	N.E.	1	2 (▲)	2 (—)	2 (—)	3 (▲)	3 (—)	2 (▼)
SE-3	1960	1967	1993	1	1 (—)	2 (▲)	2 (—)	3 (▲)	4 (▲)	4 (—)	4 (—)	2 (▼)	2 (—)
SE-4	1976	1982	1997	N.E.	N.E.	N.E.	1	2 (▲)	2 (—)	3 (▲)	4 (▲)	4 (—)	2 (▼)
SE-5	1985	1985	2005	N.E.	N.E.	N.E.	N.E.	N.E.	2	2 (—)	3 (▲)	2 (▼)	2 (—)
SE-6	1962	1970	1992	1	1 (—)	1 (—)	2 (▲)	3 (▲)	4 (▲)	4 (—)	4 (—)	2 (▼)	1 (▼)
SE-7	1967	1970	Not Exit	N.E.	1	2 (▲)	3 (▲)	3 (—)	3 (—)	3 (—)	2 (▼)	2 (—)	2 (—)
SE-8	1965	1975	1993	N.E.	1	1 (—)	1 (—)	2 (▲)	2 (—)	3 (▲)	3 (—)	2 (▼)	2 (—)
SE-9	1960	1977	1992	1	1 (—)	1 (—)	1 (—)	3 (▲)	3 (—)	3 (—)	3 (—)	2 (▼)	2 (—)
SE-10	1972	1975	1992	N.E.	N.E.	1	2 (—)	4 (▲)	4 (—)	3 (▼)	2 (▼)	2 (—)	2 (—)
SE-11	1965	1967	1993	N.E.	1	2 (▲)	2 (—)	3 (▲)	4 (▲)	4 (—)	4 (—)	3 (▼)	2 (▼)
SE-12	1974	1982	2000	N.E.	N.E.	N.E.	1	1 (—)	2 (▲)	2 (—)	2 (—)	1 (▼)	1 (—)
SE-13	1967	1972	1995	N.E.	1	2 (▲)	3 (▲)	3 (—)	3 (—)	3 (—)	2 (▼)	2 (—)	2 (—)

Source: Author's interviews

Note: (1) Numbers 1=employ not more than 10 workers; 2=employ 10-50 workers; 3=employ 51-100 workers; and 4=employ more than 100 workers. (2) 'N.E.' =the enterprise did not exist in that year. (3) The symbols (▲) = number of workers increased from the previous five years; (▼) = number of workers decreased from the previous five years; and (—) =number of workers did not change from the previous five years.

grew continuously until they exited the arrangement. In fact, by 1992, 10 JTFS had increased the number of workers to more than 50, and four of them even employed more than 100 workers. Note also that, for 11 JTFS (except SE-5 and SE-7), the number of workers did not drop from the previous five years during the period these enterprises were involved in JT's subcontracting arrangement (the symbol is either ▲ or — in this period).

Table 3 which shows the trend in output (silk-woven fabrics in yard per year) also indicates that most of 13 JTFS started to increase the level of output after they were hired by JT, following the same pattern shown in table 2. After most of JTFS started to increase the level of output, their output did not drop from the previous five years during the period that they were involved in JT's subcontracting arrangement (again the symbol is either (▲) or (—) in this period). By 1992, the year that JT's hand-woven silk fabrics reach its highest production level (Table 1), 10 out of 13 enterprises also reached the level of producing more than 50,000 yard per year.

To see to what extent JT's demand for output from subcontractors contributed to the subcontractors' output growth, I divide JT's output sourced from subcontractors by the number of subcontractors in each subsequent year, this yields an average output per subcontractor of 35,294, 26,666, 47,058, and 26,700 yards per year in 1982, 1987, 1992, and 1997, respectively. These numbers imply that 10 out of 13 JTFS heavily depended on JT for output growth in 1982, the year in which

Table 3 Trend in output (silk fabrics) of JT's former subcontractors (measured in yard per year)

