

## **EFFECTIVENESS OF RELATIONSHIP MODEL IN THE SUPPLY CHAIN MANAGEMENT**

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### **Abstract**

*This paper proposes to 1) Develop a model framework of effectiveness for the supply chain management in Thai automotive organization, and 2) Identify the supply chain integration, and the interrelationships between them (internal and external integrations) which influence to the performance in supply chain management (SCM) implementation to obtain the competitive advantage in Thai automotive organizations. This study is an exploratory investigation into the process of SCM implementation in Thailand's automotive companies. This includes: 1) An extensive literature review, 2) an exploratory survey and, 3) follow-up interviews in-depth case studies of four leading automotive companies were conducted to understand the process of supply chain management integration, and how the effectiveness of supply chain management. Based on the findings from the survey, particularly when combined with the results of follow-up interviews in four case studies of companies, the study proposes a model of effectiveness for the SCM in Thai automotive organization, and suggests that there are supply chain integration which have been categorized into two groups of integration. These consist of (1) Internal Integration, (2) External integration which consists of supplier integration and customer integration. The findings also indicated that the interrelationships between internal and external integration which are related to each other. In particular, they are highly correlated to the performance in SCM implementation in order to obtain the competitive advantage. This finding has not been discussed in previous work especially in the Thai automotive industry before. Finally, implications are drawn and presented for managers and practitioners to achieve more successful implementation of supply chain management.*

*Keywords: Supply chain management, Competitive advantage, Thai automotive, Effectiveness, Relationship*

## INTRODUCTION

In 1990's the supply chain management (SCM) concept as "an integrative philosophy to manage the total flow of a channel from earliest supplier of raw materials to the ultimate customer, and beyond, including the disposal process" (Cooper, et al., 1997). Some companies have already adopted this approach to gain a competitive advantage (Christopher, 1998). In recent years, there has been a great deal of empirical evidence to show that successful supply-chain integration can improve a firm's performance and competitive advantage (Fabbe-Costes and Jahre, 2008; van der Vaart and van Donk, 2008; Singhand Power, 2009; Ou et al. 2010; Wiengarten et al. 2010). Supply chain management seeks to enhance competitive performance which measured by integrating the internal cross-function within the company and with the external operation of suppliers, customers, and other members to be successful (Ellram and Cooper, 1993; Lambert, et al. 1998; Kannan, and Hadfield, 1998; Kim, 2006). The Thai government also realized the important of supply chain management concept (Thailand Automotive Institute, 2013). It is also indicated that automotive industry is one of the industrial target which need to be highlighted. Previous studies indicate that there is a lack of understanding of supply chain integration in practice (Narasimhan, 1997; Lambert, et al. 1998, 2001; Morash, 2001; Sahay, 2003 and; Hussein and Nassar, 2010). This implies that SCM practices needs to pay attention to supply chain integration (SCI) and its implementation. As the result, the main purpose of this paper is to provide a model framework of effectiveness for the supply chain management integration which measured by competitive capability performance. It is hoped that this would help the Thai automotive business to overcome the challenge of supply chain integration, gain competitive advantage to make decisions for their businesses to do well and improve their businesses and economy. Also, this paper will provide guidelines that researchers can confidently apply in their future studies.

