



On the Quest for Supply Chain Competence: The Impact of Competitive Strategy

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Abstract

In the epoch of globalization and electronic commerce, supply chain competence is one of the most critical core competences for many enterprises. However, the role of supply chain competence has seldom been addressed in the research of competitive strategy. This paper investigates the impact of business level strategy on supply chain competence. In this study, empirical data from enterprises were collected and analyzed to assess the association between business strategy and supply chain competence. The results supported our hypotheses and the implications for management decisions are elaborated.

Keywords: supply chain competence, business strategy, core competence, differentiation, cost leadership

1. Introduction

Recent development of the extensive globalization, the meticulousness of enterprise internationalization and business integration, and the rapid development of information technology have caused business environments to change rapidly and tremendously. For enterprises, customers require an increasingly rapid response and fulfillment. To respond promptly to changing internal situations and external environments, enterprises must interact efficiently with vendors of upper, middle, and lower streams to form a highly efficient supply chain network. Supply chain competence thus becomes a critical core competence pursued by enterprises [1-4].

In the era of big data, developing supply chain competence is even more critical than before for a firm [5-7]. The first challenge is the growing data volume in supply chain operations. This is because supply chain activities need to collaborate with other trading partners across corporate boundary. For many enterprises, the supply chain needs to integrate value chains of participating parties [8, 9]. The second challenge is the increasing data velocity in supply chain operations. Many organizations are gradually aware of that they must compete, as part of a supply chain against other supply chains, to quickly reflect customers' changing demands [10]. The third challenge is the expanding data variety in supply chain operations. Supply chain operations need to be seamlessly integrated with more and more business functions such as production, marketing and information systems [11-13].

Studies have shown that competitive business strategy could lead to competitive advantage for firms [14-16]. Furthermore, the high level concept of business strategy needs to be implemented and realized in distinctive core competences such as supply chain competence [17]. However, research which has empirically investigated the linkage between business strategy pursuit and distinctive competence is scant. How different business strategies influence the development of enterprise core competences towards gaining competitive advantage is thus far less clear in the literature.

This study is intent on filling the gap of the literature and examines the relationship between business strategy and supply chain competence. The paper focuses on the role of a firm's business level strategy in shaping supply chain competence, and further examines possible impact of business strategy pursuit on supply chain competence.

The paper begins with a review of the relevant literature about the relationships between business strategy and supply chain competence. Then it proposes hypotheses which link these variables. Following that, the hypotheses are tested using a sample of large Taiwanese companies with international operations. The findings are presented along with the managerial implications of the study and recommendations for future work.

2. Hypotheses

Porter's framework for business strategy of competition is one of the most widely accepted typology of business competition models [14, 16]. Porter's research in industrial economics suggested two fundamental types of generic business level strategies for achieving above average rates of return: cost leadership and differentiation [14, 15]. Porter proposed that to succeed in business, a firm must pursue one or more of these generic business strategies, and that a firm's strategic choice eventually determines its competitiveness and profitability [18]. Other scholars argued that the two types of business strategies are not strictly mutual exclusive. Firms adopting cost leadership strategy may seek to deliver distinctive products or services under the main theme of low cost thinking. Firms with differentiation strategy could also attempt low cost operations as long as the uniqueness of products or services is maintained [19, 20].

The successful implementation of the business strategies relies on making right decisions on core functions of a firm, such as human resource management, production, marketing, research and development, sales, information systems, and supply chain management. These functions form a value chain and all have a role in lowering the cost structure and increasing the value of products through differentiation [15]. A firm's ability to acquire superior functional efficiency, including supply chain competence, will determine if its product offering is differentiated from that of its competitors, and if it has a low cost structure simultaneously. Firms that increase the utility consumers get from their offerings through differentiation, while at the same time lowering their cost structure, can create more value than their rivals, and will acquire a competitive advantage, superior profitability, and profit growth [19, 21].

Cost leadership strategy is pursued through low cost operations in each segment of supply chain activities, including production scheduling, demand management, sourcing and procurement, inventory management, distribution and delivery [22, 23]. For differentiation strategy, the principal thinking in these operations are geared towards the design and delivery of distinctive products and services. Differentiation may also eventuate in unique methods or channels of sourcing or delivery, in innovative manufacturing processes or inventory operations in a supply chain [24]. Thus, the following two hypotheses are proposed:

H1. Cost leadership strategy pursuit is positively associated with supply chain competence.

H2. Differentiation strategy pursuit is positively associated with supply chain competence.