	Estab- lished	Enter JT's sub.	Exit JT's sub.	1962	1967	1972	1977	1982	1987	1992	1997	2002	2007
SE-1	1958	1967	1997	1	2 (▲)	3 (▲)	3 (—)	4 (▲)	4 (—)	4 (—)	4 (—)	2 (▼)	2 (—)
SE-2	1977	1980	1997	N.E.	N.E.	N.E.	1	2 (▲)	3 (▲)	4 (▲)	4 (—)	2 (▼)	2 (—)
SE-3	1960	1967	1993	1	1 (—)	2 (▲)	3 (▲)	3 (—)	4 (▲)	4 (—)	3 (▼)	2 (▼)	2 (—)
SE-4	1976	1982	1997	N.E.	N.E.	N.E.	1	2 (▲)	2 (—)	4 (▲)	4 (—)	4 (—)	4 (—)
SE-5	1985	1985	2005	N.E.	N.E.	N.E.	N.E.	N.E.	2	4 (▲)	3 (▼)	2 (▼)	3 (▲)
SE-6	1962	1970	1992	1	1 (—)	1 (—)	2 (▲)	2 (—)	4 (▲)	4 (—)	3 (▼)	2 (▼)	1 (▼)
SE-7	1967	1970	Not Exit	N.E.	1	2 (▲)	3 (▲)	3 (—)	3 (—)	3 (—)	2 (▼)	2 (—)	2 (—)
SE-8	1965	1975	1993	N.E.	1	1 (—)	2 (▲)	2 (—)	3 (▲)	3 (—)	4 (▲)	4 (—)	4 (—)
SE-9	1960	1977	1992	1	1 (—)	2 (▲)	2 (—)	3 (—)	4 (▲)	4 (—)	2 (▼)	2 (—)	2 (—)
SE-10	1972	1975	1992	N.E.	N.E.	1	2 (▲)	2 (—)	4 (▲)	4 (—)	3 (▼)	3 (—)	2 (▼)
SE-11	1965	1967	1993	N.E.	1	2 (▲)	2 (—)	3 (▲)	4 (▲)	4 (—)	2 (▼)	2 (—)	2 (—)
SE-12	1974	1982	2000	N.E.	N.E.	N.E.	1	2 (▲)	3 (▲)	3 (—)	3 (—)	2 (▼)	1 (▼)
SE-13	1967	1972	1995	N.E.	1	2 (▲)	4 (▲)	4 (—)	4 (—)	4 (—)	2 (▼)	2 (—)	2 (—)

Source: Author's interviews

Note: (1) Numbers 1 = Not more than 10,000 yards per year; 2 = 10,001-25,000; 3 = 25,001-50,000; and 4 = more than 50,000 (2)

'N.E.' means the enterprise did not exist in that year. (3) The symbols (▲) = output increased from the previous five years; (▼) = output decreased from the previous five years; and (—) = output did not change from the previous five years.

these 10 subcontractors produced silk fabrics of not more than 50,000 yards. In 1987, we can say that 6 out of the 13 JTFS whose level of output was not more than 50,000 yards per year still heavily depended on JT. After 1987, it is impossible to estimate the proportion of output that most subcontractors produced for JT because 10 out of 13 JTFS already produced larger than 50,000 yards per year. However, all JTFS that I interviewed claimed that JT was still their largest buyer until they exited JT's subcontracting arrangement.

Since 1997, JT's former subcontractors have faced long term recession until the late 2008 (in which I conducted the interviews). It can be observed from Table 2 and 3 that levels of employment and output dropped in most enterprises since 1997. Aside from the reduction in JT's purchasing orders (in Table 1, number of subcontractors reduced from 27 to 17 and to 2 in 1992, 1997, and 2002 respectively),¹⁹ these JTFS claimed that there are two additional causes of recession: the economic crisis in 1997 and the coup d'état in 2006 followed by economic recession of the whole country.

From the above tables, it can be argued that the growth in employment and output of the sample 13 enterprises is related to their being JT's subcontractors. Learning under JT's subcontracting arrangement also helped them adjust to new market conditions. Even after JT stopped outsourcing, most enterprises did not face a serious drop in employment and output. Most of them could manage to survive and did not return to where they had started: cottage enterprises (except SE-6 and SE-12). In fact, most of 13 JTFS claimed that the slump in JT's demand did not seriously affect them, thanks to their less dependence on JT since the late 1980s. Although they still considered JT as a major buyer until they exited its subcontracting arrangement, they had already established themselves in new markets other than JT, especially such lucrative markets as high-end domestic and export markets. All JTFS maintained that they did not face difficulties in adapting themselves into new market conditions as demand conditions under new buyers were not different from those under JT. Similar to JT, producing for new buyers whose markets were either high-end domestic or export requires special attention to quality control, punctuality, and patterns/designs specified by buyers. The characteristics of products (i.e. designs and quality) they produced for new buyers were not more sophisticated than those for JT. Therefore, they did not need to change production methods or techniques from those used before. JT's former subcontractors tended to find production methods/techniques provided by JT standardized ones, which could always be applied to other buyers' demands. In terms of quality control, new buyers were not as strict as JT. All 13 sample enterprises claimed that their new buyers only checked final products and never examined production processes at subcontractors' factories.

