AN EXPLORATORY STUDY OF THAI SMES SUPPLY CHAIN MANAGEMENT PRACTICES

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1. Introduction

Supply chain management (SCM) study has been of substantial importance since mid 1980s (Cooper et al., 1997) and recently has become a topic of increasing interest to practitioners and academic researchers. The SCM study includes the management of inter-organisational operations, system integration, partnership model and information sharing. While the goal of business is to meet customer needs better than competitors with lower resource usage, supply chain management is designed to help business to achieve this goal. In order to implement SCM concept, the number of firms involved in the supply chain and the activities and functions have to be identified in advance. This leads to three major components of supply chain management concept (Jespersen and Skjott-Larsen, 2008) which includes network structure, business processes and management.

Small and Medium Enterprises (SMEs) are core business format of a country (Stokes and Wilson, 2006, Tan et al., 2006). Thai SMEs create jobs and contribute to Thailand economic growth and enhance country's rural development (Thailand Business News, 2010). SMEs have realised that good strategies are vital in order to survive under current complex and competitive business environment with higher demanding customers to get better, cheaper and faster products and services (Thakkar et al., 2008a).

According to the SCM studies on the relationship between SMEs and their performance in various countries (Thakkar et al., 2008b, Koh et al., 2007, Vaaland and Heide, 2007, Quayle, 2003), it can be observed that: (1) SMEs were lacking proper SCM implementation such as technology and system application that resulted in losing their competitive performance, (2) focusing on strategic supply chain can improve SMEs' operational efficiency which leads to competitive advantage, (3) relationship management can be built by appropriately employing SCM practices. On the other hand, some literature argued that SCM is not suitable to SMEs (Arend and Wisner, 2005) as SCM may lead to lower firm's performance and return on investment.

In the same way, most of Thai SMEs have been left behind the advancement of SCM implementation because of they lacked of adequate empirical knowledge on supply chain performance measurement such as cost, time and reliability (Bhanomyong and Supatn, 2011). Thai SMEs are mostly reluctant to change and invest. Supply chain management is considered to be an important tool to help Thai SMEs to improve their business performance.

This study aims to determine the relationships among antecedents of SCM practices, which are SCM driver, SCM facilitator and SCM impediment and SCM practice. Then, define the associations of SCM practices and firm's performance, which is the consequence of SCM practice, in the context of SMEs in Thailand. The result of the study can be adapted to other developing countries.

Research methodology

To achieve the research objectives, i.e. developing the SCM practices for Thai SMEs, the following research methods have been used. Firstly, literature reviews both antecedents and consequences constructs that related to supply chain management practices is to be examined. Then, an empirical study of SCM implementation by using semi-structured interview has been conducted. The semi-structured interview has been widely adopted with deductive approach.

It is considered as a favoured strategy in business and management research (Saunders et al., 2007). An interview guide is prepared in order to confirm that information obtained from the experts is identical. The interview examined to both SMEs and large firm to confirm that SMEs have a particular understanding of SCM similar to large firm. Resulting from interview, mapping the practices and literatures has been framed as SCM practices for Thai SMEs with construct as in Figure 1