## LITERATURE REVIEW

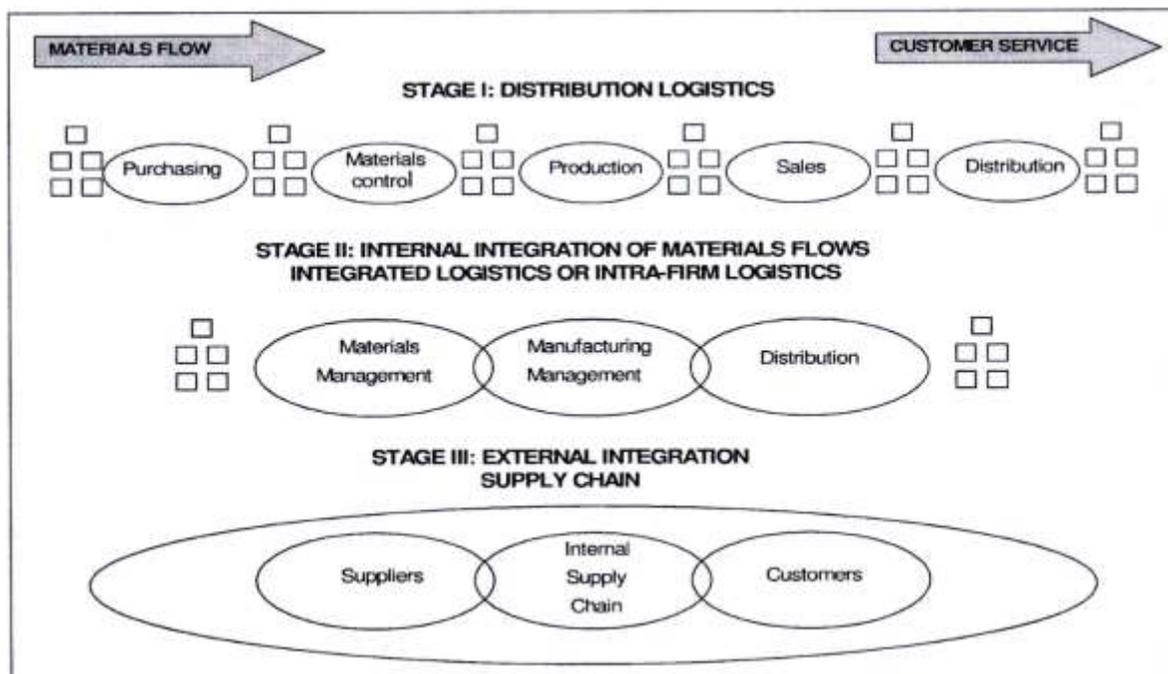
### Supply Chain Management (SCM)

Supply Chain Management has gone through huge development globally. SCM is the integration of key business processes from customer through original suppliers that provides product, services, and information that add value for customers and other stakeholders (Lambert, 1998). This implies that SCM requires internal (intra-organizational) and external (inter-organizational) integration. The objective of supply chain management has to maximize the overall value generated rather than profit generation (Othchere et al, 2013). Also Hartland (1996) defined SCM is to improve the performance of an individual organization and to improve the performance of the whole supply chain. The goal of SCM is to integrate both information and

materials flows seamlessly across the supply chain as an effective competitive weapon (Childhouse and Towill, 2003; and Li et al., 2006). Furthermore, SCM is concerned with smoothness, economically driven operations and maximizing value for the end customer through quality delivery (Al Mudimigh et al., 2004). On the whole, SCM manages business activities and relationship internally within an organization, with immediate suppliers, with first and second-tier suppliers and customer along the supply chain, and within the entire supply chain (Tan, 2011).

Stevens (1989) also stated that companies follow an integration process that goes through different stages as shown in Figure 1;

Figure 1: Logistics evolution: From distribution logistics to supply chain



Source: Stevens (1989)

Figure 1 shows that in stage I Logistics is considered just a distribution function, with no coordination with Supply, Production and Marketing. Stage II, there is an integrated logistics concept, where all logistics activities are coordinated. And, finally stage, the internal integration achieved in stage II is extended to other supply chain members. This suggests that companies integrate internally first, and then, extend the integration process to other supply chain members.

Furthermore, Steven (1989) suggests that a strategy for gaining competitive advantage requires the development of an integrated supply chain. Rosenzweig et al. (2003) stated that in

consumer products manufacturing also shows a significant relationship between supply chain integration intensity and output measures such as cost, process flexibility (PF), product quality (PQ), product innovation (PI), and delivery (D).