It is important to note that little evidence was found to suggest that other sources apart from JT helped in the improvement of products and production methods in the ways described above. Training courses and access to experts did not take place until recently. In fact, PTC silk industry just began to attract attention from government agencies in the later years after it had already become widely known to the customers. PTC's silk industry became a target of government support after silk

industry was declared as a strategic industry of NR Province in 2001. After that, efforts were made to improve production capabilities have been made through many training courses.²⁰ However, the real beneficiaries of those training courses seem to be individual homeworkers rather JTFS. This is because JTFS hardly attended training courses as they found those courses to be no better than the methods that they had obtained from JT.²¹

6. Mechanisms for upgrading

What mechanisms contributed to upgrading? From the interviews, I found three significant mechanisms including: first, cooperation between JT's technicians and subcontractors; second, regular visits by JT's technicians to subcontractors' workplaces; and third, provision of guidelines and feedback by JT personnel.

(a) Cooperation between buyer and subcontractors for product development

Before 1982, JT focused on product development and marketing, leaving production activities to its subcontractors. To ensure that products would meet its standards, JT sent its technicians to stay at PTC where they could work closely with local subcontractors. As we can see from Table 1, from 1970s to 1992, during which JT sourced more than 50% of hand-woven fabrics from subcontractors, the number of technicians increased from 3 to 7 and to 11 in 1977, 1987, and 1992 respectively.

From my interviews with 13 JTFS and two of JT's technicians, business relations between JT and these subcontractors before 1982 took two forms. First, JT gave orders with specified characteristics and subcontractors had to produce to meet the orders. This was done in the case of products that subcontractors had already obtained the knowledge and skills to produce. In this case, JT's technicians just went to the workplace to follow up or give some instructions when problems occurred. Second, JT's technicians worked side by side with subcontractors to develop products which were new to them. In this case, JT invested in raw materials and bore all the costs related to product development. All of the JTFS's owners stated that, in the process of product development, JT's technicians stayed at their workplaces for the whole day and everyday to supervise the whole production processes and work together with them until succeeding in product development. This process allowed knowledge transfer from JT's technicians to subcontractors to take place. After the subcontractors had obtained knowledge and skills to produce by themselves, JT's technicians would leave the whole production process to them, but still followed up regularly.

(b) Regular visits

One of the main jobs of JT's technicians who resided in PTC was to visit subcontractors regularly. The main purposes were to supervise production, share information with subcontractors, and check or sort out products before sending them to the purchasing station. The owners of JTFS mentioned that almost everyday, after JT had placed orders to them, JT's technicians had visited their workplaces to

supervise and follow up.²² Since JT's technicians resided in PTC, these 13 subcontractors could easily approach them for help with any technical problem.²³ For example SE-1 and SE-4 mentioned that when problems occurred, they usually stopped producing and waited until JT's personnel came because if they kept producing or solving problems by themselves, the products would be downgraded, or even rejected by JT.

As JT did not have its own factory before 1982, it considered subcontractors' workplaces its own. Therefore, regular visits to subcontractors by JT personnel was the best way to internalize production activities as if those activities had taken place in JT's own factories.

(c) Provision of guidelines and feedback

JTFS learned about QC from JT in three ways. First, they learned from guidelines provided by JT. Since JT did not want to reject the products, when it put purchasing orders on these 13 enterprises it also provided detailed guidelines to these enterprises, which normally contained things-to-do in order to meet JT's orders. Second, JT also provided guidelines at workplaces of these enterprises, which occurred when JT's personnel visited the workplaces of these enterprises to follow up the production. Additionally, the 13 JTFS also learned from feedback. Generally, when JTFS delivered the finished products to JT's purchasing station, JT's QC personnel would examine and grade their products, which would then be sent back to subcontractors with the explanation of grading evaluation. In this way, JTFS learned what mistakes they made and what to improve if they wanted their products to meet JT's standards next times.