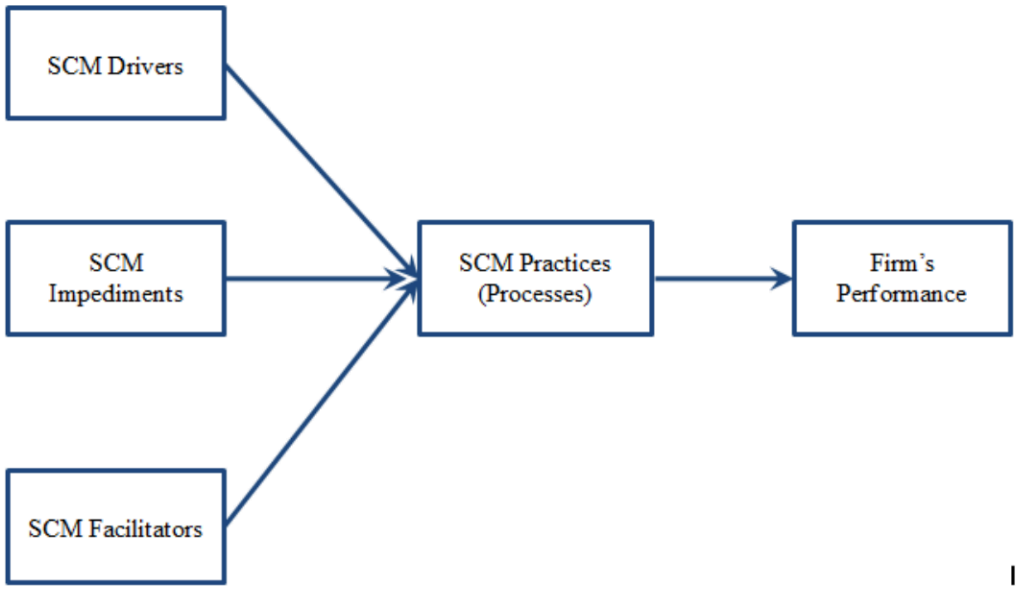

Figure 1: The Supply chain management practices model with constructs

The sample was selected from members of The Federation of Thai Industries (FTI). We selected only firms that fit the criteria of small and medium size firms' definition, which have been classifying by the number of full time employee of the firms. According to definition of SMEs from The Federation of Thai Industries (FTI), the size for small business (S) is typically 50 or fewer employees, the size for medium business (M) is 51 to 200 employees and more than 200 employees will be classified as large business (L). Pilot test has been done with the SMEs who participated in food supply chain seminar with the ministry of industrial. The volunteer respondents have completed 30 sets of questionnaire, which was suitable with research scale (Saunders et al., 2007). The results showed that the respondents have no problems in answering the questions in the questionnaire.

After four weeks of sending out the questionnaires, we got 129 responding answered questionnaires. Then we sent out two waves reminding letters in the following months at four weeks interval. Finally, the survey produced 311 valid responses, resulting in a response rate of 11.5 per cent. This response rate was comparable to the previous study of SMEs in Thailand context, supply chain management – SMEs approach (Udomleartprasert et al., 2003) and provide adequate data for further analysis.

We examined the nonresponse bias by testing for statistically significant difference between early and late responses. The questionnaires returned after the last remind were considered the proxy for non respondents, while the early returned questionnaires were appraised as proxy for respondents (Arend and Wisner, 2005). The statistical *t* tests based on two groups showed non-significant results for the means of independents and dependents variable. The characteristics of respondents and their businesses are summarised and presented in table 1.

Demographic characteristic of the business	Number of firms	Percentage
Type of industry		
• Leather and shoes	8	2.6%
• Agricultural processing	14	4.5%
• Health care and pharmaceutical	10	3.2%
• Motor and spare parts	31	10.0%
• Appliance and furniture	21	6.8%
• Pulp and paper	12	3.9%
• Metal and machinery	16	5.1%
• Rubber products	14	4.5%
• Clothing and textile	22	7.1%
• Plastics and chemical	16	5.1%
• Electronics	11	3.5%
• Food processing and animal nutrition	48	15.4%
• Ceramic	15	4.8%
• Mass merchandising and retail	15	4.8%
• Services	58	18.9%
Number of employee		
• Micro (Less than 25)	95	30.5%
• Small (25 to 50)	71	22.9%
• Medium (51 to 200)	145	46.6%
Total	**311**	**100.0%**

Table 1: Characteristics of respondents and their businesses

2. Literature reviews

The literature on the reasons why SMEs implement supply chain management may be classified into three broad categories: SCM drivers, SCM impediments and SCM facilitators (Yardpaga et al., 2013). They may be termed SCM antecedents (Mentzer et al., 2001). As SCM may be implemented in different practices and have different impacts on firms' performance (Mentzer et al., 2001), this section will also review the literature related to SCM practices and firms' performance. .

