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The effects of Supply Chain Management Factors on the Performance of SCM Adoption in Textile/Apparel Firms[+]

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Abstract

The purpose of this study was to investigate how component factors of SCM affect the performance of textile and apparel firms in a competitive market.

For the methodology of this study, the questionnaire was developed based upon the literature review. 150 questionnaires were distributed to the CEOs, CMOs,and experts who operate SCM in textile and apparel firms. The returned usable 85 were analyzed by SPSS10.0 with multiple regression analysis and Cronbach's Alpha for internal consistency and reliability.

The performance of the textile and apparel firms that adopted SCM was affected by information system, partnership, and business environment in a descending order. For details, the performance of the textile and apparel firms that adopted SCM was affected by computerization, information sharing, CEO's concern, alliance, and support in a descending order.

Key words : Supply Chain Management, Performance, Textile/Apparel business

Ⅰ. Introduction

Faster product development, and increasingly flexible manufacturing systems, an unprecedented number and variety of products are competing in global competitive markets from apparel to computers (Fisher, 1994)[1]. In order to sustain continuing growth, even to survive competitive business environment such as globalization, Internet availability, information age, innovation of production, and rapid changes of consumer needs, companies try to adopt new and innovative

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business management such as Supply Chain Management (SCM) to respond quickly and flexibly on market changes.

SCM is to enhance competitiveness and flexibility of company, and to fortify customer satisfaction. According to Beamon (1998)[2] and Swaminathan (1998)[3], SCM is to network inter business components through production and supply processes from raw material industry to final customers. The primary objective of SCM is to increase the value of products and services to customers in the supply chain vis-à-vis improved customer service and quality, and lower inventory carrying costs (Wisner, 2003)[4]. By fine-tuning inventories according to SKU-level demand, a manufacturer can increase profits and reduce inventory risks (Abernathy, 2000)[5]. The value created by firm's SCM efforts clearly supports organizational strategy. Successful SCM can results in lower system inventories, a network of firms that responds more quickly to market changes, and products that more closely match customer expectations.

In textile/apparel business there are particular characteristics to be differentiated from other business, that is long channel length, small & medium sized business, diversified consumer demands, short cycle in product life, small production in many items, need for consumer-oriented marketing strategy, and globalization.

Regarding to SCM in textile/apparel business, first, component is the range of participants. All channel members within a company or between companies should be involved in the chain activities. Second, component is the flow of both materials and information. Whether raw materials or finished goods or information flow simultaneously both upstream and down stream. Third, integrated and coordinated value-added activities are required such as cross-functional approach, joint planning and forecasting, flexible operations.

According to Oh (2001)[6], labor-intensive and a small-scale enterprise and lack of liaison with inter business in fashion and textile industry are the main reasons to incomplete performance of SCM.

Previous researches have been focused on efficiency of SCM (Ku, 2000; Kim, 1997 Yoon, 2001)[7][8][9], and system development for implementing SCM (Kim & Park, 1999)[10], and SCM factors (Lee, 2000: Park, 2000)[11][12]. Very little verifying research has been done on the effects of SCM factors on the performance of SCM adoption in textile/apparel firms.

Therefore, the purpose of this study was to investigate how component factors of SCM affect the SCM performance of textile and apparel firms in a competitive market.

Ⅱ. Review of Literature

A supply chain can be defined as a network of autonomous or semiautonomous business entities collectively responsible for procurement, manufacturing and distribution activities with one or more families of related products (Swaminathan, 1998)[3]. Christopher (1994)[13] indicated that Supply Chain Management covers the flow of goods from supplier through manufacturing and distribution chains to the end user. According to Bowersox (1997)[14], Supply Chain Management is a collaborative-based strategy to link cross-

enterprise business operations to achieve a shared vision of market opportunity. Integrated Supply Chain Management is a process-oriented, integrated approach to procuring, producing and delivering products and services to customers (Metz, 1997)[15]. The Global Supply Chain Forum (1998)[16] represented that Supply Chain Management is the integration of business processes from end user through original suppliers that provides products, services, and information that add value for customers. Thus, Supply Chain Management is seen as a key to delivering higher customer satisfaction with reduced lead times and costs (Bhattacharya, 1996)[17].

For successful Supply Chain Management, the components of SCM played important role to promote SCM performance. Anderson & Favre (1997)[18] indicated major successful factors of SCM were information system, strategic alliance with suppliers, and flexibility of supply chain. Scharlacken (1998)[19] and Metz (1997)[15] showed the components for successful SCM operation such as credibility among members, and information system. According to Derocher & Kilpatrick (2000)[20], information system, alliance, and integrated management among industries were the important SCM components. Also, CEO's concern, and progressive support for successful SCM operation were significant business environmental factors and partnership with credibility was critical SCM component (Ellrem, 1995)[21].