The aforementioned mechanisms are supportive for upgrading 13 JTFS. Repeated and face-to-face interactions by JT's personnel allowed the transfer of knowledge and information to happen. These three mechanisms continued for almost three decades in PTC. They helped JTFS to learn to improve their products and production processes.

7. Comparing JT's former subcontractors with non-former subcontractors

To test whether JT's subcontracting arrangement helped upgrade subcontractors, I compared some characteristics and performance of two enterprise groups: JTFS and non-JTFS.

Table 4 shows three groups of variables used for comparison: owner's characteristics, enterprise's characteristics, and enterprises' performance. Two types of test-statistic, namely, the independent T-test and the M-W test, are used to statistically test whether statistical significant difference exists between two groups of enterprises with respect to each variable (except variables *formality* and *export*).²⁴

We can observe that current owners of the two enterprise groups are not significantly different in terms of age, education, and experience. Generally, the current owners of both groups are of the same generation. The only difference is that most of current owners of JT's former subcontractor

enterprises inherited businesses from their parents who were the founders of the enterprises,²⁵ while most of owners of another enterprise group are themselves the founders of the enterprises. In terms of experience, the current owners of the first enterprise group appeared to enter the silk business slightly earlier than those of the second group, though the difference is not statistically significant. This is because the current owners of the first enterprise group started to get involved in the silk-weaving industry by helping their parents right after they finished high school or university, while the owners of the second group entered the industry as wage workers and spent some time before they accumulated skills and capital to start their own business. This also explains why the average of age of the enterprises in the two groups is significantly different (at 1% level): JTFS were established on

Table 4 Comparison of JT's former subcontractors and Non-JT's former subcontractors

Variables	JT's former Sub	Non-JT's former Sub	Test statistics	
			T test	M-W test
Owner's characteristics				
1.Age	49.4	50.5	-0.23(0.749)	—
2.Years of schooling	11.7	9.0	1.498(0.146)	—
3.Experience ¹	28.8	24.1	1.056(0.298)	—
Enterprise's Characteristics				
4.Age ²	39.7	17.7	7.012(0.000)**	—
5.Formality ³				
Yes	13(100%)	10(43%)		
No	—	13(57%)		
Performance				
6.Labor (L) ⁴	22.8	34.1	—	138.500(0.721)
7.Output (O) ⁵	3,062	3,131	-0.088(0.930)	—
8.Sales (S) ⁶	756,548	593,020	—	104.000(0.140)
9.Profit ⁷	191,781	79,777	—	57.000(0.002)**
10.Profit margin (%)	28.2	14.1	—	47.000(0.000)**
11.Labor productivity (O/L)	133.6	96.4	2.653(0.012)*	—
12.Labor productivity (S/L)	33,144	19,911	—	49.000(0.001)**
13.Export				
Yes	9(66%)	6(26%)		
No	4(31%)	17(74%)		
N	13	27		

Source: Author's interview

Note: (1) Number 1=Number of years that current owner has been involved in silk business; 2=Number of years since the enterprise has been established; 3=Formal status of the enterprise acquired by official business registration; 4=Number of persons currently employed; 5=Average silk fabrics in yard per month in the first half of 2008; 6=Average sales in baht per month in the first half of 2008; and 7=Average profit in baht per month in the first half of 2008. (2) The numbers in column 2 and 3 are mean values, except those for variables *formality* and *export*. (3) The numbers in column 4 and 5 are the critical value and P-value (in the parentheses) of T test and M-W test. (3) The marks (*) and (**) represent statistical significance at 5% and 1% levels respectively.

average 39.1 years ago compared to 17.7 years ago for the non-JTFS.

Most of non-JTFS tend to operate in the informal sector, although the average size of about 34 employees is not considered to be very small. They can do so because they put out most of the production processes to homeweavers. On the other hand, as JTFS tend to concentrate production activities in their factory, they have to register with the Provincial Office of Commerce and operate formally.