Supply chain management drivers, which are the strategic factors that help to determine an appropriate level of supply chain management practices. While supply chain management facilitators can be ideas, tools, actors and organisations that usually enhance supply chain management implementation. For example, Mentzer et al. (2000) use term "enablers" as the same meaning of facilitators, which include people, organisation and technology that move supply chain management forward. Supply chain management impediments can potentially cause supply chain management practices to fail. Supply chain management impediments are defined as obstacles that prevent supply chain management practices to succeed. The following SCM impediments or inhibitors have been identified in the literature, e.g. employee resistance to change, ineffective information technology systems, lack of trust and sharing between supply chain network members and improper resources allocation, affect negatively supply chain management performance (Mentzer et al., 2000, Mentzer et al., 2001, Bayraktar et al., 2009, Goh and Pinaikul, 1998, Fawcett et al., 2008, Fawcett et al., 2009, Tan et al., 2006).

Supply chain management practices, which is a set of effective activities across the supply chain network. Cooper et al., (1997) explains framework of SCM that consists of business processes, management components and the structure of supply chain. Process approach is the focus of every activity to meet customer's requirements. Supply chain management practice, which embraces process approach, is integrating process across functions to produce a specific output for a particular customer or market. The Global Supply Chain Forum (GSCF) developed a process-based supply chain management framework such as

- Customer relationship management
- Supplier relationship management
- Manufacturing flow management
- Product development and Commercialisation (Cooper et al., 1997)

In each process, this study will examine the supply chain flows including material flow, information flow and resources flow (Mangan et al., 2008).
Firm's performance can be identified as the process of measurement the effectiveness and the efficiency of firm's activities (Bhanomyong and Supatn, 2011). The firm's performance can be measured as cost, time and reliability of its processes to produce product and services. Li et al., (2006) classifies organisational performance into short-term and long-term objectives. In short-term objectives are mostly related to increase productivity and reduce inventory and cycle time, while long-term objectives are associated with increasing market share and profit. In firm's financial aspect, market share gaining and higher profit reflects higher asset utilisation of a firm.

3. Empirical findings

Factor analysis

In factor analysis we are interested in finding common underlying dimensions within the data. According to Field (2009), the total variance for a variable consists of two components; common variance which sharing with other variables and unique variance that specific to its. The proportion of common variance is known as communality. Therefore, a variable that share none of its variance with any other variables would have communality of 0 while a measure that has no specific or random variance would has a communality of 1. To reduce dimension of the variables is to transform our observed data into part of linear component which known as principal component analysis technique. For this technique, the initial common variance for each variable is assumed to 1. Therefore after grouping the variables into factors the common variance for each variable will be calculated. Table 2 illustrates the communality of each variable after extraction by the principal component analysis extraction method. The communality also a measure of the proportion of variance explained by the extracted factors. The principal component analysis extraction method gives each component the eigenvalues. Generally, Kaiser (1960) recommends to retain all factors that have eigenvalues greater than 1. Then in our study we propose two extraction factors that can explain total variance 62.22%. The result of factor analysis is illustrated in table 3.

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Var.	Cum. %	Total	% of Var.	Cum. %	Total	% of Var.	Cum. %
1	3.283	46.90	46.90	3.283	46.90	46.90	2.287	32.67	32.67
2	1.073	15.32	62.22	1.073	15.32	62.22	2.068	29.55	62.22
3	0.812	11.60	73.82						
4	0.607	8.67	82.49						
5	0.558	7.98	90.47						
6	0.386	5.52	95.99						
7	0.281	4.01	100.00						

Note: Extraction Method: Principal Component Analysis.

Table 2: The result of Total Variance Explained for supply chain management drivers

Supply chain management drivers	Factor 1	Factor 2	Communalities
• Global competition	**0.705**	0.051	0.500
• End-customer needs	**0.652**	0.260	0.493
• Process integration	**0.772**	0.276	0.672
• Network collaboration	**0.789**	0.252	0.686
• Cost reduction	0.196	**0.758**	0.613
• Process improvement	0.135	**0.878**	0.789
• Internal collaboration	0.300	**0.717**	0.604

Note: Extraction Method: Principal Component Analysis, Rotation Method: Varimax with Kaiser Normalization.

Table 3: The result of factor analysis for supply chain management drivers

Four variables; global competition, end-customer needs, process integration, and network collaboration are loaded into the first factor. Thus the first factor can be called as external supply chain management driver. The second factor includes cost reduction, process improvement, and internal collaboration, which relates to internal company activities so it can be labeled as internal supply chain management driver.