Although H1 and H2 both hypothesize positive effects on supply chain competence from two different business strategies, the means through which the two strategies are linked to supply chain competence are quite different. Differentiation strategy pursuit is linked to supply chain competence through effectiveness in product innovation and customization,

whereas cost leadership strategy pursuit is linked to supply chain competence through efficiency in operations [25]. Even though both strategies have a positive impact on supply chain competence, differentiation strategy pursuit is considered to have a stronger relationship with supply chain competence than cost leadership strategy pursuit will have. Because differentiation strategy pursuit represents an approach to product or service innovation, whether through the development of unique product features or through the enablement of business innovations which explore opportunities, it requires the support of highly efficient supply chain operations which are responsive to changing customer preferences. These supply chain operations need to react to unique customer experiences with speed and flexibility. To sustain in competition, the differentiators will always need to be a step ahead, looking for the next uniqueness enhancing innovation. The differentiators are therefore more likely to require promptness and flexibility in supply chain operations. Furthermore, the impact that the introduction of a radical product or business innovation has on the supply chain activities of a firm is likely to exceed that of the implementation of a cost efficient solution that is more common in an industry regardless of the efficiency that it brings [26]. Thus the following is hypothesized:

H3. The relationship between differentiation strategy pursuit and supply chain competence will be stronger than the relationship between cost leadership strategy pursuit and supply chain competence.

3. Method

3.1 Survey Instrument

The survey instrument was developed using questions derived from the literature on Porter's competitive strategies and supply chain competence discussed previously. We operationalized the study variables by using multi-item reflective measures on a 7-point scale [27].

The construct of cost leadership strategy pursuit was measured using four items that reflect the extent to which a firm pursues a cost-oriented strategy. First, cost leadership refers to the generation of higher margins than those of competitors by achieving lower operation costs. Firms with a cost leadership strategy often have highly stable product lines and a strong emphasis on profit and budget controls [18]. Second, pursuing of cost leadership is often reflected in price competitiveness [28, 29]. The third item was the economic scale. A firm can gain a cost advantage through economies of scale or superior manufacturing processes [14, 15]. Finally, larger firms with greater access to resources are more likely to take advantage of cost leadership strategy through development of lower cost products, whereas smaller firms are often forced to compete using highly differentiated products and services in a niche market [30].

The differentiation strategy pursuit construct was measured using four items that reflect the extent to which a firm pursues a differentiation strategy. Differentiation entails being unique or distinct from competitors, for example, by providing superior information, prices, distribution channels, and prestige to the customer [14]. Differentiation prevents a business from competitive rivalry, insulating it from competitive forces that reduce margins [31]. Extending Porter’s competitive strategy framework, Miller distinguished differentiation strategies based on innovation from those based on marketing [18]. These propositions form two items included in the construct. Differentiation strategies based on innovation may create a dynamic environment or a distinct business model in which it is difficult for competitors to predict and react. This unpredictability may provide the innovator a substantial advantage over its competitors [18, 29].

The construct of supply chain competence was measured using six items. Respondents rated their intensity of pursuing supply chain competence over the time frame of past few years. Beamon [32] proposed a framework for measuring supply chain competence. The framework included the measurement of resources, output, and flexibility as the strategic goals of supply chain operations. The key measuring variables included cost, activity time, customer responsiveness, and flexibility. These variables have been recognized as direct and observable measures of supply chain practice. Firms in a supply chain achieve efficiency by lowering operational costs, reducing inventory, promoting flexibility, ensuring on-time deliveries, and minimizing shortages of critical resources. These objectives relate to all parties in a buyer–supplier relationship, and therefore, can represent the core competence of supply chain operations [33, 34].

All items for this study were assessed with a 7-point Likert scale ranging from “strongly disagree” to “strongly agree.” In addition, we use firm size, IT department size and industry sector as control variables, as these factors have been noted in several studies to affect intention to adopt information technologies [35, 36]. Table 1 presents the items used to measure each of the independent and dependent construct variables.

Table 1 Constructs and items used in the survey

Construct and item description (1 – strongly disagree; 7 – strongly agree)
CLS: Cost leadership strategy pursuit
CLS1: We provide low cost products or services based on operational efficiency.
CLS2: We deliver products or services with lower price than competitors.
CLS3: We provide products or services with economy of scale.
CLS4: We develop our products or services with lower cost than our competitors.
DFS: Differentiation strategy pursuit

DFS1: We deliver products or services with distinctive business model.

DFS2: We differentiate our products or services based on innovation.

DFS3: We deliver products or services with superior functionality to our competitors.

DFS4: We differentiate our products or services based on effective marketing.

SCC: Supply chain competence

SCC1: We delivery products or services on time.

SCC2: Reducing lead time is crucial to us in our supply chain operations.

