

Identifying Critical Success Factors in Supply Chain Performance

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ABSTRACT

Because of the rapidly changing business environment, companies must have the ability to quickly respond to environmental changes in order to survive. This study explores supply chain critical

success factors in supply chain performance. In this paper we review the relevant literature and establish related hypotheses. For the purpose of data collection, a survey form is developed based on the constructs for the study model. The questionnaire is designed using a five point Likert scale and administered to respondents. Total valid responses of 337 are used for this study purpose. Descriptive statistics of independent and dependent variables are identified. A regression analysis is conducted for model parameter estimates of supply chain performance with supply chain critical success factors. Study findings show that management may be in a better position dealing with CEO leadership commitment, customer information sharing, supply stability and flexibility, and supplier operational integration, in order. This study is expected to provide supply chain managers and relevant decision-makers with strategic insights for improving decision-making in a supply chain environment and other similar business settings.

Keywords: Supply Chain Management, Critical Success Factors (CSF), Supply Chain Performance

INTRODUCTION

An emerging management concern in companies that operate internationally and/or locally is to explore critical success factors (CSFs) for supply chain management (SCM), which incorporates appropriate supply chain practices to interact with partners (customers, distributors, and suppliers) in a holistic setting. Well-integrated supply chain activities are one of the critical success factors (CSF) that improve supply chain performance (Ab Talib and Hamid, 2014, Huang et al., 2022; Lin et al., 2010).

Real-time information exchange with suppliers in the upstream and with customers in the downstream will create additional value. Linkages which help reduce lead-times undoubtedly will reduce adverse effects (e.g., bullwhip effects) and contribute to enhancing performance. From the theory standpoint, it has been well-known that supply chain critical success factors create strategic advantages in supply chain operations. However, there has been a lack of research to explore and measure such critical success factors in terms of an integrated perspective on performance metrics in real-world supply chain strategy situations (Cox, 1999; Gaukler, Seifert and Hausman, 2007; Kwon and Suh, 2015, Manuj and Sahin, 2011; Yontar, 2023).

The purpose of this study is to identify CSFs affecting a partnership relationship in SCM, explore CSFs affecting the relational quality in SCM, examine SCM performance, and to recommend appropriate supply chain strategies for global and local companies.

Section 1 of this paper introduces the current issues in supply chain management, especially in the area of linkages, and outlines the purpose of this study. Section 2 briefly describes a conceptual model of supply chain linkage and performance, followed by a description of methodology in Section 3. Section 4 explains the model building process and discusses the results. Section 5 summarizes the overall study results, including concluding remarks.

STUDY BACKGROUND AND HYPOTHESES

Due to the constant development of the economy and trade around the world, supply chains are facing a more complex competitive environment, and companies are facing more intense

competition (Attaran, 2012; Banik et al., 2022; Soin, 2004). Competition between companies has changed into competition between supply chains where companies are based on simple product quality and performance. Companies have also realized that their success depends on their ability to manage their supply chain management (Ahi and Searcy, 2013, Khan et al., 2018; Lee, Kwon and Severance, 2012; Waqas et al., 2023)

The basic principle of supply chain management is to achieve efficient supply chain operation by establishing partnerships between members. A partnership can be defined as a specific business relationship based on mutual trust, information sharing, risk sharing, and profit sharing, and this relationship can create greater business performance than individual companies as a corporate competitive advantage. Creating overall benefits through building partnerships between supply chain members is one of the prime objectives of supply chain management (Carter and Rogers, 2008; Denolf et al., 2015; Narasimhan and Nair. 2015; Kim and Lee, 2018).

Supply chain management encompasses the integration, coordination, and collaboration of the entire supply chain, improving management performance through close internal functions of a company, and also has the effect of linking with the external operations of suppliers and other members of the supply chain community. Trust is one of the most important factors in cooperation between partners, and mutual trust plays a very important role in reducing uncertainty and functional conflict and building long-term relationships between partners in the supply chain. The higher the trust index between partners, the more positive influence it has on business process integration that fosters improving performance (Schmidt, Foerstl and Schaltenbrand, 2017; Zacharia, Nix and Lusch, 2011).

