A Study on Operations Strategy and Competitiveness in the Korean Silk Industry

Sung-Eui Cho · Hag-Soo Kim[†] · Jeong Sook Lee*

Division of Business Administration, B&ERI, Gyeongsang National University
*Dept. of Clothing & Textiles, ERI, Gyeongsang National University

한국 실크산업의 경쟁력 제고를 위한 운영관리전략에 관한 연구

조성의 · 김학수[†] · 이정숙*

경상대학교 경영학부, *경상대학교 의류학과

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Abstract

The Korean silk industry is facing challenges due to decreasing demand and intensified competition. To understand its current state and evaluate its competitiveness precisely, we have visited most of the leading silk firms in Jinju area. By questionnaire and in-depth interview, we investigated their operational problems. We found that most of the managers are understanding the necessity of the capabilities in design and material development, but they did not fully aware of the importance of operational flexibilities. Based on the results of the survey, suggestions that are necessary to restore the competitiveness of the Korean silk industry were proposed from industrial and corporate viewpoints.

Key words: Silk, Competitiveness, Cost, Operations, Flexibility; 실크, 경쟁력, 가격, 운영관리, 유연성

I. Introduction

The Korean textile industry is at a critical moment to regain its competitiveness(Kim, 2002). Numerous papers have emphasized the importance of product related technology development, information technology, efficient production and inventory management(An-derson et al., 1989; Joo et al., 1999; Kim & Lim, 2002). The Korean silk industry is not an exemption to such requirements, but few studies have characterized the market. In order to suggest the right direction for the Korean silk industry, we need to understand more about the characteristics of the silk market including its supply chain structure, demand pattern and the competitiveness of its upstream and downstream firms. The textile and apparel industries have a great potential by constructing an efficient supply chain. In USA, these industries have regained new competitiveness through quick response programs. It seems that the supply network efficiency corresponds to the core of the quick response programs. In addition, a Spanish apparel maker Zara is harvesting the highest profit due to its demand-based agile production system. During 1993-1999, the annual growth rate of Zara reaches up to 39% in spite of its minimum investment in information technology(McAfee, 2004). These cases show the direction of operations strategy to regain the competitive edge of the Korean silk industry in the global market. The key for

competitiveness in the 21st century is the efficiency in the demand-based management(Lee, 2001). Therefore, the Korean silk industry needs new operational strategies that improve the flexibilities of firms to restore its competitiveness.

Currently, most of the silk firms in Jinju area are small companies with less than 30 workers(KSRI, 2002; Lee, 2003), and the supply chain has a horizontal structure, different than those of numerous other small firms which follow a vertical subcontract structure. Markets of the traditional costume and other western-style clothes including necktie and interior goods have different features in growth rate and demand pattern. So, we take them into account in the investigation to find out the right way to build an efficient supply chain.

To have a clear picture of the Korean silk industry, we have surveyed about 30 companies which are most of the key silk textile manufacturers out of the 100-110 firms in Jinju area. As Jinju represents about 15% of the export and 75% of the whole domestic demand, we believe the survey shows reliably the current status of the Korean silk market. Both questionarie and in-depth interview were used together to have a deep understanding about the industry. We focused on the operational aspect of those silk firms and investigated key competition factors to find out structural problems. We suggested various measures, from the firm and industry viewpoints, to help the industry to meet challenges from both low-cost Chinese manufacturers and high quality western manufacturers. We believe our study enables both the industry and the academia to understand clearly about the current state of the industry and the measures necessary to restore its competitiveness in the global market.