Based upon studies of Anderson & Favre (1997)[18], Fine (1999)[22], and Gill & Abend (1997)[23], SCM performed cost reduction, reduced lead-time, reduced inventory, increasing sales volume, and effective operational management, CLM (Council of Logistics Management, 1998)[24] conducted research that SCM performed better customer services, cost reduction, and increasing effective productivity of whole supply chain.

Ⅲ. Research Methodology

Through the literature reviews (Derocher & Kilpatrick, 2000; Ellram, 1995; Walker, 1995; Lee, 2000; Park, 2000)[20][21][25][11][12], three factors of SCM such as information system (standardization of computerized intra/inter business, information sharing with intra/inter business, computerization of infrastructure on intra/inter business), business environment (CEOs' concern about incorporating SCM, degree of assistance from government and textile/apparel federation, individual participation from organization), and partnership (alliance, openness of corporate culture and information sharing with intra/inter business, credibility of partners) were identified and measured by 7 point Likert type scale (7: very much do so, 1: very much not do so).

Based upon previous review of literature (Anderson & Favre , 1997; Fine , 1999; Gill & Abend, 1997; Council of Logistics Management, 1998)[18][22][23][24], enhancing customer services, cost reduction, improving operational management, and increasing sales & profits were measured by 7 point Likert type scale (7: very much do so, 1: very much not do so) for SCM performances of the textile and apparel firms.

For the methodology of this study, the questionnaire was developed based upon the literature review (Derocher & Kilpatrick, 2000;

Lee, 2000; Park, 2000)[20)11)12)]. The questionnaire was composed of business environment (17questions), information system (20questions), partnership (17questions), SCM performance (27questions), and demographic information (12questions). For sampling, we used convenience sampling of nonprobability sampling technique. 150 questionnaires were distributed to the CEOs, CMOs, and experts who operate SCM in 14 textile and apparel firms adopted SCM system. The returned usable 85 were analyzed by SPSS10.0 with multiple regression analysis and Cronbach's Alpha for internal consistency and reliability.

Ⅳ. Results and Discussion

Here are demographic information and Cronbach's Alpha for internal consistency and reliability.

〈Table 1〉 Demographic information

		Freq.	%			Freq.	%
Gender	Male	65	76.5	Product category	Fiber	14	16.5
	Female	20	23.5		Fabric	10	11.8
Total		85	100		Dying & finishing	15	17.6
Age	20–29	40	47.0		Apparel Manufacturing	7	8.2
	30–39	26	30.5		Apparel distribution	21	24.7
	40–49	17	20.0		Apparel Manufacturing & distribution	18	21.2
	Over 50	2	23.5				
Total		85	100	Total		85	100
Education	High school	2	2.4	Sales Volume	Below 5billion	9	10.6
	College	12	14.1		5billion–20billion	16	18.8
	University	71	83.5		20billion–40billion	28	32.9
Total		85	100		40billion–60billion	13	15.3
Major	Business	24	28.2		60billion–80billion	9	10.6
	Liberal art	11	12.9		80billion–100billion	5	5.9
	Clothing & textile	19	22.4		Over 100billion	5	5.9
	Textile engineering	16	18.8	Total		85	100

〈Table 1〉 continued

		Freq.	%			Freq.	%
Major	Engineering etc	10	11.8	Types of production	Mass production with a few items	6	7.1
	Liberal art etc	3	3.5		Small production with a few items	4	4.7
	No response	2	2.4		Mass production with many items	28	32.9
Production Composition	Repeat production	46.8%			Small production with many items	44	51.8
	Planned production	53.8%			Mass-customized production	3	3.5
Total		100%		Total		85	100

〈Table 2〉 Cronbach's Alpha for internal consistency and reliability

		Variables	Chronbach's Alpha
Dependent variable		SCM performance	0.9613
Independent variables	Hypothesis 1	Business environment	0.9287
		Information system	0.7317
		Partnership	0.8969
	Hypothesis 2	CEO' concern	0.9466
		Employee participation	0.9233
		Support	0.7938
		Computerization	0.9056
		Standardization	0.8588
		Information sharing	0.8788
		Credibility	0.8469
		Alliance	0.8593
		Openness	0.8104

The results of this study were as follows:

Hypothesis 1 : Business environment, information system, and partnership affect the SCM performance of the textile and apparel firm.

H 1-1 : Business environment affects SCM performance of textile and apparel firms.
H 1-2 : Information system affects SCM performance of textile and apparel firms.
H 1-3 : Partnership affects SCM performance of textile and apparel firms.

As a result of regression analysis for figuring out the effects of three factors on SCM performance, there was a significance (F=16.889) with 0.001 significant level.