It was said that information sharing between partner companies clearly has an impact on supply chain performance. The higher the level of information sharing between partner companies, the better business and supply chain performance. Supply chain information sharing was defined as the act of exchanging and delivering information between companies during a specific transaction or cooperation process (Huo, Zhao and Zhou, 2014; Narasimhan and Nair, 2015). In addition, it was suggested that a company's top management plays a significant role when making strategic decisions in supply chain management, and that through information sharing, companies in the supply chain can achieve good management performance and acquire more market share. Sharing information related to production or transportation can improve management efficiency and customer satisfaction because resource use, production activities, and rule compliance can be managed and coordinated harmoniously (Koh, Gunasekaran and Goodman, 2011; Banik et al., 2022).

As the global manufacturing paradigm changes, manufacturing companies need to develop and change their business models. Although there are still gaps in the level of supply chain management across manufacturing companies, the key success factors for supply chain management have already been formed and are beginning to receive widespread attention from companies. Supply chain management key success factors have a significant impact on supply chain capabilities, which in turn have a significant impact on supply chain performance, and supply chain management process maturity and supply chain performance both have a significant impact on corporate performance (Faisal, 2010; Phan et al., 2019; Sarkis, 2003).

This study examines the relationship between business performance and critical success factors which link suppliers, internal operations, and customers in supply chain management.

Accordingly, this study established the following hypothesis based on theoretical grounds and previous studies.

H1: Supply stability and flexibility (SSF) has a positive relationship with overall supply chain performance.

H2: CEO leadership commitment (LCM) has a positive relationship with overall supply chain performance.

H3: Customer operational integration (COI) has a positive relationship with overall supply chain performance.

H4: Supplier operational integration (SOI) has a positive relationship with overall supply chain performance.

H5: Customer information sharing (CIS) has a positive relationship with overall supply chain performance.

H6: Supplier information sharing (SIS) has a positive relationship with overall supply chain performance.

METHODOLOGY

A survey instrument was designed based on the constructs for the research model. Respondents are asked to indicate the supply chain related factors of their firm. The questionnaire was designed using a five- point Likert scale and included typical demographic information of the respondents and company. The instrument was pre-tested and finalized to improve clarity reflecting all comments and questions. A series of meetings with experts was followed to measure the content validity and reliability of the instrument. The survey was administered to individuals identified from various managers practicing in supply chain activities. The cover letter specifically requested to forward the questionnaire to appropriate person(s) within the organization. Questionnaires with an introductory letter were distributed to the various regions by regular mails, emails, and e-survey forms. Multiple mailings and

follow-up emails resulted in total valid responses of 337 for this study purpose. In order to measure non-response bias, 12 valid returns from the reminder were used to examine whether the contents of these late returns were significantly (statistically) different from those returns from the first two reminders. The latter is considered as representative of non-respondents (Lambert and Harrington, 1990; Kannan and Tan, 2002). The t-test results of means of integer variables and frequency of nominal and/or categorical variables for two groups of returns do not show any statistically significant differences.

MODEL RESULTS AND DISCUSSION

We developed the six hypotheses that were mentioned in the previous section. Table 1 shows descriptive statistics and correlation analysis for each independent and dependent variable. Pearson’s correlation coefficients show on all variables that are significant.

Table 1. Descriptive Statistics of Study Variables (N=337)

Var.	Mean	SD	Correlation					
			SSF	LCM	COI	SOI	CIS	SIS
SSF	3.779	.613						
LCM	3.895	.701	.718**					
COI	3.806	.621	.741**	.705**				
SOI	3.870	.690	.702**	.667**	.710**			
CIS	3.806	.656	.724**	.683**	.706**	.691**		
SIS	3.791	.634	.705**	.683**	.714**	.665**	.841**	
SCP	3.987	.666	.721**	.752**	.674**	.688**	.743**	.714**

** : p < 0.01

Note: SSF: Supply stability and flexibility, LCM: leadership commitment
 COI: Customer operational integration, SOI: Supplier operational integration
 CIS: Customer information sharing, SIS: Supply information sharing
 SCP: Supply Chain Performance

A reliability test was conducted. Cronbach’s alpha is used to assess the reliability of each scale. Alpha values over 0.7 indicate that all scales can be considered reliable (Nunnally, 1978). Cronbach’s alpha of .934 with a number of items of 35. Hotelling’s T-Squared 340.184, 9.023 ($p < .000$). It shows all measurement items are reliable for further study.