II. Theoretical Background

1. Factors of Corporate Competitiveness

To propose the right direction for the Korean silk industry, we need to clarify key factors that can evaluate the competitiveness of firms in the industry. In this paper, we have considered cost and quality that correspond to two of the most well-known traditional factors in operations management area as the corporate competitiveness factors. Next, we have taken into account the lead time, flexibility, and information sharing, which are keys for competitiveness in the time-based competition to satisfy customer needs (Stalk & Haut, 1990; Stalk et al., 1992), as the corporate competitiveness factors. These factors are in line with the recent study trends focusing on the application of the information technology, Quick Response system, logistic efficiency, new product development and inventory management in the area of operations management for apparel and textiles(Kim & Lim, 2002; Kim, 2002; Joo et al., 1999). They include most of the general factors that have been emphasized in the area of operations strategy(Anderson et al., 1989; Hayes & Wheelwright, 1979; Hill, 1989; Roth & Miller, 1992; Skinner, 1978). Furthermore, we considered the competitiveness of innovation capabilities and services, as in Giffi et al.(1990), and have used the term 'marketing' as a generalized factor for current status of Korean silk industry. It coincides in concept with recent studies such as KSRI(2002) and Lee(2003) emphasizing the importance of the marketing.

2. Industrial Competitiveness

To have a comprehensive understanding about the general competitiveness of the Korean silk industry, we have reviewed the RCA index first. Park(2002) reports that China is more competitive than Korea in the apparel industry but less competitive in the textile industry. Korean industry is weaker than those of leading nations in its business processes, marketing, production facilities and basic infrastructure. As to the competitiveness of Chinese companies, we can observe that, by the end of 2002, most of the textile manufacturers, except a few cotton spinning companies, are small enterprises and numerous companies are suffering from deficit in spite of their restructuring efforts(Choi & Oh, 2002). The growth in quantity is not followed by a similar growth in quality. The Chinese products are still way behind in design, marketing, brand management and systems for quality

certification(Choi & Oh, 2002). These facts imply that the recession in the Korean silk industry is due to its lack of strategies and, so far, it has enough opportunities to restore its competitiveness. Therefore, the competitiveness need to be considered in industrial level as well as corporate level. In this paper, we propose several ways to improve the competitiveness of the Korean silk industry considering the current status. Evaluations on the competitiveness need to be made on both industrial and firm level viewpoints.

III. Methodology

1. Research Framework

Our goal of this study is to suggest effective strategies for Korean silk firms to restore its competitiveness in the global market. For this purpose, we evaluated present competitiveness(in critical operational variables such as cost, quality, lead time, flexibility, and marketing) of silk firms through surveys using structured questionnaires and in-depth interviews. Surveys and interviews were conducted on CEOs in the silk industry. Based on the present conditions of competitiveness, needed strategies were suggested from 'industrial' and 'corporate' viewpoints.

Our research framework differs from the previous studies. First, we classified the silk industry into two categories: the traditional Korean costume textile manufacturers and western-style clothes manufacturers. With respect to the environments in demand patterns and marketing imperatives, we identified significant operational differences among firms in each

category. It helps us to understand the current state of the industry more accurately and point out the key issues for re-engineering. Second, two different approaches from the 'industrial' and 'corporate' viewpoints were used. Therefore, effective strategies for regaining competitiveness were suggested from two levels of 'industrial' and 'corporate'. 'Industrial' viewpoint is unavoidably required to extract effective strategies for present conditions of the silk industry. For example, the low operating rate and the increasing bankruptcy rate of the silk firms can be explained accurately considering both their industrial environment and the capability of each firm. The framework of our study is shown in <Fig. 1>.

2. Questionnaires and In-depth Interviews

In this study we have visited most of the key silk firms in Jinju area during March-May in 2005 and have asked the current status of the industry using questionnaires and in-depth interviews. The structured questionnaire was developed and pre-tested to improve its effectiveness. The questionnaire was comprised of three categories of questions. The first category was concerned with the degree of the respondent's perceptions on the level of the competitiveness of their own firms and factorys' operating rates. Answers to the former questions were made on a 5-point scale(1: very low, 3: middle, 5: very high) and answers to the latter question was made on a percentage scale. The second category of questionnaire was composed of seven questions on operational variables: reponses to short lead time request in market, reasons for keep-
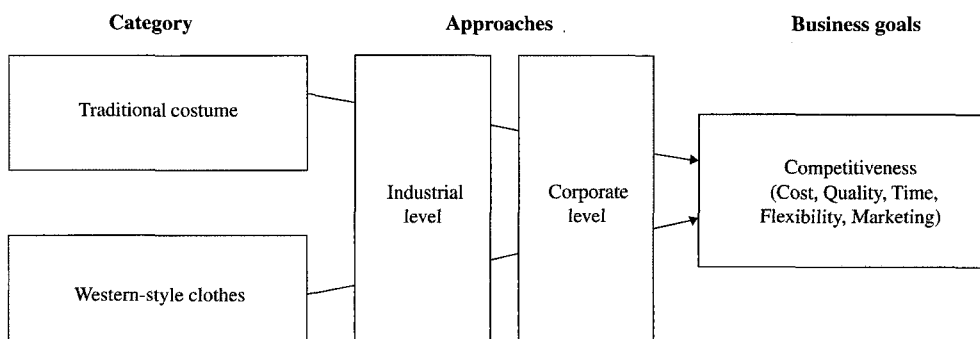

