

CHAPTER V

Conclusion, Implication, Limitation, and Suggestion

In the conceptual framework of this study, the level of SCM activities was assumed to be different among apparel manufacturers, and it was assumed to have a relationship with the company characteristics. Company characteristics were assumed to have a relationship with inventory performances of fashion goods and basic goods within the three inventory types. The SCM activity implementation was assumed to have a relationship with the inventory performance measures. The research hypotheses were built based on these assumptions (Figure V-1). The survey results supported the research hypotheses. Relationships were found to be significant, and all four hypotheses were rejected. Asterisk marks on the figure represent that the null hypotheses were rejected.

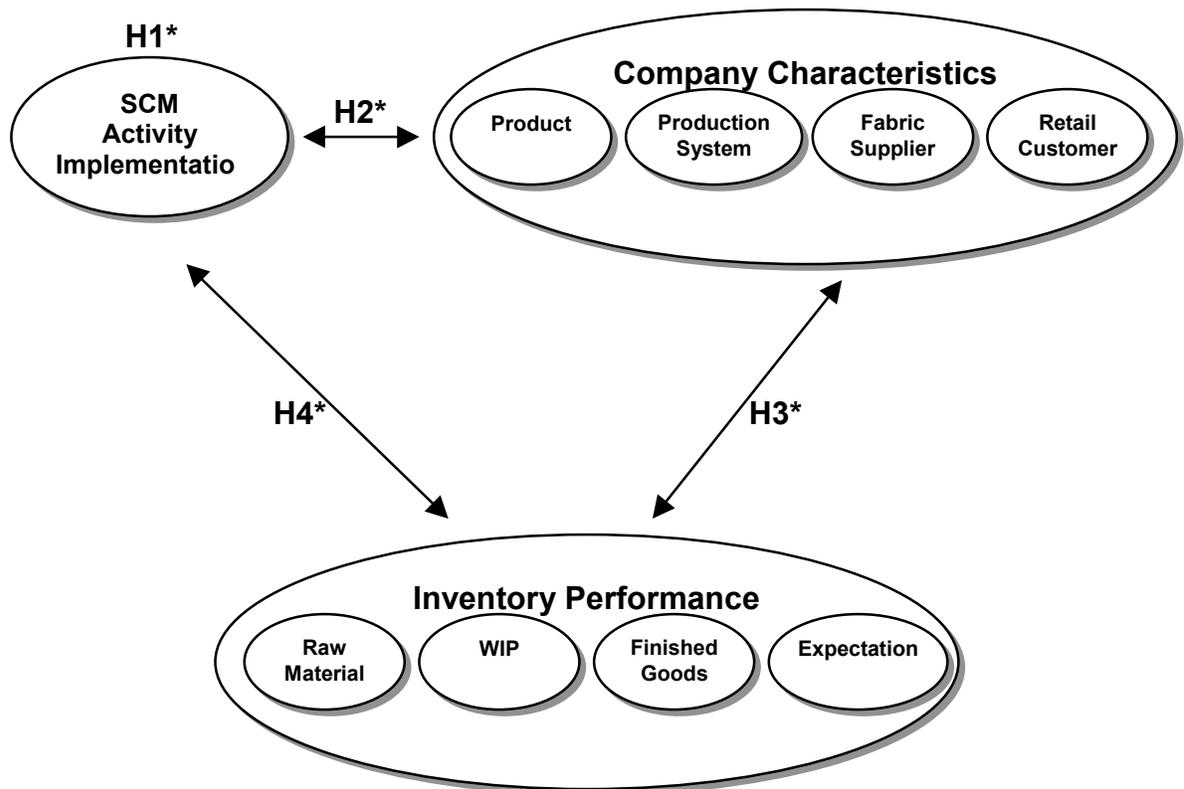


Figure V-1. Conceptual framework of the study

A survey of U. S. apparel manufacturers was done to collect data to these research hypotheses. Data were collected with a four page mailed questionnaire that was developed based on the literature review and previous questionnaires in apparel manufacturing. Of the 1,195 apparel manufacturers that were contacted 93 responses were obtained with a response rate of 9.49 % after four mailings and follow-up activities. Data analysis included the cluster analysis, factor analysis of 17 SCM activity scales, ANOVA, Chi-square analysis, Correlation analysis, and multiple regression analysis to test the hypotheses. The survey results supported the research hypotheses.