Means for composite independent variables are 3.779 for SSF, 3.895 for LCM, 3.806 for COI, 3.870 for SOI, 3.806 for CIS, and 3.791 for SIS respectively, with corresponding standard deviation (SD) of .613, .701, .621, .690, .656 and .634 respectively. Mean of performance measurements is 3.987 with SD of .666. Table 1 also provides correlation coefficient values among variables.

Table 2. Model Parameter Estimates of Supply Chain Performance

Model (Dependent Variable: SCP)	B	Std. Error	t	VIF
(Constant)	.356	.140	2.543**	
SSF	.168	.058	2.865***	3.109
LCM	.308	.047	6.524***	2.641
COI	-.001	.057	-0.025	3.053
SOI	.135	.047	2.843***	2.590
CIS	.239	.063	3.806***	4.110
SIS	.098	.064	1.543	3.938

Model Summary: Adj R² = .686, F = 123.601***

** $p < .05$, ***: $p < .01$

The variance inflation factors (VIF) are estimated to check the degree of multicollinearity. The VIF in this model has SSF (3.109), LCM (2.641), COI (3.053), SOI (2.590), CIS (4.110) and SIS (3.938). Thus, no serious multicollinearity is present among independent variables in the model. For the overall performance model,

multiple linear regression analyses are used to develop models relating the measures of supply chain performance to the five independent variables.

Table 2 shows coefficients of each model along with corresponding test statistics. Table 2 suggests that although many firms expend significant effort to manage critical success factors, not all are equally successful. In the model, where the dependent variable is overall supply chain performance, the model seems to be reliable (p -value for $F < 0.01$) and adequate with adjusted R-square of 0.686. LCM CSF (beta coefficient = .308 and t value of 6.524 with p -value for $t < 0.01$) is the most important determinant in overall SCM performance, followed by customer information sharing (CIS) CSF (beta coefficient = .239 and t value of 3.806 with p -value for $t < 0.01$). The results also show that SSF and SOI have a similar effect on the supply chain performance. COI and SIS do not provide as strong of an association as the other CSF activities.

Management may be in a better position dealing with CEO leadership commitment (LCM) first, before dealing with customer information sharing (CIS), supply stability and flexibility (SSF), and supplier operational integration (SOD). Thus, firms need to pay more attention in planning to improve CEO commitment towards supply chain management, then, consider supply stability and flexibility to integrate with customers via information sharing on the downstream side of a supply chain as well as supplier operations side.

If customers trust an eco-friendly product, they will believe that the product will greatly benefit the environment in the future and will not damage the environment. Products that ensure the sustainability of supply chain management, such as green and environmentally friendly products, can have a positive impact on business performance by satisfying customers and generating higher purchase intent. It is difficult for manufacturing companies

to achieve good supply chain structural development alone in a highly competitive market due to limited size and resources and insufficient supply chain management expertise. Companies must form strategic partnerships with other companies if they want to survive in such fiercely competitive markets. Through these strategic partnerships, each company can demonstrate its core capabilities by complementing each other's strengths.

CONCLUSION

Well-defined supply chain linkages have been a critical success factor to improve a supply chain performance across a wide range of industries. In the near future, a more intelligent and innovative supply chain management (SCM) system will meet new business demands as market leaders develop paradigms of new supply chain business practices. Many firms have already identified value through supply chain integration with operations, information sharing, with customers, suppliers, and internal leadership. Such efforts will provide SCM with innovative insights for planning and executing applicable supply chain operational strategies (Pettit and Beresford, 2009; Seuring and Müller, 2008).