Fig. 1. Research framework

ing raw materials inventory, reasons for keeping fin-
ished goods inventory, buyer's critical request, bot-
tleneck in business, loss from the lack of collaboration,
and needed information. Finally, the third category
was concerned with questions on their firms and
demographic factors of the respondents. Both ques-
tionnaires and in-depth interviews were used simulta-
neously to understand in detail about the industry. Out
of the survey results from more than 30 firms, we had
to discard some of them due to the inaccuracy and
insincerity of the answers. Our analysis was based on
the responses of the top managers of 23 silk firms. All
the firms could be classified as small and medium
enterprises and their annual revenues are ranging from
100 million to 3 billon wons with 6-38 workers. Those
firms could be classified either the traditional costume
firms or the western-style clothes firms, and we have
10 korean traditional costume firms and 13 western-
style clothes firms.

IV. Results and Discussion

1. Current Competitiveness

To find out the current status of the corporate com-
petitiveness of the silk firms we asked the managers

to evaluate their competitiveness with respect to each
of the corporate competitiveness factors: cost, qual-
ity, lead time, product diversity, and marketing. The
results are shown in <Table 1>. The evaluation of the
domestic competitiveness is based on the responses
of the whole firms and that of the international com-
petitiveness is based only on the responses of the
western-style clothes firms. It shows that the silk
firms in Jinju are highly vulnerable to domestic and
international challenges in cost and marketing, and
they need improvements in their capabilities to pro-
vide diversified products. It shows that they need to
secure the competitiveness in cost and marketing.
Especially, innovative measures are urgently needed
to restore their marketing competitiveness in the
international market.

2. Reasons of Low Competitiveness

1) Analysis on the Low Competitiveness in Cost

The reasons of low competitiveness in cost are
related to diverse factors such as low factory operat-
ing rate, ordering and production policies etc. In
<Fig. 2>, we can find that the proportion of the firms
with less than 50% operating rate reaches up to 80%.
It implies that extra measures in the industrial level,

Table 1. Average of competitiveness evaluation on each factor

Competitiveness factors	cost	quality	lead time	diversity	marketing
Domestic competitiveness (n=10)	2.90 (0.99)	4.10 (0.99)	4.30 (0.82)	3.80 (1.37)	3.30 (1.16)
International competitiveness (n=13)	3.23 (1.09)	4.08 (0.76)	4.00 (0.82)	4.08 (1.19)	3.00 (1.08)

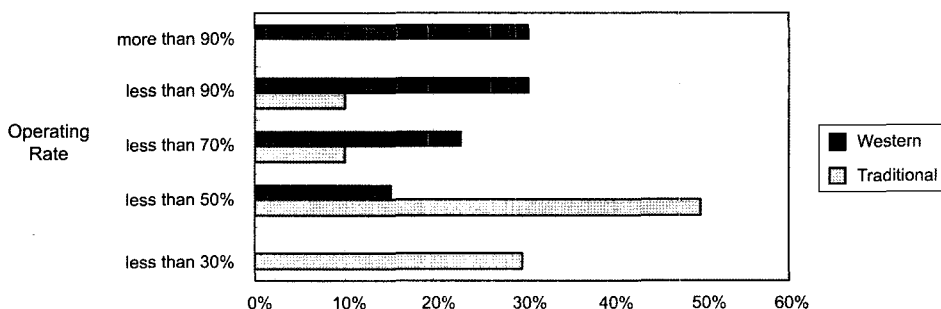*( ) is the statistics of standard deviation

Fig. 2. Annual plant operating rate

including restructuring of the industry, should be performed urgently. The firms in the category of the traditional costume are significantly weak in the operating rate too, as it is shown in <Fig. 2>. For the firms in the western-style clothes category, the proportion of the firms with more than 50% operating rate reaches up to 85% and that of the firms with more than 90% operating rate reaches up to 31%. These firms need two different measures from both corporate and industrial viewpoints to improve their managerial capabilities and operational effectiveness.