Conclusion and Implication

SCM activities adopted from the literature were grouped into six SCM activity dimensions through a factor analysis, which supports the discussions in the literature. Apparel manufacturers who participated in this study could be grouped into three clusters based on the level of SCM activity implementation. In Cluster 1, manufacturers' SCM activity implementation is high overall and these manufacturers are rather large companies according to the number of employees. They produce more basic goods than fashion goods and their fabric suppliers' delivery performance is high. Their retail customers are cost-oriented, relatively big, and the relationship with them is more partnership-like and long-term based, and the retail type is likely to be department store or mass merchandiser. This group can be called 'Model of SCM' in the apparel industry. Cluster 2 manufacturers are relatively small companies compared to Cluster 1. The level of SCM activities for Group 2 varied from high and low across the activities and was, in general, between the levels of Cluster 1 and Cluster 3. They focus more on fashion goods production. Their retail customers are less cost oriented and relatively small companies, and the type is likely to be specialty chain stores and small independent stores. These manufacturers are more likely to be 'Fashion-driven Players'. Cluster 3 manufacturers, whose SCM activity implementation level is the lowest overall, are relatively small companies compared to Cluster 1 and produce more basic goods than fashion goods. Their fabric suppliers' delivery performance is not satisfactory and their relationship with retail customers is less partnership-like and less long-term based, when compared to the

other clusters. Their retail customers are likely to be mass merchandisers. Apparel manufacturers in this cluster can be called 'Routineer'.

Individual SCM activity dimension is significantly related to the company characteristics. Higher Partnership activity implementation is related to the higher fabric suppliers' delivery performance and more desirable relationship with retail customers. Information Technology implementation is mainly related with the retail customers' characteristics such as cost orientation, relative size, and retailer type. Apparel manufacturers who use advanced information technologies (i.e., computer-to-computer communication, EDI) tend to have highly cost-oriented and relatively big retail customers and the retailer type is likely to be department store and mass merchandiser. Management Commitment implementation is related with men's wear production, more desirable fabric suppliers' delivery performance, highly cost-oriented retail customers, and more desirable relationship with retail customers. For apparel manufacturers who implement more Demand Characterization activities, their production system is likely to be those for flexible specialization (i.e., modular system, UPS) and the relationship with retailers tend to be more partnership-like and long-term based.

In brief, out of four company characteristics, SCM activity implementation is closely related with the retail customers' characteristics according to the results by SCM activity clusters or individual SCM activity dimensions. Fabric suppliers' delivery performance is also closely related with the SCM activity implementation levels. This finding is consistent with the definitions of SCM (Giunipero & Brand, 1996) that the cooperation between chain members determine the SCM activity implementation level. Desirable relationship with the retail customers as found in this study supports the discussion (Ellram & Cooper, 1993) that close partnership is not only a prerequisite for the SCM, but also a benefit of it.

Company characteristics were significantly related to the inventory performance of apparel manufacturers. Out of 17 inventory measures selected for this study, on-time delivery rate and delivery lead-time measure are found to be more susceptible to changes

in company characteristics. On-time delivery rate of basic goods and fashion goods are positively related to the fabric suppliers' delivery performance. On-time delivery rate of basic goods is negatively related with the fashion goods production volume and flexible production system. Inconsistent relationships among product characteristics, production system, and fabric suppliers delivery performance with on-time delivery rate of basic goods indicate that improvement of on-time delivery rate might not be apparent, although apparel manufacturers make changes in production system to increase the fashion goods production volume and select the fabric suppliers who have desirable delivery performance. Instead, apparel manufacturers who focus more on basic goods production in a large volume with the assistance of fabric suppliers in fabric delivery can experience the improvement in on-time delivery rate of basic goods to retail customers. This finding shows that SCM activities may not be improving the time to market and the consumer reactivity of fashion goods, but it is consistent with the information about basic goods and automatic replenishment systems, as described by Kincaid and Cassill (1993).

Long delivery lead-time of fashion goods is found among apparel manufacturers with a high fashion goods production volume, more flexible production system, and specialty chain retail customers. This finding indicates that apparel manufacturers who handle high fashion level goods with the specialty chain stores might need to carry high level of finished fashion goods at their own expense in anticipation of retail customers' order. This condition is counterproductive to the purpose of fashion goods and the ability of manufacturers to meet the demands of consumers.

Shop lead-time of basic goods could be shortened by apparel manufacturers who focus more on basic goods production with fabric suppliers of desirable delivery performance, and retail customers of small independent stores. This finding is consistent with the Industry Surveys by Standard and Poor's (1998) in that basic goods manufacturing companies require shorter lead-times.

In summary, involvement with more fashion goods production seems to put a complex task on apparel manufacturers. It does not show apparent improvement for basic

goods inventory performance (i.e., shop lead-time, on-time delivery rate) and shows unfavorable results for fashion goods inventory performance (i.e., delivery lead-time). This inconsistent relationship with company characteristics and inventory performance might be one reason why apparel manufacturers of fashion goods are struggling with high level of inventory although they are changing more to improve. SCM might reduce lead-time when retailers order fashion goods, this shortened lead-time seems to come at the expense of manufacturers' higher inventory level. However, basic goods manufacturers might see the apparent improvement when they actively implement the SCM activities. They can order fabrics for basic goods more frequently, shorten shop lead-time, increase on-time delivery rate, and increase inventory turnover ratio for basic goods. This finding is consistent with previous studies and relevant literature (Iyer & Bergen, 1997; Fisher et. al., 1997)'s discussion.