Li et al. (2006) stated that SCM practices are the set of activities undertaken by an organization to promote effective management and supply chain. The practices of SCM are proposed to be a multi-dimensional concept, including upstream and downstream of the supply chain. Tan (2002) mentioned supply chain practices are related to supply and materials management issues, operations, information technology, and sharing information and customer services. Supply chain also includes; cost competitiveness, technology, inventory management and external regulation (McMullan, 1996). Furthermore, SCM practices depends on business strategy and collaboration in organization, plan and execution, logistic performance and information technology and its implementation in the organization and include five distinctive dimensions which are strategies supplier partnership, customer relationship, level of information sharing, quality of information sharing and postponement (Li et al.2006).

## **Supply Chain Integration**

### ***Internal Integration***

Internal integration is defined as a process of inter-functional interaction, coordinator, collaboration communication and cooperation that may bring together a carefully selected group of specialists who share information and make product, process, and manufacturing decision, jointly and simultaneously (Koufteros, Vonderembse and Jayaram,2005; Otchere et al.2013). Internal integration is the integration across functional boundaries within a firm. The level of internal integration is reflected by the extent to which logistics activities interact with other functional areas, as well as by the extent to which logistics is or is not a separate functional unit (Stock, Greis, and Kasarda, 1998).Additionally, supply chain partner has regularly exchange information, are able to understand the needs of the end customer better and can respond to market change quicker (Stein and Sweat, 1998). Internal integration is a prerequisite for successful supply chain management (Lambert, Cooper and Pagh, 1998). Also, companies with a low internal integration strategy will have obtained low level of external integration (Stevens, 1989; Otchere et al.2013). On the other hand, companies implementing full internal integration strategy will have the highest level of external integration (Gimenez and Ventura, 2005; Otchere et al.2013). However, Bowersox (1989) stated that the introduction of new technology and continuous performance control under formalized structure can be accomplished through automation and standardization of each internal logistics functions.

### ***External Integration (supply and customer integrations)***

Stock, Greis, and Kasarda, (1998) define the external integration as the integration of logistics activities across firm boundaries. It is about the manufacturing enterprise in term of the entire supply chain, which increasingly consists of many separate firms banded together in network arrangements. Collaboration with outside the firm with their customers and suppliers to obtain information and complementary resources is becoming as a competitive environment. Frohlich and Westbrook (2001) reveal that external integration has two majors areas which need to emphasize. They are 1) supply integration (SI) or backward integration, 2) customer integration (CI) or forward integration. Furthermore, Zhao et al. (2011) discusses that supply integration refers to the process of interaction and collaboration between an organization and its suppliers to ensure the effective flow of supplies. Also the customer integration refers to the process of interaction and collaboration between an organization and its' customers to ensure the effective flow of products and/or services to customers. Customer integration will help the manufacturer to understand better the customer needs and to product design, better quality product at lower cost, and respond to customer demand to more flexibility (Flynn et al.2010; Zhao et al.2011).

### **Effectiveness and Competitive Advantage**

In present, global competition situation, facing the rapid technology progress and high customer expectations, companies find it difficult to win the competition only depending one's own capacity (Su et al., 2008). In this situation, coordination of the supply chain partnership is highly value added. Cai et al. (2009) states there are some dimensions of supply chain performance based on supply chain processes and management which has direct influence to competitive advantage as: Product Quality (PQ), Production Cost (PC), Production Flexibility (PF), Product Innovation (PI), and Delivery (D).

However, many companies struggle in justifying the cost of quality within their supply chain, but many companies fail to see the cost associated with varying quality levels from their suppliers. In the other word, product quality is one of the competitive advantages, and company must address carefully in all aspects of the supply chain including individual processes and supplier selection (Franca et al.2010).Therefore, improving supply chain performance has become a critical issue for most suppliers, manufacturers to gain and sustain competitiveness. Furthermore, many companies emphasize Product Quality (PQ) which can stay competitive in the marketplace over the long run.

A study by Rosenzweig et al. (2003) in consumer products manufacturing also shows a significant relationship between supply chain integration intensity and output measures. This implies internal and external integration can affect the output measures such as PQ, PC, PF

and D. Also, Stock et al. (2000); Frohlich and Westbrook, (2001) found that the levels of integration correlate and influence each other positively. However, it is difficult to come to a summary that integration clearly affects performance, since many studies in this field are discernable enough that integration and performance have been defined and measured variously and mostly limited way (FabbeCostes and Jahre, 2007). Companies have to realize to improve and integrate their network partners.