In addition, the ordering and production policies of firms are closely related to factors such as cost, quality, diversity and explain directly the cause of their low cost competitiveness. Order-based production is widely used in the silk industry and about 70% of the traditional costume firms are producing goods by the buyers' order more than 50% of their total production quantities, and 92% of the firms in the western-style clothes category are producing goods by their buyers' orders more than 70% of the total order. The proportion of firms, with the proportion of quick delivery exceeds 50%, reaches up to 61% in the western-style clothes category and 30% in the traditional costume category. These characteristics are explained in <Fig. 3, 4>.

With respect to the operation of the supply chain, we can observe that the traditional costume firms have excessive inventories due to their decreasing demand in the traditional costume market and an intensified competition among them. They are not able to control inventories efficiently due to their operational inflexibility, but managers of these firms are awaring about the importance of both expanding the sales opportunity and efficient operations of their facilities. Due to the inflexibility, they usually meet the shortened lead time by keeping a certain level of inventory and controlling the amount of order they receive. Therefore, we can observe a small increment in cost in spite of the buyers' increased quick response orders.

For the western-style clothes firms, we can observe that they have a high order-based production ratio and they are trying to avoid build-to-stock system to reduce risks from highly uncertain demand. On the other hand, the shortage of inventory without enough
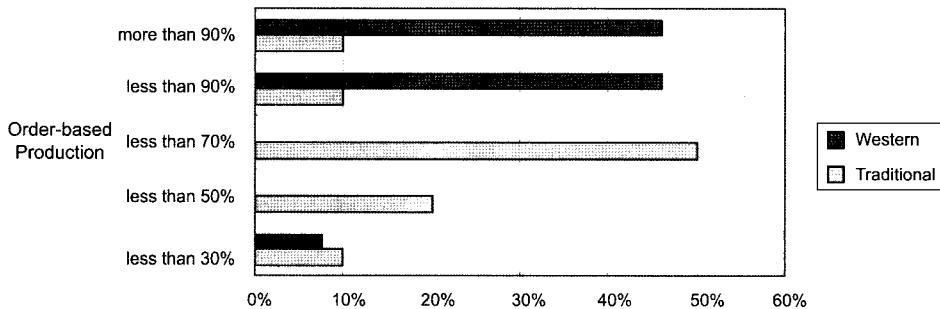

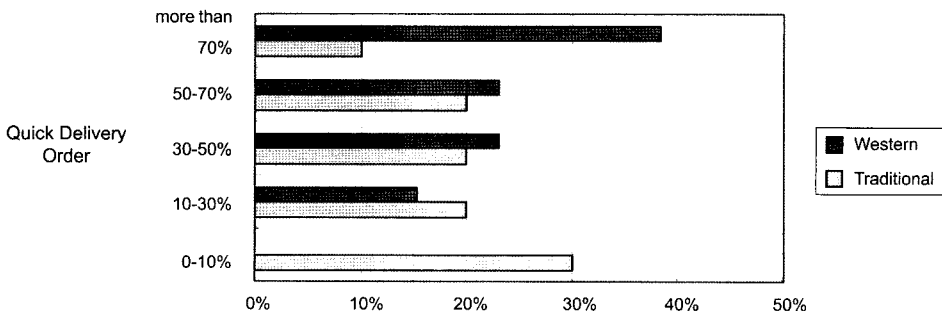Fig. 3. Rate of order-based production
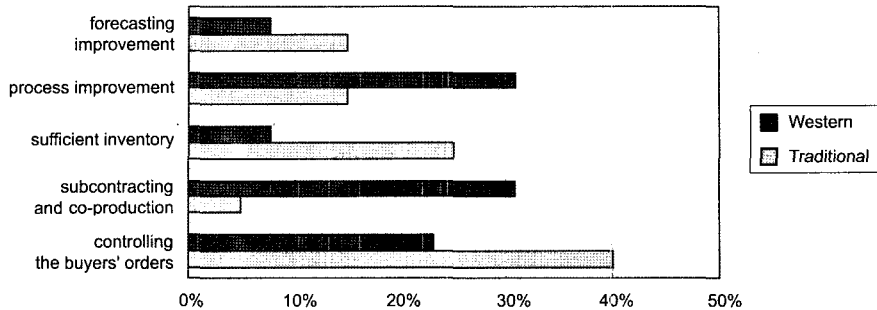