In terms of performance, the differences in employment, output, and sales are not statistically significant. This is because PTC silk industry, in general, has been facing recession after the economic crisis in 1997. All 40 enterprise owners I interviewed said their purchasing orders have fallen since the 1997 economic crisis, resulting in a reduction in employment, output, and sales. Although both enterprise groups have been facing recession recently (2008), the advantages of having in the past been involved in JT's subcontracting arrangement cannot be ignored. First, JTFS enjoyed growth for much longer than non-JTFS. They enjoyed constant employment and output growths under JT's subcontracting arrangement, as shown in the previous section, around 22 years (average number of years that 13 JTFS were involved in JT's subcontracting arrangement), before facing recession since the late 1990s. On the other hand, non-JTFS, who entered the market on average 18 years ago (around the early 1990s), enjoyed only short-term growth before facing recession after the economic crisis in 1997.

Second, although both groups are not significantly different in terms of employment, output, and sales, they are significantly different in terms of labour productivity and profits. Here, labour productivity is measured in two ways: monthly output by labour and monthly sales by labour. As Table 4 shows, labour productivity is higher for JTFS in both measures, indicating that they produce silk fabrics more efficiently than non-JTFS. Higher output per labour of the former, I would argue, is due to more efficient work organization rather than utilization of higher technologies. This is because machines or tools used in both groups are not different. Recall that, on average, non-JTFS were established around the early 1990s by which time new machines/tools introduced by JT were already widely used and had become available to every enterprise.²⁶ Clearly, the difference between them is in the forms of work organization. While JTFS mainly uses the factory system, non-JTFS relies on the putting-out system. As it is difficult to supervise homeweavers who work at their own premises, outputs produced under the putting-out system tend to be lower than those produced under the factory system. In fact, non-JTFS indicated that homeweavers tend to be the older or women who cannot work at the factory because of housework and child rearing. While non-JTFS said their homeweavers can produce only 90–120 yards of silk fabrics per month, JTFS claimed that their factory workers can even produce as much as 180–200 yards per month. In terms of higher sales per labourer of JTFS subcontractors, I would argue that it is due to the production of better quality products. From Table 4, we find that the products of JT's former subcontractors are more profitable (their profit and

profit margin are higher with statistical significance of 1% level). Moreover, in terms of exports, 69% of JT's former subcontractors can establish themselves in export markets which are generally more profitable than domestic ones, while only 26% of non-JTFS were able to sell their products abroad. Therefore I argue that JTFS, on average, produce better-quality products than non-JTFS, and their better performance is to a large extent associated with their having been involved in JT's long-term subcontracting arrangement.

8. Conclusion

This paper has examined the role of the buyer in rural enterprises' upgrading. It has asked what role the buyer play in upgrading rural-based enterprises. The term "upgrading" in this paper has referred to the improvement in products and production processes. JT, a largest silk firm in Thailand, and 13 enterprises hired as subcontractors by JT were taken as a case study.

Based on in-depth interviews with JT and a sample of 13 JT's former subcontractors, I found that the former played important roles in upgrading products and production processes of the latter. Under the supervision and assistance of JT, 13 JTFS upgraded their machines/tools, changed the way that production processes were organized, improved the patterns and designs of products, and improved production and QC methods. These changes occurred through certain mechanisms established by JT. For example, JT sent its technicians to subcontractors' workplaces to work closely with subcontractors. Its technicians were obliged to visit subcontractors regularly in order to supervise, follow up the jobs, and solve problems. It gave detailed feedback and guidelines to subcontractors which helped subcontractors learn more about quality and standards. The case study indicates that linking rural-based small enterprises with large buyers can be an alternative for the upgrading of such enterprises.

There are three points which should be stated here both as limitations and as suggestion for further investigation. First, as this paper has not investigated how the relationship between rural small subcontractors with large buyers may limit the ability of the former to upgrade functionally and inter-sectorally, future research may fill the gap by investigating more on this issue. Second, each buyer may take different kinds of subcontracting arrangements which may have different impacts on subcontractors. Due to limited space, this paper has not taken into account this topic. Further research should compare modes of subcontracting arrangement taken by different buyers to see what model can best serve as rural enterprise development model. Finally, as this paper has mostly focused on 13 JTFS, in-depth comparisons with enterprises that are not involved in such an arrangement should be examined in further studies.

