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Capabilities and Levels of Supply Chain Integration in Malaysian SMEs: A Preliminary Analysis

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Description

The purpose of this study is to analyse a preliminary data through the descriptive statistics, exploratory factor analysis (EFA), and reliability test. The analysis is based on a quantitative approach using a questionnaire survey from a total of 135 Malaysian SMEs' manufacturing companies. This analysis reveals a good result of EFA, and reliability test. The most critical limitation of this study is its narrow focused on the manufacturing sector in Malaysian SMEs, thus, preventing the generalisation to other sectors and also to other countries that may gain the benefits from the responsiveness of both capabilities and levels of supply chain integration. Also, this study may contribute to the body of knowledge by providing new data and empirical insights into the relationship between CCC, SCOC, levels of supply chain integration, and business performance in Malaysian SMEs.

Location

iC - SBS Teaching Facility

Capabilities and Levels of Supply Chain Integration in Malaysian SMEs: A Preliminary Analysis

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Abstract

The purpose of this study is to analyse a preliminary data through the descriptive statistics, exploratory factor analysis (EFA), and reliability test. The analysis is based on a quantitative approach using a questionnaire survey from a total of 135 Malaysian SMEs' manufacturing companies. This analysis reveals a good result of EFA, and reliability test. The most critical limitation of this study is its narrow focused on the manufacturing sector in Malaysian SMEs, thus, preventing the generalisation to other sectors and also to other countries that may gain the benefits from the responsiveness of both capabilities and levels of supply chain integration. Also, this study may contribute to the body of knowledge by providing new data and empirical insights into the relationship between CCC, SCOC, levels of supply chain integration, and business performance in Malaysian SMEs.

1. INTRODUCTION

This research discusses four major constructs that might be significant to Malaysian SMEs. The constructs are corporate competitive capabilities (CCC), supply chain operational capabilities (SCOC), levels of supply chain integration, and business performance.

In this study, CCC can be referred as the distinctive competence of firms' specific abilities. Therefore, firms must recognise their abilities in order to compete effectively in domestics and international market. Then, according to SCOC, it discusses the pattern of decision that relates to the supply chain activities. These include the inside or outside operations activities of a firm, such as sourcing products, demand management, and delivery. This study also considers levels of supply chain integration as an intervening variable. It unites between the domain of CCC and SCOC with business performance. Successful SMEs in Malaysia may require the internal and external function to be integrated into any key of supply chain process that may lead to improve business performance. Finally, business performance of this study refers to the functioning of firms as a result to the execution of several constructs which are CCC, SCOC, and levels of supply chain integration in the manufacturing sector of Malaysian SMEs.

To further analyse the data, this study considers the research question, which is "To what extent attributes of corporate competitive capabilities and supply chain operational capabilities (including levels of supply chain integration) influence the SMEs business performance in the Malaysian manufacturing industry?" However, the current discussion focuses to answer the preliminary result to confirm the feelings of the data through three statistical analyses including descriptive statistics.

The data for this research was provided via a paper-based mail questionnaire. Each of the returned questionnaires was thus manually checked, entered, and analysed through the SPSS software version 17. There were three major steps of analysis preparation. First, the process began with the raw data which was obtained from returned questionnaire. The data was edited, coded, and entered into the actual variables of interest in the data file. Second, the variables were checked through several basic procedures such as screening and cleaning the data, missing data, assessing normality, and checking for the outliers. Finally, the data was analysed for respondents' characteristics via descriptive statistics, exploratory factor analysis, and reliability test to obtain more meaningful and reliable data.

2. DESCRIPTIVE STATISTICS

In this study, the descriptive data is derived from Part A of the questionnaire which consists of 16 questions. From the analysis, those questions could be divided into 14 relevant components. Table 1 shows the descriptive data of the study *(please see the appendix)*.

3. EXPLORATORY FACTOR ANALYSIS

Exploratory factor analysis (EFA) is conducted as a validity test for the measurements. Indeed, it is also to validate data for both manifest dependent and independent variables. Besides, it assesses of any possible data reduction and produce result summarisation (Hair et al., 2010). Thus, this study used the Principal Component Analysis (PCA) with Varimax rotation. The next sub-sections discuss the analysis of PCA into four constructs which are corporate competitive capabilities, supply chain operational capabilities, levels of supply chain integration, and business performance. These constructs cover Part B, Part C, Part D, and Part E of the questionnaire.