Fig. 4. Rate of quick delivery order

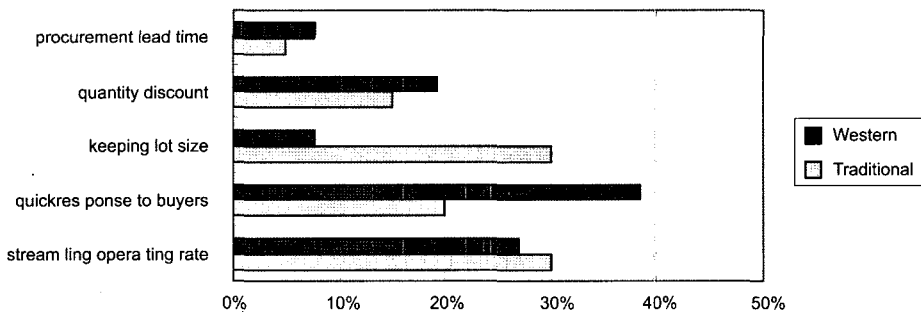**Fig. 5. Responses to the short lead time**

Fig. 6. Reasons for keeping raw material inventory

production flexibility results in inefficiency in their work force and facility management. The inability of the western-style clothes firms to achieve an economy of scale, due to the increased quick response and their small-sized orders, decrease their cost competitiveness significantly.

<Fig. 5> shows how the managers of both category firms meet challenges by short lead time. The traditional costume managers are accepting orders within their inflexible capacity limit to reduce risks, but they are not so active in improving operations of their production processes to overcome the limit. On the other hand, western-style clothes managers are meeting risks by focusing on both process improvement(31%) and subcontracting or co-production(31%). Their approaches are more advanced than those of the traditional costume managers, but they also need more advanced flexible systems to reserve their competitiveness. It implies that, in addition to the product related excellence in material development and design capability, the silk managers should fundamentally change their production operations.

In the textile industry, inventory is an important

factor that influences cost and which, in turn, can be influenced by numerous other factors. We have asked managers the reason why they keep inventories of raw materials and finished goods, and the results are shown in <Fig. 6>. About 30% of the traditional costume managers pointed out a streamlined plant operating rate and another 30% pointed out the maintenance of constant procurement lot size as the key factors. The western-style clothes managers pointed out a quick response to customers' demand as the most important factor for them. They show that the traditional costume managers are not focusing on the flexibility in their production processes to meet seasonal demands and their current business practice requires them to fix lot size. About 38% of the western-style clothes managers are keeping inventories to meet customers' demands quickly and 27% of them are keeping inventories to streamline their plant operations. In addition, their raw material procurement operations are based on the traditional inventory system rather than the JIT(Just In Time) based flexible system.

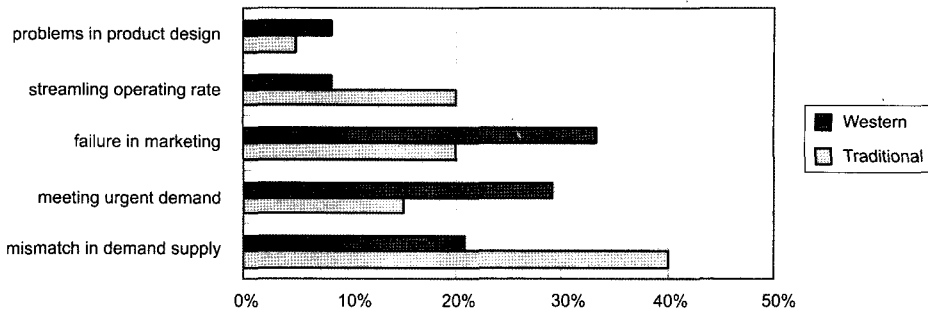Key reasons for the finished goods inventories are