SCC3: We respond promptly to changes of customer requirements.

SCC4: Lack of critical resources is effectively avoided in our supply chain operations.

SCC5: Inventory and logistics flexibility is above average in our supply chain operations.

SCC6: Reducing the cost of our supply chain operations is important to us.

Control Variables (rescaled)

Firm Size: Total number of employees.

IT Size: Total number of IT staffs.

Industry: Industry sectors of firms. 1 for service firms and 0 for manufacturing firms.

3.2 Sample and Data Collection

Empirical data for testing the hypothesized relationships were obtained by conducting a survey of large Taiwanese companies. A questionnaire developed in accordance with Table 2 was implemented as the survey instrument. It was pretested in an iterative manner among a sample of 15 executives and managers. The questionnaire items were revised on the basis of the results of the expert interviews and refined through pretesting to establish content validity. The pretesting focused on instrument clarity, question wording, and validity. During the pretesting, members of the testing sample were invited to comment on the questions and wording of the questionnaire. The comments of these respondents then provided a basis for revisions to the construct measures.

A Taiwanese marketing research organization publishes comprehensive data of the 1,000 largest corporations in Taiwan with international operations. Most of these companies are public listed corporations with global transactions. After the pretesting and revision, survey invitations and the questionnaires were mailed to these 1,000 companies. Follow-up letters were sent approximately 15 days after the initial mailing. Data were collected through responses from executives and managers of the companies. Data collection was completed in two months. In total, 201 valid questionnaires were obtained, with a valid response rate of 20.1%. We compared respondent and non-respondent firms in terms of industry, size (number

of employees) and revenue. These comparisons did not show any significant differences, suggesting no response bias. Table 2 shows the profile of the final sample list.

Table 2 Profile of the final sampling firms

	Count	% of sample
Number of employees		
Under 100	33	16%
100~1,000	64	32%
1,000~5,000	59	29%
5,000~10,000	35	17%
Above 10,000	10	5%
Total	201	100%
Number of IT Staffs		
Under 5	66	33%
6~10	31	15%
11~20	49	24%
21~50	34	17%
Above 50	21	10%
Total	201	100%
Industry sectors		
Manufacturing	93	46%
Services	108	54%
Total	201	100%

4. Results

Our goal was to investigate the impact of business strategy pursuit on supply chain competence. The results were used to test the relationship between business strategy pursuit and supply chain competence.

4.1 Reliability and Validity

Cronbach's alpha tests the interrelationship among the items composing a construct to determine if the items measure a single construct. Nunnally and Bernstein [37] recommended

a threshold alpha value of .7. Cicchetti, et al. [38] suggested the following reliability guidelines for determining significance: $\alpha < .70$ (unacceptable), $.70 \leq \alpha < .80$ (fair), $.80 \leq \alpha < .90$ (good), and $\alpha > .90$ (excellent).

Content validity [39] refers to the extent to which the instrument measures what it is designed to measure. Most of the measures used in the study were adopted from relevant research. The study's validity was further improved by pre-testing the instrument on a panel of experts comprising 15 business executives and supply chain managers.

Table 3 summarizes the descriptive statistics and results of the reliability and validity tests. The reliability of the instrument was examined using composite reliability estimates by employing Cronbach's α . All the coefficients exceeded Nunnally's recommended level (0.70) of internal consistency [37, 38]. In addition, factor analysis was performed to confirm construct validity. The discriminant validity was confirmed since items for each constructs loaded on to single factors with all loadings greater than 0.8.

Table 3 Descriptive statistics and reliability and validity test

Construct	Item	Mean	SD	Cronbach's alpha	Cronbach's alpha if item deleted	Factor loading on single factor
CLS	CLS1	3.716	1.521	0.952	0.956	0.912
	CLS2	3.597	1.460		0.978	0.855
	CLS3	3.657	1.320		0.905	0.909
	CLS4	3.677	1.351		0.908	0.993
DFS	DFS1	4.552	1.371	0.905	0.893	0.854
	DFS2	4.393	1.375		0.857	0.921
	DFS3	4.308	1.579		0.889	0.866
	DFS4	4.214	1.456		0.870	0.895
SCC	SCP1	4.507	1.460	0.920	0.911	0.815
	SCP2	4.935	1.338		0.901	0.870
	SCP3	4.612	1.330		0.901	0.869
	SCP4	4.552	1.330		0.905	0.847
	SCP5	4.423	1.465		0.909	0.827
	SCP6	4.547	1.396		0.904	0.849

We also assessed discriminant validity on the basis of the construct correlation. Table 4 summarizes the correlations among different factors. The tests indicated acceptable results with respect to discriminant validity.