3.1 EFA for Corporate Competitive Capabilities (CCC)

A principal component analysis (PCA) was conducted on 27 variables. After analysis, these variables were reduced to 26 explanatory variables of six components. The components are: (i) innovative marketing, (ii) customer service, (iii) cost control, (iv) cost leadership, (v) differentiation, and (vi) product positioning. These six components identified empirically are similar to the four components that have been mentioned in previous studies (Kim, 2006b; Kim, 2006a; Watts et al., 1992), with additional in two new components. Thus, Table 2 shows the KMO and Bartlett's Test result of CCC, and Table 3 shows the rotated component matrix for CCC *(please see the appendix)*.

3.2 EFA for Supply Chain Operational Capabilities (SCOC)

A principal component analysis (PCA) was also conducted on 21 variables to measure the supply chain operational capabilities (SCOC). Then, these variables were reduced to 18 that reflect to three components. The components are consistent with the previous studies (Tan et al., 2007; Narasimhan et al., 2005), which are: logistical capability, structural capability, and technological capability. Table 4 depicts

the KMO and Bartlett's Test result, and Table 5 depicts the rotated component matrix of SCOC *(please see the appendix)*.

3.3 EFA for Levels of Supply Chain Integration

A principal component analysis (PCA) was conducted on 19 variables to measure levels of supply chain integration. After the analysis, these variables were reduced to 16 explanatory variables that reflect to three components, which are: (i) external integration with customer, (ii) internal integration, and (iii) external integration with suppliers. These components are consistent with the previous studies (Kim, 2006a; Narasimhan and Kim, 2002). Thus, Table 6 shows the KMO and Bartlett's Test result, and Table 7 shows the rotated component matrix for levels of supply chain integration *(please see the appendix)*.

3.4 EFA for Business Performance

A principal component analysis (PCA) was conducted on 16 variables to measure the business performance for Malaysian SMEs. Then, these variables were reduced to 13 and reflect to three components. The components are: (i) relationship development performance, (ii) supplier performance, and (iii) market performance. Thus, Table 8 shows the KMO and Bartlett's Test result, and Table 9 shows the rotated component matrix for business performance *(please see the appendix)*.

4. RELIABILITY

The purpose of reliability test is to measure the stability and consistency of the variables (Sekaran and Bougie, 2010). This study analyses reliability through a cronbach's coefficient alpha on four constructs; (i) corporate competitive capabilities, (ii) supply chain operational capabilities, (iii) levels of supply chain integration, and (iv) business performance.

The reliability of most constructs fall within the acceptable ranges (0.70 to 0.90). However, most of the construct are quite high given that the variables were collected from previous studies and were tested for several times. Indeed, the research obtains high reliability as it might be affected by a large number of variables, and regardless the value of its inter-item correlation (Netemeyer et al., 2003). Besides, the reliability is high as each construct was formerly analysed through EFA.

Table 10 depicts the reliability test result of the study as in the appendix.

5. DISCUSSION

The analysis began with the test of descriptive data. According to the descriptive analysis, it reveals that the major contributor for this study is Medium Enterprises. Also, it reveals that majority of the SMEs under study is owned by Malaysian. Thus, it proves that Malaysians are capable to involve in the manufacturing industry, and then, to develop a firm and stable company.

Furthermore, the result of exploratory factor analysis (EFA) contributes a new knowledge for the study particularly for CCC and business performance. According to CCC, two new components are introduced which are: cost control and product positioning. Meanwhile, there are three major components that describe business performance, which are: (i) relationship development performance, (ii) supplier performance, and (iii) market performance.

Then, the Kaiser-Meyer-Olkin (KMO) result for all the constructs are more than 0.80 which indicates that variables are good and appropriate to be analysed under EFA. Indeed, the *p*-value for all the constructs are 0.000 (p=0.000), which are highly significant and indicates the correlation between items are sufficiently large for principal component analysis (PCA).