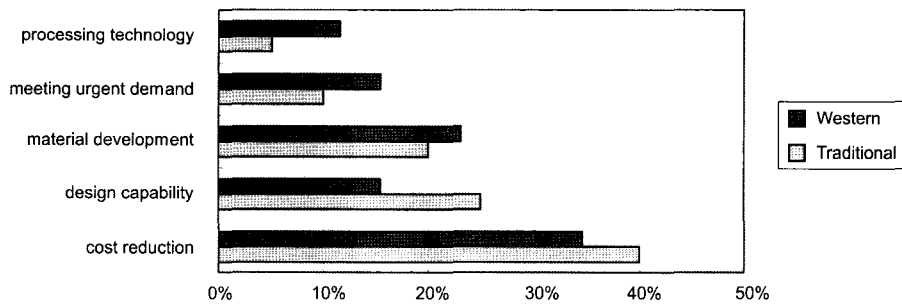**Fig. 7. Reasons for keeping finished goods inventory**

Fig. 8. Buyers' requests

shown in <Fig. 7>. Forty percent of the traditional costume managers pointed out that the mismatch in production capacity and demand is the key reason. We can also observe that the capacities of the traditional costume textile plants are far greater than the sluggish demand. So, firms in this category need advanced technologies that enable them to switch production items. We also have found that managers are interested in streamlining their plant operations but it can decrease their power against buyers in their negotiations and their profit can be improved by increasing flexibility in production systems and reducing inventories.

The western-style clothes managers pointed out that their failure in sales and marketing as an important factor and which reflects their lack of capability to catch market trends or grasp buyers. Those managers do not emphasize so much on streamlining of their plant operations as in the case of the traditional costume managers. About 29% of the managers said they rely on inventories heavily to meet demand and which shows the necessity of improvement in operations to meet demand quickly.

2) Analysis on the Low Marketing Competitiveness

Survey results on the marketing competitiveness is shown in <Fig. 8>. Forty and thirty-five percent of the traditional costume and western-style clothes firms, respectively, said that cost reduction is the key request of their buyers. It implies that firms in both categories are in a buyer-driven supply chain and they do not have enough capabilities in finding new markets, by switching their production items, or finding new buyers in the traditional market. The other requests are the development of new material for 20% and 23% of the firms in the traditional costume and the western-style clothes categories, respectively, and the design development capability for 25% and 15% of them in both categories, respectively. They show the necessity of product differentiation. Many firms in the western-style clothes category have bright views on the market. Some firms have a strong competitiveness and have enough capabilities to lead the market with more bright views on the market. On the contrary, most of the traditional costume firms have negative views on the market.
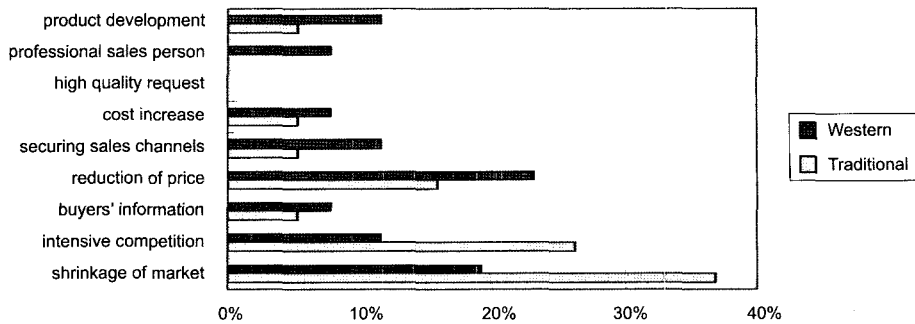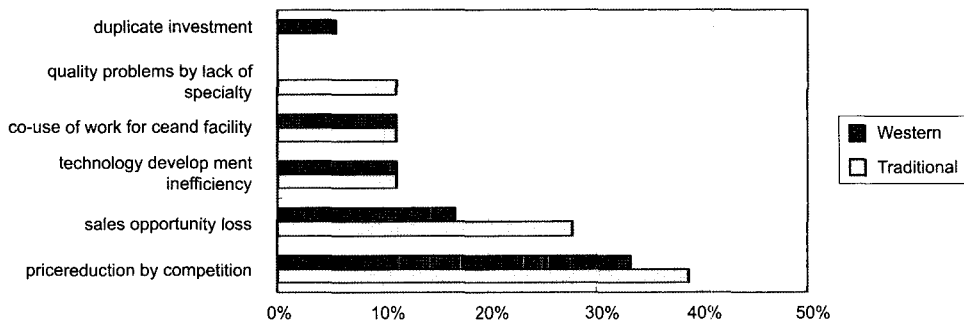
Fig. 9. Bottleneck in business