Then we applied factor analysis to every group of measurements and resulting that supply chain management facilitator, supply chain management impediment, supply chain management practice and firm's performance each group has only single component. According to the factor analysis technique, the composite score, mean score, standard deviation and alpha coefficients from the summated scales for external supply chain management driver, internal supply chain management driver, supply chain management facilitator, supply chain management impediment, supply chain management practice and firm's performance are calculated and displayed in table 4.

	Composite score	Mean score	Standard deviation	Alpha coefficient
• External SCMD	0.730	4.007	0.912	0.742
• Internal SCMD	0.784	4.317	0.823	0.747
• SCMF	0.731	4.106	0.820	0.855
• SCMI	0.689	3.866	0.928	0.815
• SCMP	0.831	3.591	1.011	0.959
• FP	0.788	3.565	0.840	0.912

Table 4: Factors analysis summary

Multiple regression analysis

To examine how antecedents of supply chain management impact on the supply chain management practice, regressions analysis techniques were conducted based on the factors standardisation score of each antecedent and the composite score of supply chain management practice. In the analysis of sample data we would like to study the dependence of supply chain management practice on the supply chain management antecedents according to our proposed supply chain management practices model. The antecedents of supply chain management in our model consist of supply chain management driver, supply chain management facilitator and supply chain management impediment. From our factor analysis, we categorised supply chain management driver into two factors; external supply chain management driver and internal supply chain management driver. Then we have four antecedents acting as independent variables. Supply chain management practice is identified as dependent variable. To predict the level of supply chain management practice of the firm we applied multiple regression technique to fitting a model to the data. The results of multiple regressions are presented in table 5. A simple regression model was conducted to examine whether supply chain management practice impact on firm's performance with result as shown in table 6.

Model Correlation Coefficient R = .542 R^2 = .293	Standardized Coefficients		t	Sig.
	B	Std. Error		
(Constant)	.000	.048	.000	1.000
External SCM Driver	.260	.059	4.392	.000
Internal SCM Driver	.023	.062	.377	.707
SCM Facilitator	.165	.076	2.182	.030
SCM Impediment	.243	.061	3.991	.000

Note: Dependent Variable: SCM Practice

Table 5: Supply chain management practice regression model coefficients

Model Correlation Coefficient R = .558 R^2 = .311	Standardized Coefficients		t	Sig.
	B	Std. Error		
(Constant)	.000	.047	.000	1.000
SCM Practice	.558	.047	11.821	.000

Note: Dependent Variable: Firm's performance

Table 6: Firm's performance regression model coefficients

Next, the respondents were classified into three different groups based on their level of performance. The composite score of firm's performance is calculated by sum of score for measurements according to firm's performance. In total we had 8 questions according to performances then the score ranges from 8 (answer 1 to each question) to 40 (answer 5 for all questions). From our questionnaire, score 1 and 2 implied that firm's performance was worse than competitors, score 3 indicated performance was comparable to competitors while score 4 and 5 showed that firm's performance was better than competitor. Then, we calculated a range of low performance as total score from 8 to 23, medium performance score from 24 to 31 and a score higher than 31 accounts for high performance respectively. Finally, an ANOVA was conducted to investigate the differences of firm's performance and supply chain management practice among groups of firms that have different level of performances. The results are displayed in table 7.

	Firm's Performance				**Significant (p – value)**			
	Low (45)	**Medium (172)**	**High (94)**	**Total (311)**	**Overall**	**L - M**	**L - H**	**M - H**
SCM Practice Average Standard Score	-.5826	-.2286	.6972	0.00	0.000	0.017	0.000	0.000
Network Relationship Management								
• Joint inventory management	3.16	3.47	4.22	3.65	0.000	0.037	0.000	0.000
• IT Coordination	3.33	3.53	4.26	3.72	0.000	**0.183***	0.000	0.000
• Long-term relationship enable	3.09	3.45	4.18	3.62	0.000	0.017	0.000	0.000
• Clear vision of SCM	3.13	3.33	4.10	3.53	0.000	**0.199***	0.000	0.000
Manufacturing Flow Management								
• JIT / Lean implementation	3.00	3.30	4.13	3.51	0.000	**0.061***	0.000	0.000
• S&OP implementation	3.04	3.37	4.11	3.54	0.000	0.048	0.000	0.000
• Benchmarking and performance measurement	2.93	3.22	4.11	3.44	0.000	**0.094***	0.000	0.000
• Quality policy established	3.22	3.50	4.22	3.68	0.000	**0.069***	0.000	0.000
Product Development and Commercialisation								
• Material strategy alignment	2.98	3.42	4.17	3.58	0.000	0.006	0.000	0.000
• Customer requirement information sharing	3.04	3.38	4.15	3.56	0.000	0.043	0.000	0.000
• Design for supply chain concept	3.07	3.35	4.17	3.56	0.000	**0.056***	0.000	0.000
• Customer's feedback as input to design	3.22	3.48	4.32	3.69	0.000	**0.105***	0.000	0.000