Finally, all constructs show a good reliability result which falls within the acceptable ranges (0.70 to 0.90). According to the data, product positioning shows the lowest cronbach's alpha value (0.723) and external integration with customers shows the highest cronbach's alpha value (0.901). There are several factors contribute to the reliability value, such as; the number of variables for each construct, variables are obtained from previous studies, and variables have been tested for several times.

6. FURTHER RECOMMENDATION AND CONCLUSION

This study proposed the further analysis through a structural equation modelling (SEM) to answer the primary research question, "To what extent attributes of corporate competitive capabilities and supply chain operational capabilities (including levels of supply chain integration) influence SMEs business performance in the Malaysian manufacturing industry?" Besides, the further analysis is proposed to test all six major hypotheses of the study.

An SEM will be analysing using Analysis of Moment Structures (AMOS) software version 17. At first, an SEM will be used to test a confirmatory factor analysis (CFA) to measure the variables before proceed with a full structural model of SEM analysis. The full structural model of SEM analysis is conducted to test the significance effects for all the hypotheses under study.

Moreover, the future study is recommended to cover other SMEs sector in Malaysia such as service sector, in order to improve the entire SMEs development in Malaysia. Also, it should be acknowledged that this study is subject to some limitations. In this issue, the most critical limitation of this study is the narrow focus on the manufacturing sector of Malaysian SMEs. Thus, the lack of the generalisation of findings to other sectors (e.g., service industry) and to any developing countries may inhibit to the richness of the findings.

In conclusion, this study is significance to Malaysian SMEs as it will contribute to the development of new approach and at the same time, it will improve the efficiency of SMEs in Malaysia.

APPENDIXES

Table 1: Descriptive Statistics

Descriptive Data		Frequency	Percent	Total Percent
Position	CEO/Managing Director	37	27.4	
	Production/Operations Manager	16	11.9	
	Owner	14	10.4	
	Supply Chain Manager	9	6.7	
	Marketing Manager	7	5.2	
	Logistics Manager	5	3.7	
	Others	46	34.1	100.0
Year Establish	Less than 5 years	9	6.7	
	5-10 years ago	18	13.3	
	11-15 years ago	30	22.2	
	16-20 years ago	21	15.6	
	More than 20 years ago	57	42.2	100.0
Legal Structure	Partnership	15	11.1	
	Sole Proprietorship	6	4.4	
	Private Limited	114	84.4	100.0
Major Shareholder	Malaysian	110	81.5	
	Non-Malaysian	25	18.5	100.0
Sub-sector	Electrical and electronics	17	12.6	
	Chemicals including petroleum	14	10.4	
	Food, beverage, and tobacco	21	15.6	
	Fabricated metal	15	11.1	
	Machinery	9	6.7	
	Plastics	10	7.4	
	Transport	5	3.7	
	Paper, printing, and publishing	5	3.7	
	Basic metal	2	1.5	
	Non-metallic mineral	9	6.7	
	Rubber	6	4.4	
	Textiles, wearing apparel, and leather	7	5.2	
	Manufacture of furniture	3	2.2	
	Medical, precision, and optical instrument	5	3.7	
	Wood, wood products including furniture	4	3.0	
	Others	4	2.2	100.0
Full-Time Employees	5-50	57	42.2	
	51-150	78	57.8	100.0
Location	Johor	10	7.4	
	Kedah	4	3.0	
	Melaka	4	3.0	
	Negeri Sembilan	3	2.2	
	Pahang	2	1.5	
	Perak	15	11.1	
	Pulau Pinang	15	11.1	