## **METHODOLOGY**

In this study, the mix of survey and followed up by in-depth case studies methods was adopted. The survey has been the principle methodology in this study which concerning the process of the supply chain management, supply chain integration and performance competitive advantage capability. The sampling size for this survey study is about seven hundred and twenty-three companies, which are 14 automotive assemblies, and 709 first tier automotive part manufacturing companies. Only one survey questionnaire was sent to each company to be completed by logistic manager/supply chain manager/production manager/material manager/inventory control manager. However, the position of respondent in each company might be called by a different name through they might have a same duty. Totally, the response rate in this study was then approximately 42.74% (309 questionnaires replied)

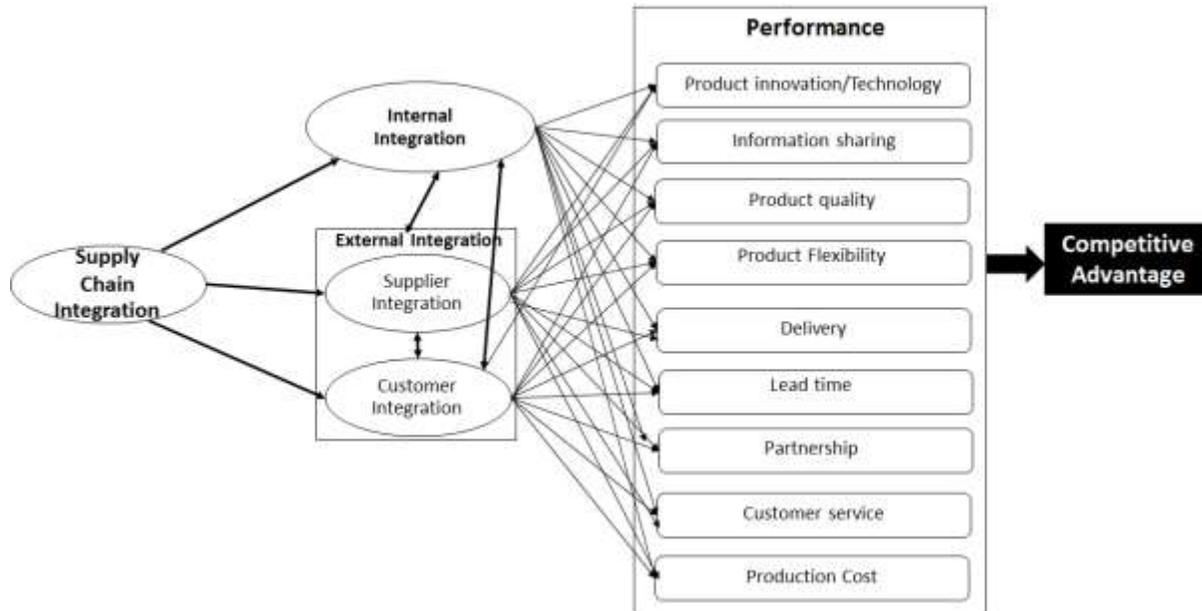
The use of case study approach was necessitated by the fact that this method is more suitable to provide an in-depth understanding of the process of supply chain integration and effective to gain the competitive advantage capability.

Following the development of the model, feedback and opinions were obtained from participants in the automotive industry. The case studies were conducted through semi-structure interviews of four leading automotive companies in order to understand how manage the process of supply chain and how the effectiveness of supply chain management integration. The approach followed the current study is in line with the multi-method approach that allows data triangulation (Jick, 1979, 1998; Burgess, 1984; Mentzner and Flint, 1997; and Van Maanen, 1979).

## **THE PROPOSED MODEL**

The proposed model has three main variables as drawn in Figure 2.