Note: *Indifferences of firm's performance for supply chain management practices

Table 7: Differences in SCM practice among groups of firm's performance

4. Findings and discussion

Table 5 explains the importance of each predictor to the dependent variable. The standardised coefficients (beta) indicate that external supply chain management driver has more important than internal supply chain management driver. The external supply chain management driver and supply chain management impediment have a comparable degree of important in the model. From the t-statistics, concludes that the internal supply chain management driver has no significant to the model. The beta also explains to us that the increase in one score of important external supply chain management driver will increase score of implementation of supply chain management practices of an organisation 0.26 score. Also the increase in one score of important supply chain management impediment will increase score of implementation of supply chain management practices of an organisation 0.243 score. Finally, the increase in one score of important supply chain management facilitator will increase score of implementation of supply chain management practices of an organisation 0.165 score. When firms realised with the important of the external supply chain management driver, supply chain management facilitator and supply chain management impediment ones will implement the supply chain management in their organisation.

Table 6 gives us the valuable information about the importance of predictor to the dependent variable. From the t-statistics, the supply chain management practice has significant to the model. This can be concluded that the increase in one score of implementation supply chain management practice will increase score of advantage of firm's performance compare to competitors 0.558 score. This leads to conclusion of supply chain management practice is leading to higher firm's performance.

From table 7, an overall supply chain management practice had radically influenced to difference level on firm's performance. The higher level of supply chain management practices resulted in higher firm's performance. This confirmed the correlation between supply chain management practice and firm's performance. The differences level of supply chain management practice had highly impacted between medium performance firms and high performance firms. While the low performance and medium performance firms had moderate impact. Some of supply chain management practices had resulted indifference to performance of low and medium performance firms i.e. IT coordination, clear vision of supply chain management, JIT/Lean implementation, benchmarking and performance measurement, quality policy established, design for supply chain concept, and customer's feedback as input to design.

5. Conclusion and limitation

The study examined the causal relationship of supply chain management practices in Thai SMEs context. The model was developed from literature review and confirmed by supply chain executive experts through interviews. In general, data from the self-responded questionnaire survey provided empirical evidence supporting the causal model. This study appears to confirm that the antecedents of supply chain management, which include driver, facilitator and impediment, have a significant relationship to supply chain management practice for Thai SMEs. It also concludes that the supply chain management practice can improve firm's performance in comparison with firm's competitors.

This research attempted to enhance the understanding of how Thai SMEs perceived with supply chain management. These findings have a number of managerial implications. Some of Thai SMEs have resisted implementing supply chain management because they believed that supply chain management practice led them to lower profit. This research provides conclusion against that belief. This study, like others, has limitation. The list of members of The Federation of Thai Industries (FTI) was used as representative of Thai SMEs; thus, the results are generalizable only to the extent that FTI members resemble the population of Thai SMEs.

The response rate was also somewhat low; however given the subject matter and complexity, this is reckoned acceptable. Another limitation of this study is the use of respondents from varies industries. It should be accepted that different supply chain environmental in each industry could impact the respondent's answer to the questionnaire differently. The focus research from particular industry may solve this issue but it makes the results less generalizable.

The extension of this study can be conducted by doing sample case analysis within Thai SMEs to achieve higher understanding of how supply chain management practices are implemented, which exact drivers, facilitators and impediments are involved by these practices, and what are the performance outcomes.

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