Apparel manufacturers who have fabric suppliers with high delivery performance and who maintain a desirable relationship with retail customers are expecting more improvement in inventory performance such as fill rate, order lead-time, on-time delivery rate, turnover ratio, and overall inventory level. This finding indicates that apparel manufacturers are aware that cooperation with chain members is necessary to realize the improvement of inventory performance; however, their expectations are not fulfilled as evidenced by these data.

SCM activity clusters showed a few significant mean differences in inventory performances. Apparel manufacturers in Cluster 1 showed the lowest raw material inventory level for fashion goods in terms of WOS (Weeks of Supply). Apparel manufacturers in Cluster 2 had the shortest production lead-time for fashion goods. Implementation of individual SCM activity dimensions is related with the ten detailed inventory performance measures and all the five expectation measures. The findings in this study indicates that a high level of SCM activities in all the dimensions at the same time does not necessarily guarantee the favorable performances in inventory performances of the company. The relationship between inventory performance for fashion goods and basic goods, and some SCM activity dimension is contradictory to the

anticipated results. Although apparel manufacturers can invest more to implement SCM activities and expect to see apparent improvement in inventory performance, they might not have yet realized the benefit of SCM. Company characteristics such as retail customers' may intervene between the relationship of SCM activity level with inventory performance measures. Additional variable might have an interaction effect on inventory performance. As stated by Subramanian and Nilakanta (1996), company characteristics can alter innovations implemented in a company.

Another finding is that not all respondents might be familiar with the SCM activities or inventory performance measures used in this study. For instance, many did not understand the term QR, although this term is widely used in the literature. Many respondents did not answer to the inventory performance questions. They might have been reluctant to reveal their performance, but they might not be familiar with those measures and/or do not use them. This finding implies that the apparel industry, especially for apparel manufacturers, might be a more difficult industry in which to implement SCM activities, unlike other industries where standardized products are prevalent. When comparing the apparel manufacturers' efficiency, a common performance measure such as inventory performance measures used in this study might not be a good indicator of level of SCM activity implementation if the unique conditions specific to fashion apparel goods are not considered together.

Limitations and Suggestions

The biggest concern of this study is the randomness of the sample. Because of its small sample size (n=93), this study has a limitation in generalizing the findings into the population if the randomness of the sampling is violated. This research can be repeated with a larger sample and with more small apparel companies to be representative of the total population. When the sample size is big, the more diverse SCM activities can be included in the factor analysis and may explain more variance of SCM activity dimensions.

Not all the SCM activities used in this study identified through the literature are directly related to the apparel industry. The SCM activities adopted from other industries might not be the ones that must be implemented in the apparel industry. To determine the apparel manufacturers' SCM activity implementation level with these measures might not be realistic. Further study is suggested. In-depth interviews or focus groups with apparel manufacturers might be useful to refine the questionnaire and increase knowledge of specific SCM activities for the apparel industry.

SCM activity implementation level was examined from the perspective of apparel manufacturers. Future research can be applied to examine from the perspective of retailers and textile producers to thoroughly understand the supply chain of the apparel industry. The relationships between SCM activity implementation level and inventory performance of retailers and textile producers may vary unlike apparel manufacturers.

In future study, the SCM activity clusters identified in this study (i.e., model of SCM, mixed use of SCM, low level of SCM) need to be profiled with additional company characteristics not used in this study. Variables that included financial measures would be useful to establish a cost/benefit analysis. For example, management strategies, manufacturing and sourcing strategies, human resource activities, and financial situation can be used. Additional variables that could impact SCM activities could be studied. Pre-production activities including design could impact lead-time. Lead-time could also be affected by source of production activities including outsourcing from overseas. Length of time for implementation of SCM could also be examined.

Many missing values in the company characteristics and inventory performance measures reduced the researcher's ability to compare the effect of company characteristics on the relationship between SCM activity implementation level and inventory performance. In addition, direct and indirect relationship between SCM activity implementation level and inventory performance could not be compared. To solve this kind of problem, additional pilot work should be done to refine the variables. More

interviews with apparel manufacturing practitioners is needed to determine the reasons that the questions for these variables were not completed.

In this study, SCM activity implementation level was analyzed in a group or individually. ANOVA and correlation analysis were mainly used. To examine the relationship between integrated SCM activity implementation level and other categorical and continuous variables, multivariate analyses can be used for future study, such as MANOVA and canonical correlation analysis.

Such a low response rate in this study should be considered for the future study. A mail survey seems to require techniques in selecting the sample frame and mailing time and method. The reliability of the sample frame is important. In this study, non-deliverable addresses amount to about 18%. November and December are not the appropriate season to do a mail survey because of holidays. More attractive incentives and brief format of the questionnaire might be required to boost the participation.

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