Figure 2: The proposed significant Model



As you can see in the figure 2, shows the proposed relationship between internal and external integration and related to the performance of the firm. This means the internal integration leads to external integration and both lead to improved performance and competitive advantage. The implementation process should start from functional supply chain integration through internal integration to external integration which consists of supplier and customer integration. To consider the integration performance relationship, it is necessary to measure firm's performance by analyzing performance which improvements can be obtained by implementing a supply chain integration program. Because of supply chain integration program can lead to many benefits such as product innovation and technology, cost reduction, improved product quality, improved lead times, product flexibility, improved customer service, delivery at the right time, better in information sharing, and improved partnership network. However, these elements of performance may not lead to a competitive position.

## EMPIRICAL FINDINGS

Using the Mann-Whiney and Kruskal-Wallis test, which are appropriate and useful for evaluation of the relationships between multiple dependent and independent latent constructs (Hair et al. 1999). As a result, there are relationship of variables in the model (as significant and correlation see in Table1), the main conclusions of this study are 1) internal integration and external integration are positively correlated (see in Table 1); 2) Also, internal integration leads to a better competitive performance variables such as production innovation/technology, information

sharing, partnership and cost; 3) Supply integration leads to a better performance variables such as partnership, customer service, and product quality; 4) customer integration leads to a better performance variables such as delivery, lead time, partnership, and customer service.

Table 1: The correlation between main variables

		Internal integration	Supplier Integration	Customer integration	Product Innovation/Technology	Information sharing	Product Quality	Product Flexibility	Delivery	Lead times	Partnership	Customer Service	Production Cost
Internal Integration	Correlation	-	0.357983346	0.346733698	-0.314785625	-0.5161588021	-0.158120223	-0.072555408	-0.204007829	0.071064639	-0.228683741	0.02566555	-0.245769576
	Significance (2-tailed)	-	0.003165629	0.004342989	0.010045118	0.002853737	0.268741491	0.562626605	0.100376637	0.570701513	0.064762314	0.837917718	0.046688443
	df	-	64	64	64	64	64	64	64	64	64	64	64
Supplier Integration	Correlation	0.386078321	-	0.353057443	0.107142857	-0.84049772	-0.038265306	-0.065614366	0.010957958	0.140634678	-15993071	0.443943712	-0.013746435
	Significance (2-tailed)	0.001866174	-	0.003640779	0.391848324	0.502242287	0.007335005	0.600672696	0.930413551	0.260038483	0.020614606	0.000150423	0.912767899
	df	64	-	64	64	64	64	64	64	64	64	64	64
Customer Integration	Correlation	0.911346436	0.316369825	-	0.223606798	-0.155921426	0.363361046	0.200138648	0.627270133	0.227851882	411719242	0.056719998	-0.203833163
	Significance (2-tailed)	0.031887326	0.009655337	-	0.071104609	0.21123668	0.002710622	0.107132685	0.017434408	0.045769095	0.001277188	0.016012785	0.100674301
	df	64	64	-	64	64	64	64	64	64	64	64	64

**EFFECTIVENESS OF THE SUPPLY CHAIN IMPLEMENTING INTEGRATION**

There is a number of stimulating in implementing supply chain integration in the literature. The implementation process adopted in this study was product innovation, technology, information sharing, product quality delivery, lead time, partnership, customer service, and production cost. It should be noted that, companies needs to carefully consider at each stage in the implementation process. According to the literature, many companies was suffered with the most of problems of all factors challenges of supply chain integration (Flynn et al (2010); Hussain and Nassar (2010; and Zhao et al (2011). These included integrated information network in particular external networking (with supplier and customer), inefficient lead time, inefficient traffic jam in many cities in Thailand, delivery at the right time etc.

**CONCLUSION**

This study purposes the model of effective of the supply chain management to gain the competitive advantage. The paper provides a comprehensive approach to successfully implementing the supply chain integration. Furthermore, this model indicated that the interrelationships between internal and external integration which are related to each other. In particular, they are highly correlated to the performance in supply chain management implementation in order to obtain the competitive advantage. Finally, this model can help manufacturing companies, suppliers and customers to improve their performance in the form of

improved the product innovation, technology, product quality, delivery, lead time, partnership, customer service, and reduced production cost.

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