Empirical investigation of the associations of technological capability, logistics capability and supply chain management strategies with competitive advantage: Evidence from Saudi manufacturers

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CHRONICLE	ABSTRACT
	The objective of this study is to empirically evaluate the associations of information technology, supply chain management, and logistic capability with a competitive advantage of some Saudi Arabia industry during the year of 2020 using Resource-based Theory. Using the information from a self-administered survey with an ultimate sample of 118 respondents, the outcome of Multiple Regression indicates a significant positive correlations of information technology, supply chain management, and logistics capabilities strategies with a competitive advantage. The outcome of this study should be applied by the company's top management to improve their supply chain management within strategic plans, as a result, increase the magnitude of their competitive advantage and financial performance.

1. Introduction

The ability of a company to handle technology and changes associated with it is referred to as technological capability (Lall, 1993). In any firm, the objective of information technology is to reduce the cost and increase capability (Closs et al., 1997). However, there are challenges affecting organizations implementing information technology (IT), including lack of IT experts, complex and complication of IT applications, IT application cost, and determination of outsourcing as well as IT strategy (Handfield & Withers, 1993; Dawe, 1994; Zulkiffli, 2010). Besides, Bowersox et al. (1989), Closs et al. (1997), and Burgess (1998) suggest that IT is reviewed as a milestone in safeguarding supply management from failure. IT can reduce costs and enhance the quality of services at the same time, and improve the profitability of a firm. It also enables firms to share sensitive, useful, and accurate information on time with supply chain partners. Consequently, this can improve supply chain coordination associated with the success of partnerships in the supply chain (Bowersox et al., 1990; Cooper & Gardner, 1993; Lambert et al., 1996). Nowadays, firms are using their ability of the strategic plan to attain competitive advantage in the market place, including strategies of supply chain management and logistics capabilities (Olavarrieta & Ellinger, 1997). According to Ellinger et al. (2000), correlation between performance and logistical capability accommodates the incorporation with other financial areas of the firm, including operations, marketing, and finance. Sezhiyan, Page and Iskanius (2011) suggest that there exists a positive relationship between the performance of a firm and logistic capabilities. In their study, they exhibited that companies have to consider logistic capability to maintain a remarkable competitive advantage and high-performance level. Also, the managers have the responsibility of reviewing logistic capabilities, including market coverage, pre- and post-sales services, low-cost distribution, and prompt delivery. Capabilities such as quality service, delivery speed, flexibility, cost, and innovation can improve the performance of an

organization (Fawcett & Fawcett, 1995). Besides, there exists a positive correlation between logic capabilities and performance of market and finance (Zhao et al., 2001; Olavarrieta & Ellinger, 1997; Hayes & Pisano, 1994; Morash, Droge and Vickery, 1996; Cho et al., 2008). Green et al. (2006) suggest that supply chain management is a vital management strategic mechanism that improves the competitive advantage of a firm. It is reported that the improvement of strategies in supply chain management has a positive influence on the company's operations (Sezhiyan, Page and Iskanius, 2011; Armistead & Maps, 1993; Bowersox & Closs, 1996; Oliver & Delbridge, 2002; Tan, 2002). According to Lummus and Alber (1997), the companies have to balance between their supply chain capabilities and what the customers expect. In particular, the ability of company management to initiate a strong relationship with its customers and suppliers is the first step to achieve a competitive advantage (Tyndall, 1988).

1.1 Problem statement

Various empirical researches explored the correlation of logistic capabilities, supply chain management, and information technology with competitive advantage in already developed and developing countries. Based on the awareness of the researchers, a study evaluating these issues in Saudi Arabia context does not exist. Applying the perspective of resource-based theory, the objective of this study is to explore the correlation between information technology, logistics capabilities, as well as supply chain management with a competitive advantage in some industry in Saudi Arabia. The research involves the following testable hypotheses stated in direct forms:

H_1: There is a positive association between information technology and competitive advantage.

H_2: There is a positive association between logistics capability and competitive advantage.

H_3: There is a positive association between supply chain management and competitive advantage.

This research is organized as follows; section two highlights the methodology, section three introduces the empirical findings, and the last section consists of the conclusion.