Notes

- 1 The main reason for importing Japanese silk production technologies was that Japan was the world leader in silk industry at that time. Since 1868, silk yarn and other silk-related products accounted for about 46% of Japan's export. Moreover, between 1906 and 1910, Japan had become the top silk exporting country, overtaking China which had been the top exporter for a long time (Yonio and Toshiharu, 1987 cited in Kasikosol 1998: 16).
- 2 JT's personnel manager.
- 3 JT's personnel manager.
- 4 JT's personnel manager.
- 5 For PTC entrepreneurs who became JT's subcontractors, silk-weaving was operated on a commercial basis instead of a seasonal one. According to my interviews with the owners of 13 JTFS, none of them had ever been involved in agricultural production. These entrepreneurs mentioned that they did not have knowledge of agricultural production and did not own farm land. Silk trade was their only source of income. This made them work on silk-weaving on a year-round basis. For example SE-1, SE-6, and SE-9 said that during the off-farm season, they coordinated production activities which they put out to homeworkers who worked on a seasonal basis. But in the farm season, they worked by themselves or hired family workers and a few wage weavers. These entrepreneurs stated that they did not face serious problems in seasonal labor supply because seasonal fluctuation in demand for silk fabrics was different from the seasonal pattern of agricultural demand for labor: the demand for silk fabrics was high in the off-farm season (December-April) and low in the farm season (May-November).
- 6 JT's personnel manager and technicians.
- 7 JT's personnel manager and technicians.
- 8 Interviews with JTFS.
- 9 Interview with SE-5
- 10 JT's technicians.
- 11 Interviews with JTFS.
- 12 JT's personnel manager.
- 13 For example, SE-4 said she received interest-free loans of 30,000 baht from JT to enlarge her factory.
- 14 As large sunk costs of introducing factory system were totally borne by subcontractors, despite JT's provision of some financial assistance, it is reasonable to think of this as a risky step which might pose a problem on subcontractors: at the beginning of adopting the factory system, costs per unit of output tend to be very high, as compared to costs incurred under putting-system. This can be considered as a trade-off of being JT's subcontractors. In spite of the high cost, the subcontractors would still have adopted the factory system. Why? Based on my interviews, I found that 13 JTFS were inclined toward risk-minimizing behavior. They did not invest a large amount of money in building a large factory immediately after they became JT's subcontractors. Rather, they reinvested in expanding their factory (and production scale) only after they accumulated some capital derived from continuously selling to JT.
- 15 According to JT's personnel manger, around 30% of sales are from exports and 70% are from domestic market in which the tourist market is the main domestic market of JT.
- 16 According to SE-1, light-weight fabric refers to a fabric woven by one or two silk threads, middle-weight to that woven by three to six threads, and heavy weight to that woven by more than six threads.
- 17 For example, SE-2 claimed that very detailed guidelines regarding weight and texture of fabrics were carefully transferred to her by JT's personnel. JT's personnel regularly demonstrated ways to examine products based on standard rules of JT. These guidelines included, for instance: in one square inch of fabric, how many threads should be woven; for one yard of the two-thread, three-trade, or six-thread fabrics, how much a certain area of fabric should weigh; and in one square yard, how many ragged threads were allowed.
- 18 In Thailand, cottage enterprise refers to rural enterprises employing not more than 10 persons and applying traditional production technologies.
- 19 JT's abandonment of outsourcing from subcontractors can be seen as a negative aspect of the subcontracting

arrangement. As all fixed costs (e.g. building and expanding factory, buying new machines/tools) were borne by subcontractors when they entered JT's subcontracting arrangement with the expectation to sell their products to JT on a large scale. The end of JT's outsourcing is thus one of the causes of their decline.

20 DIP and DCD officials.

21 Interviews with JTFS.

22 SE-5 and JT's technicians

23 Interviews with JTFS.

24 The independent T-test is used for the variables that two sample enterprise groups are at least roughly normally distributed; otherwise the M-W test is used, provided that two samples have similar shapes of distribution (Weiss 2005).

25 Except SE-3, SE-6, and SE-8 whose current owners are also the founders of the enterprises.

26 Among 40 sample enterprises, electronic looms are used by six enterprises of which two are JTFS (SE-4 and SE-5). The total numbers of electronic looms are 20 for the JTFS group and 27 for the non-JTFS one. Thus, the difference in output per labor does not seem to be associated with using electronic looms.

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