	Sabah	1	0.7	
	Sarawak	3	2.2	
	Selangor	61	45.2	
	Terengganu	3	2.2	
	Federal Territory	12	8.9	98.5
Quality Assurance	Yes	108	80.0	
	No	26	19.3	99.3
Export	Yes	108	80.0	
	No	27	20.0	100.0
Years of Exporting	Less than 3 years	7	6.5	
	3-6 years	20	18.5	
	7-10 years	21	19.4	
	More than 10 years	60	55.6	100.0
No. of Export Countries	Less than 3 countries	18	16.7	
	3-6 countries	40	37.0	
	7-10 countries	18	16.7	
	More than 10 countries	32	29.6	100.0
Suppliers	Less than 5 suppliers	5	3.7	
	5-10 suppliers	15	11.1	
	10-15 suppliers	17	12.6	
	More than 15 suppliers	95	70.4	97.8
Third Party Logistics (3PL)	Yes	90	66.7	
	No	45	33.3	100.0
No. of 3PL	1-3 companies	56	62.2	
	4-6 companies	24	26.7	
	7-9 companies	6	6.7	
	10 companies or more	4	4.4	100.0

Table 2: KMO and Bartlett's Test for Corporate Competitive Capabilities

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.881
Bartlett's Test of Sphericity	Approx. Chi-Square	2100.611
	df	325
	Sig.	.000

Table 3: Rotated Component Matrix for Corporate Competitive Capabilities

No.	Components	Loadings	Eigen Values	% of Variance
	Component 1 – Innovative Marketing		4.38	16.83
B16.	Use innovative marketing technique/methods, such as for advertising and promoting products	0.827		
B19.	Distribute the product broadly	0.810		
B20.	Control sales or distribution network	0.771		
B15.	Develop distinctive brand or brand identification	0.695		
B17.	Create new market	0.688		
B18.	Obtain new patent successfully	0.656		
B21.	Respond to target markets requirement	0.543		
	Component 2 – Customer Service		3.26	12.53
B26.	The capability of my organisation to provide after-sale service	0.746		
B27.	The capability to promptly handling customer complaints	0.710		
B25.	Volume flexibility capability	0.627		
B22.	Providing outstanding customer service	0.624		
B24.	The capability of my organisation to deliver products quickly	0.616		
B23.	The capability of my organisation to supply high-quality product	0.514		
	Component 3 – Cost Control		2.94	11.30
B7.	Tight control of overhead cost	0.820		
B5.	The capability to offer lower priced products than competitors	0.690		
B6.	Vigorous pursuit of cost reductions	0.652		
	Component 4 – Cost Leadership		2.87	11.05
B3.	Major expenditure on technology based delivery systems to lower cost	0.730		
B2.	Economies of scale enabling the company to achieve a cost advantage	0.694		
B1.	Efficient internal operating systems contributing to reduce the cost of products	0.632		
B8.	The capability to achieve a cost leadership position in the industry	0.558		
	Component 5 - Differentiation		2.52	9.71
B11.	The capability to provide specialty products	0.804		
B9.	The capability to develop new and unique products	0.687		
B10.	The capability to refine the existing products	0.673		
	Component 6 – Product Positioning		1.94	7.44
B13.	The capability to deliver a broad product line	0.712		
B12.	Design flexibility depending on customer demand	0.613		
B14.	Producing products for high price market segments	0.539		
Total Variance Explained				68.86

Table 4: KMO and Bartlett's Test for Supply Chain Operational Capabilities

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.879
Bartlett's Test of Sphericity	Approx. Chi-Square	1429.575
	df	153
	Sig.	.000

Table 5: Rotated Component Matrix for Supply Chain Operational Capabilities

No.	Components	Loadings	Eigen Values	% of Variance
	Component 1 - Logistical Capability		3.98	22.11
C18.	The capability to provide low cost distribution	0.764		
C17.	The capability to provide reliable delivery	0.730		
C16.	The capability to provide fast delivery	0.719		
C19.	The capability to effectively provide widespread and/or intensive local distribution coverage	0.706		
C21.	The capability to effectively target selective or exclusive distribution outlets	0.673		
C15.	Close location to suppliers and customers	0.663		
	Component 2 – Structural Capability		3.87	21.50
C12.	The availability of human resources that are capable of using the technology	0.781		
C9.	The extensive training of personnel	0.748		
C2.	The capability of assessing information network for both global and local marketplace	0.673		
C20.	The capability to effectively provide global distribution coverage	0.587		
C10.	Intense supervision of subordinates	0.582		
C13.	Giving workers more planning responsibility (empowerment)	0.578		
C8.	The formalisation of supply chain organisation	0.558		
C1.	The usage of advanced manufacturing technology	0.510		
	Component 3 – Technological Capability		3.07	17.06
C5.	The capability to produce products with consistently low defect rate	0.736		
C7.	Just-in-Time strategy	0.719		
C6.	Increase production capacity	0.649		
C4.	The level of information sharing	0.555		
Total Variance Explained				60.67