The performance of the textile and apparel firms that adopted SCM was affected by information system (β=0.355), partnership (β=0.330), and business environment (β=0.229) in a descending order.

$$Y_1 = 0.146X_1 + 0.299X_2 + 0.125X_3 + 2.16$$

Y_1= SCM performance,
X_1= business environment
X_2= information system,
X_3= partnership

Hypothesis2: Component detail factors (CEO's concern, employee participation, support, computerization, standardization, information sharing, credibility, alliance, and openness) affect SCM performance in textile and apparel business.

〈Table 3〉 Multiple regression analysis on Hypotheses

Factors	Non-standardized coefficient		Standardized coefficient	t-value	P-value
	B	Standard error	β		
Business environment	0.146	0.109	0.229	1.949	.045
Information system	0.299	0.099	0.355	3.000	.003
Parnership	0.125	0.382	0.330	1.151	.025

Dependent variable : SCM performance R^2=0.384
F-Value : 16.889
Sig.: 0.001

According to multiple regression analysis, there was significance (F=6.868) with significant level 0.01. The performance of the textile and apparel firms that adopted SCM was affected by computerization (β=0.371), information sharing (β =0.348), CEO's concern (β=0.329), alliance (β =0.280), and support (β=0.248) in a descending order.

$$Y_1 = 0.193X_1 + 0.200X_2 + 0.264X_3 + 0.298X_4 + 0.248X_5 + 0.67$$

Y_1 = SCM performance, X_1 = CEO's concern,
X_2 = support X_3 = computerization,
X_4 = information sharing, X_5 = alliance

〈Table 4〉 Multiple regression analysis on hypothesis

Factors	Non-standardized coefficient		standardized coefficient	t-value	P-value
	B	Standard error	β		
CEO's concern	0.193	0.081	0.329	2.374	.020
Employee participation	0.010	0.117	0.016	0.091	.927
Support	0.200	0.101	0.248	1.975	.049
Computerization	0.264	0.120	0.371	2.200	.030
Standardization	0.001	0.148	-0.001	-0.001	.999
Information sharing	0.298	0.161	0.348	1.850	.038
Credibility	0.171	0.128	-0.190	-1.338	.185
Alliance	0.248	0.124	0.280	2.003	.048
Openness	0.159	0.114	0.192	1.390	.168

Dependent variable : SCM performance R^2=0.452

F-Value : 6.868

Sig.: 0.003

Recently, textile and apparel industries realized the importance of SCM and tried to fortify infra structure to apply SCM system. According to the results of this study, information system was the most important component to accomplish the SCM performance. Standardized computerization for standard SCM system supposed to be prerequisite through fiber/textile/apparel/distribution industries to conduct real SCM operation as one of the most important management practice for determining worldly class performance.

So, Supply Chain Management (SCM) which is reflected in the strategy of quick response in the apparel industry can boost the textile and apparel industry from a labor-intense and petty to information and technology-intense business.

Ⅴ. Conclusion

This study investigated how the SCM performance was affected by SCM component factors such as information system (computerization, standardization, and information sharing), business environment (CEO's concern, employee participation, support from government & textile/apparel federation), and partnership (credibility, alliance, and openness of corporate culture & information). Furthermore, this study can suggest the idea to implement SCM for domestic textile and apparel companies adopted SCM but incomplete SCM performance efficiently, and provide competitive power in global market.

As a result, information system, business environment, and partnership affect SCM performance significantly. Moreover, we can find that information system most influence upon SCM performance. Therefore, before adopting SCM into companies, there were some kinds of prerequisite to standardization. Standardization should be required for infra structure of textile and apparel industry promoting SCM performance. Furthermore, building information system for computerization let share information between inter business in order to utilize efficient production and distribution process.

In detail, component factors in information system such as computerization and information sharing are most powerful factors to effect performance efficiently. CEOs' concern for adopting and implementing SCM into thy companies, strategic alliance are next important factors to complete and enhance their SCM performance. Also, support from government and textile/apparel federation is influential factor to promote SCM performance.

Due to the reason that Supply Chain Management is the overall project from fiber industry to apparel manufacturing to retail industry to perform one large circulation of information, product, and service between inter businesses rather than intra business, there are significant components to effect SCM performance such as technology for computerization, corporate culture for information sharing between inter industries, CEOs and top managers concern and knowledge that how SCM can be incorporated into their companies, how they develop employee education and seminars to convey SCM efficiently, and how they provide funds for initial and operating cost, alliance, and support from government and textile/apparel federation.

The limitation of this study was that the results were whole overview to figure out SCM performance based upon sampling groups, so there was need to be cautious to generalize these results to whole population.

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