For enterprises, implementing green supply chain management is not a mandatory environmental protection strategy. It is, however, increasingly consistent with the economic interests of the enterprise, and establishes long-term cooperative partnerships to enable partner enterprises in the supply chain to achieve common profits and environmental protection goals (Andersen and Skjoett-Larsen, 2009; Mollenkopf et al., 2010).

As a result of an empirical analysis of companies that are adopting and utilizing a supply chain management system, it has been proved that the higher the trust between supply chain partners, the stronger the solidarity and the more likely a long-

term, cooperative supply chain partnership can be formed and maintained.

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APPENDIX An extended questionnaire

General characteristics

What is your position in your organization?

What is your gender?

What is your age?

What is your company's position in the supply chain?

A 1-5 Likert scale was used for responses from 1 – you strongly disagree that this statement describes your work to 5 – you strongly agree that this statement describes your work.

Supply Stability (Flexibility): supply stability and supply flexibility in your organization.

SSF1: Raw materials have supplied in stable manners.

SSF2: Numbers of suppliers in raw materials are plenty.

SSF3: Amounts of supplying raw materials are predictable.

SSF4: Your supply chain is able to quickly react on rapidly changed environment.

SSF5: Your supply chain is able to quickly implement on new product launch/development

Leadership Commitments: CEO or top leadership commitment to supply chain management in your organization.

LCM1: Your CEO/leader encourages open communications.

LCM2: Your CEO/leader supports fully education and training program.

LCM3: Your CEO/leader provides guidelines to solve a problem related to SCM activities/work

LCM4: Your CEO/leader is interested in making proper relationship with business partners.

LCM5: Your CEO/leader is proactive in a financial support for supply chain management.

Customer (Downstream Partner) Operational Integration:

Operational integration with your DOWNstream supply chain partners, e.g., your customers.

COI1: Functional departments are well coordinated and communicated each other.

COI2: Information technologies (IT) are utilized for exchanging information with suppliers.

COI3: Strategic alliance is implementing with suppliers.

COI4: Stable purchasing networks has been built with suppliers.

Supplier (Upstream Partner) Operational Integration:

Operational integration with your UPstream supply chain partners, e.g., your suppliers.

SOI1: Functional departments are well coordinated and communicate well with each other.

SOI2: Information technology (IT) is utilized for exchanging information with suppliers.

SOI3: Strategic alliances have been implemented with suppliers.

SOI4: Stable purchasing networks have been built with suppliers.

Customer (Downstream Partner) Information Sharing: Information sharing with your DOWNstream supply chain partners, e.g., your customers.

CIS1: Communication among supply partners is proactive rather than reactive

CIS2: Information among supply partners is useful and able to be used for a practical purpose.

CIS3: Information among supply partners is accurate.

CIS4: Information among supply partners is timely.

CIS5: Information among supply partners is reliable (consistently good in quality or performance; able to be trusted).

CIS6: Information among supply partners can be easily acquired.

Supplier (Upstream Partner) Information Sharing: information sharing with your UPstream supply chain partners, e.g., your suppliers.

SIS1: Communication among supply partners is proactive rather than reactive

SIS2: Information among supply partners is useful and able to be used for a practical purpose.

SIS3: Information among supply partners is accurate.

SIS4: Information among supply partners is timely.

SIS5: Information among supply partners is reliable (consistently good in quality or performance; able to be trusted).

SIS6: Information among supply partners can be easily acquired.

Supply Chain Performance: Organization's supply chain performance in general. We are interested in how well your supply chain activities help across the dimensions of time, sales, flexibility, quality, and overall value.

SP1: Supply chain activities reduce business processing time.

SP2: Supply chain activities increase sales volumes.

SP3: Supply chain activities help provide timely and flexible product/service.

SP4: Supply chain activities help improve product/service quality.

SP5: Supply chain activities provide value to the supply chain partners.