Table 6: KMO and Bartlett's Test for Levels of Supply Chain Integration

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.883
Bartlett's Test of Sphericity	Approx. Chi-Square	1490.107
	df	120
	Sig.	.000

Table 7: Rotated Component Matrix for Levels of Supply Chain Integration

No.	Components	Loadings	Eigen Values	% of Variance
	Component 1 – External Integration with Customers		4.22	26.36
D16.	The frequency of periodical contacts with customers	0.881		
D17.	Communication level with customers	0.853		
D13.	Follow-up with customers for getting feedback	0.806		
D18.	The capability to accommodate a unique request from customers	0.804		
D14.	The capability to share operational information with customers effectively	0.677		
D15.	The agility of ordering process	0.652		
	Component 2 – Internal Integration		3.92	24.50
D4.	Real-time searching of logistics-related operating data	0.899		
D3.	Real-time searching of the inventory level	0.878		
D2.	Systematic information system (IS) integration among internal function	0.747		
D1.	Data integration among internal functions through intranet	0.745		
D5.	Systematic interaction system between production and sales department	0.656		
D6.	Periodic interdepartmental meetings among internal function	0.519		
	Component 3 – External Integration with Suppliers		2.96	18.50
D10.	The participation level of suppliers in the process of procurement and production	0.851		
D9.	The participation level of suppliers in the design stage	0.834		
D12.	Stable procurement through network with major suppliers	0.689		
D8.	The level of strategic partnership with suppliers	0.679		
Total Variance Explained				69.35

Table 8: KMO and Bartlett's Test of Business Performance

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.864
Bartlett's Test of Sphericity	Approx. Chi-Square	1067.667
	df	78
	Sig.	.000

Table 9: Rotated Component Matrix for Business Performance

No.	Components	Loadings	Eigen Values	% of Variance
	Component 1 – Relationship Development Performance		4.04	31.09
E12.	Resolution of customer complaints	0.803		
E13.	Customer loyalty or retention	0.769		
E9.	Performance appraisal results	0.741		
E11.	Departmental communication	0.730		
E10.	Skill level of employees	0.699		
E16.	The speed of order handling and processing	0.597		
E8.	Product quality development	0.582		
	Component 2 – Supplier Performance		2.89	22.21
E5.	Supplier delivery performance	0.907		
E4.	Supplier communication	0.889		
E3.	Supplier product quality	0.700		
E7.	Order fulfilment lead time	0.531		
	Component 3 - Market Performance		2.01	15.43
E1.	Market share growth	0.909		
E2.	Sales turnover	0.901		
Total Variance Explained				68.73

Table 10: Reliability of Scales

Variables	Scales	Number of Items	Cronbach's Alpha
Corporate Competitive Capabilities	1. Corporate Competitive Capabilities	26	0.933
	2.Innovative Marketing	7	0.891
	3. Customer Service	6	0.833
	4. Cost Control	3	0.775
	5. Cost Leadership	4	0.805
	6. Differentiation	3	0.830
	7. Product Positioning	3	0.723
Supply Chain Operational Capabilities	1. Supply Chain Operational Capabilities	18	0.927
	2. Logistical Capability	6	0.883
	3. Structural Capability	8	0.869
	4. Technological Capability	4	0.755
Levels of Supply Chain Integration	1. Levels of Supply Chain Integration	16	0.918
	2. External Integration with Customers	6	0.901
	3. Internal Integration	6	0.898
	4. External Integration with Suppliers	4	0.845
Business Performance	1. Business Performance	13	0.910
	2. Relationship Development Performance	7	0.877
	3. Supplier Performance	4	0.870
	4. Market Performance	2	0.885

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