Fig. 10. Loss from the lack of collaboration

Survey results on the bottleneck in their business is shown in <Fig. 9>. Two serious problems for the traditional costume firm case are the declining demand in the market and the price reduction. The traditional costume managers pointed out that the declining demand(shrinkage of market) as the key factor for the bottleneck and which provokes high price competition among them. It may not be a sufficient remedy to increase the size of the traditional costume demand as new entrants from China or other countries can always enter the market and threat Korean firms unless they have enough competitiveness. There seems to be no other way to survive in the future except the development of new technology and improvement of production facilities, enabling traditional costume firms to switch production items, and the improvement of flexibility in manufacturing, absorbing the shock from the seasonal demand and quick delivery. So, collaboration with Korean silk research institute(KSRI) to have the capability in material and design development, voluntary efforts of traditional costume managers' to improve their

operational flexibility and the industrial policy to improve the facilities of silk firms are highly needed.

The western-style clothes firms are in a better condition than the traditional costume firms. However they are also suffering by similar reasons as the traditional costume case. About 23% and 19% of the managers mentioned price reduction and shrinkage in market demand, respectively, as the key factors why they are in difficulty. In addition, 20% of the managers mentioned marketing difficulties, in finding appropriate sales channels and marketing personnel, and which implies the necessary of a new marketing support system that also covers an electronic commerce. Interestingly, no managers have pointed out the high quality requests of their buyers as the bottleneck in their businesses.

3. Additional Issues : Collaboration and Information Sharing

In general the silk firms are not collaborating each other except the manufacturers in the western-style
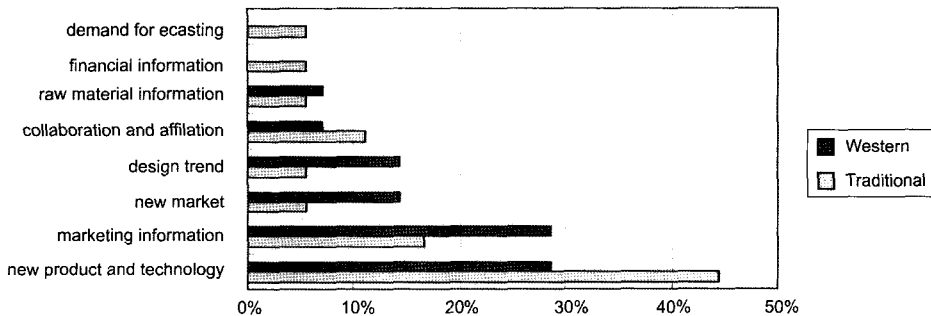
Fig. 11. Needed information

clothes category. But all the managers showed high interests in collaboration. The loss from the lack of collaboration is shown in <Fig. 10>. About 39% and 33% of the traditional costume and western-style clothes managers, respectively, pointed out that the most significant loss is price reduction due to an intensified competition and they mean the necessity of new strategic choices that empower the suppliers in the supply chain.