Table 4 Construct correlation

Construct	1	2	3	4	5	6
1. CLS	1					
2. DFS	0.625**	1				
3. SCC	0.556**	0.642**	1			
4. Firm Size	-0.031	-0.048	-0.035	1		
5. IT Size	0.185**	0.085	0.048	0.357**	1	
6. Industry	-0.024	-0.026	-0.061	-0.027	-0.144*	1

*p < 0.05, **p < 0.01

4.2 Tests of Hypotheses H1 and H2

Multiple linear regression analysis was performed using SPSS version 21 to test our hypotheses for significance. Table 5 summarizes the test results regarding the parameter estimates and p-values of the hypotheses. We also included firm size, IT department size and industry sector as control variables in the analysis.

Table 5 Tests results of the hypothesized model

Explanatory variable	Dependent variable SCC	
	Estimate	P-value
CLS	0.237	0.000***
DFS	0.444	0.000***
Firm size	0.024	0.807
IT size	-0.183	0.361
Industry	-0.041	0.351
R ²	0.451	

*p < 0.05, **p < 0.01, ***p < 0.001

The results in Table 5 supported the hypotheses H1 and H2, that is, the direct effects of CLS on SCC and DFS on SCC.

4.3 Tests of Hypotheses H3

For hypotheses H3, we used hierarchical linear regression to test the differences in the effects of differentiation strategy pursuit and cost leadership strategy pursuit on supply chain competence.

H3 stated that the relationship between differentiation strategy pursuit (DFS) and supply chain competence (SCC) will be stronger than the relationship between cost leadership strategy pursuit (CLS) and supply chain competence (SCC). The test results indicated that the standardized beta is 0.254 for the cost leadership strategy's relationship with supply chain competence and 0.483 for the differentiation strategy. The analysis showed a change in R^2 of 0.142 (F change = 51.382, p = 0.000) when the differentiation strategy was added to the model with the cost leadership strategy (original R^2 of 0.309). This signifies that the differentiation strategy explains above and beyond what the cost leadership strategy can explain for supply chain competence, thereby supporting H3.

5. Discussion

5.1 Research Implications

This study investigated the impact of a firm's business strategy pursuit on supply chain competence. Our findings provide evidence that for both cost leadership strategy and differentiation strategy, there is a positive relation between business strategy pursuit and supply chain competence. This result supports the theoretical literature on the relationship of business level strategies and functional level strategies [40-42]. Our results also indicate that business strategy pursuit influences supply chain competence significantly regardless of which business strategy a firm chooses to pursue. Both cost leadership strategy pursuit and differentiation strategy pursuit influence supply chain competence significantly. This finding is consistent with the results of some previous studies that compare the associations of the two types of business strategy with functional level efficiency in strategic links [43-45]. A managerial interpretation is that a firm's business strategy pursuit leads its functional level operations with an extensive efficiency objective, clear motivation, and planned strategic goal [46, 47]. This goal could be cost structure oriented or differentiation oriented, or a combination of both of them [19, 20, 48].

However, while both cost leadership strategy and differentiation strategy are related to supply chain competence, our results showed that differentiation strategy pursuit is more strongly related to supply chain competence than is cost leadership strategy pursuit, as hypothesized in H3. This demonstrates that the complexity of a multi-faceted differentiation strategy is more difficult for firms to pursue than the efficiency-based cost leadership strategy, and thus required higher support of functional operations. Therefore, a differentiation strategy can offer multiple and complex dimensions such as innovation and customization through

which a firm can create competitive advantage, and is more difficult for competitors to imitate than a cost leadership strategy.

5.2 Study Limitations and Further Research

This study reported meaningful implications regarding the development of multidimensional measures of factors that influence supply chain competence. However, it should be realized that the validity of an instrument cannot be firmly established on the basis of a single study. In our study, empirical data used for tests were collected from large firms based in Taiwan with global operations. Therefore, practitioners and researchers are suggested to interpret our findings as a reference model and be cautious when generalizing our measures to other industry circumstances.

Further research efforts which focus on collecting more empirical evidences for assessing and validating firm data are recommended to overcome the limitations of the present study. Such research is suggested to address how emerging technologies relate to business strategies and functional operations. Further research could also investigate the relative importance of the factors affecting each stage of the strategy shaping process. These efforts should involve studies identifying core competences which affect business operations, information processing, and decision support. In addition, special attention could be focused on data collected in various sub-industries or specific contexts over an extended period of time. The analysis of such data may enable conclusions to be drawn about more generalized relationships among business level strategies and functional level strategies

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