The managers pointed out the lack of cooperative mind as the key reason for the lack of collaboration with the KSRI and the intensified competition among the manufacturers and lack of information sharing system as the key reasons for the lack of collaboration between suppliers and buyers, respectively. Based on them we can infer that the silk industry needs a unified production system, serving the competitiveness of the supplier by connecting the whole production stages quickly, in addition to the branding and marketing support information system.

Next, with respect to the context of the information, 44.5% of the traditional costume managers pointed out the necessity of new product and new technology information for switching production items, and 29% of the western-style clothes managers also pointed out the same necessity and marketing information, respectively, implying that they are fully aware of the importance of marketing information. The information they need is shown in <Fig. 11>.

As Kulp et al.(2004) have claimed, sharing of the product development and marketing information play critical roles in improving the performance of both

upstream and downstream players of the supply chain. Silk managers should exploit domestic and global B2B(Business to Business) firms to get more new buyers as those informations can be obtained easily by the recent development of the IT and the profits of suppliers are highly dependent on the number of suppliers competing to have business with limited number of buyers. We can observe many Chinese manufacturers are doing online businesses aggressively and gaining competitive edge. Therefore, Korean silk managers should pay more attention to B2B electronic commerce, and a new educational system that allows managers to expand their knowledge on the distribution and information is highly needed to restore the competitiveness of the Korean silk industry.

V. Conclusions

Based on the survey results through questionnaire and in-depth interview, we have found that there exist differences among firms of western-style clothes and traditional costume firms. Summary of the problems and directions for improvements are as follows.

First, the traditional costume firms have high inventories due to high competition and declining demand in the market. So, they need to have an enough flexibility to meet the seasonal demand and an enough capability to diversify production items by material development, design improvement, and process innovations, respectively.

Second, cost reduction and material development capabilities are highly important for the western-style clothes firms since short lead time and small-sized

order increase the cost significantly in the industry. We believe they need more advanced flexible production systems to meet demand. Since the western-style product market is far greater than the traditional costume market, we need to help the traditional costume firms to switch their production items to western-style. In addition, the traditional costume managers are interested in the collaboration among suppliers where as the western-style clothes managers are interested in the sales capability and the cooperative information sharing with buyers.

Third, a unified production system connecting the supply chain is highly needed. The integrated system will improve the bargaining power of the silk firms and help them to collect more demand information. Almost no firm in Jinju uses such an information system and the managers of silk firms need to have new ideas to exploit new B2B opportunities in their businesses.

In conclusion, the Korean silk manufacturers need to develop new materials and improve their design capabilities, and should transform their operation paradigms to allow more flexibility in their operations. In addition to these internal efforts, they also need external efforts such as collecting demand information and building cooperative network with buyers based on the electronic business. These trials will enable the Korean silk firms to build efficient supply chains through strengthening cooperative relationships with current buyers and developing new buyers. To build a strong supply chain, a new program for manager education is imperative since, in the long run, advances in the silk industry is dependent on the capability of the managers who can transform their businesses.

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요   약

한국 실크산업은 수요 감소와 경쟁의 격화로 인해 심각한 도전을 받고 있다. 본 연구에서는 실크산업의 현황을 이해하고 그 경쟁력을 정확히 파악하기 위해 경남 진주지역의 대표적인 실크생산 업체들을 방문하여 설문 및 심층면접조사를 수행하여 관련 기업들의 운영상의 문제점들을 조사하였다. 그 결과 대부분의 경영자들이 제품디자인과 소재에 관련된 개발 필요성은 많이 이해하고 있었으나 기업 운영관리상의 문제에 대해서는 중요성을 충분히 이해하지 못하고 있음을 파악할 수 있었다. 연구결과 국내 실크산업의 경쟁력 회복을 위해서는 공급과잉상태인 한복지 생산기업들을 양장지, 수출용 원단 등의 생산기업으로 유도함으로써 산업 전체의 생산능력을 조정할 필요가 있으며, 원가의 절감과 재고의 감소, 소량 주문 추세 등에 대응할 수 있도록 공급체인의 유연성 증대가 필요한 것으로 나타났다. 또한 공급체인에서 유통업체들과의 협력체제의 구축과 정보의 교환을 통한 마케팅 능력의 향상이 필요한 것으로 나타났다.