2. Methodology

In accordance to the existing study's results and reasoning associated with supply chain management (Sezhiyan, Page and Iskanius, 2011; Armistead and Maps, 1993; Bowersox and Closs, 1996; Oliver and Delbridge, 2002; Tan, 2002), logistics capability (Zhao et al., 2001; Olavarrieta and Ellinger, 1997; Hayes and Pisano, 1994; Morash, Droge and Vickery, 1996; Cho et al., 2008; Sezhiyan, Page & Iskanius, 2011; Ul-Hameed et al., 2019), and information technology (Shang & Marlow, 2005; Lall, 1993; Closs et al., 1997; Handfield & Withers, 1993; Dawe, 1994; Zulkiffli, 2010; Bowersox et al., 1990; Cooper and Gardner, 1993; Lambert et al., 1996; Burgess, 1998; Sharma & Singh, 2013), the purpose of developing the following conceptual model is to show the predicted relations as illustrated in Fig. 1.
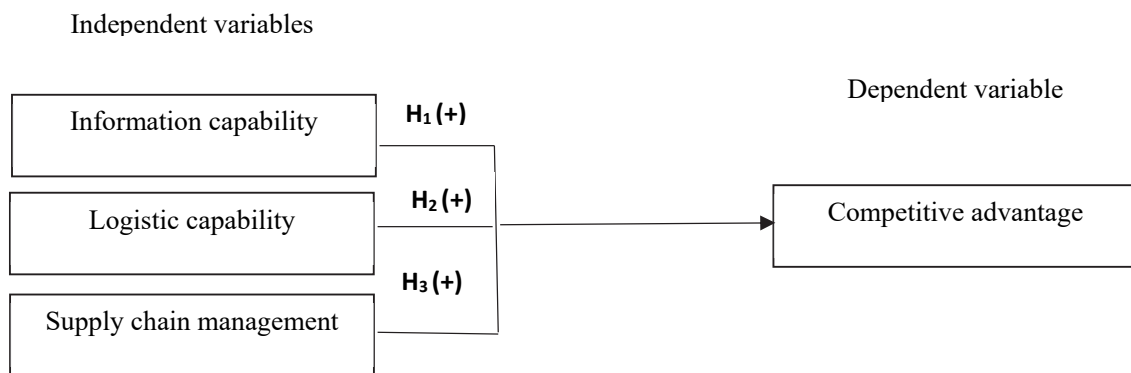
Independent variables

Fig. 1. Research model of the study

The selected industry in this study is in Saudi Arabia for the year 2020. A quantitative method is preferred for this study as the most useful and popular design of conducting a survey or field research. The use of a questionnaire survey to collect data is a suitable instrument to answer the established research questions, that is, "To what extent do information technology, logistics capability, and supply chain management are associated with a competitive advantage in X industry in Saudi Arabia?" Besides, there is a need to choose a survey as it entails surveying respondents as well as documenting their responses for analysis purposes. The model implemented in this research is adapted and validated from Zulkiffli (2010), Shan and Marlow (2005), Wisner (2003), Morash et al. (1996), Cho et al. (2008) and Sezhiyan et al. (2011), Fynes and Voss (2002), Zhang et al. (2006), Slater and Narver, (2000). Supply chain management, information technology, and

logistics capability are tested empirically with competitive advantage to establish the degree to which information technology, logistics capability, and supply chain management affect the magnitude of the competitive advantage. Information technology, logistic capability, and supply chain management have been used as independent variables, while competitive advantage is the dependent variable in this model. After translating from English, the questionnaire was administered to the study's sample in Arabic language. The questionnaire of this research consists of five sections: the first section, A, comprises of respondent's demographic data. The survey has demographic variables, including age, gender, job position, and academic qualification. The second section, B, measures the company's information capability, which is 4-items applying a five-point Likert Scale. The range of the five-point Likert Scale is from 1 (very important), illustrating to the lowermost concerns/issues of the firm's logistics capability, to 5 (high importance), showing to the highest concerns/issues of the organization's information capability. The third section, C, measures the company's logistic capability, including 4-items applying a five-point Likert Scale. The range of the five-point Likert Scale is from 1 (very important), showing to the lowermost concerns/issues of the firm's logistic capability, to 5 (high importance), exhibiting to the highest concerns/issues of the organization's logistics capability. The fourth section, D, measures supply chain management of the firm, which is 4-items applying a five-point Likert Scale. The range of five-point Likert Scale is 1(very important), illustrating lowermost concerns/issues of the firm's supply chain management, to 5 (high importance), showing to the highest concern/issues of the organization's supply management. The last section, F, measures the company's competitive advantage, which is 5-items applying a five-point Likert Scale. The range of the five-point Likert Scale is from 1 (very important), showing to the lowermost concerns/issues of the firm's competitive advantage, to 5 (high importance), illustrating to the highest concern/issues of the organization's competitive advantage. For the distribution of questionnaires, different key individuals are chosen as a sample subject representing the most appropriate ones in giving out information regarding the dimensions of the research, including managing director, chief executive officer, logistics manager, supply chain manager, and marketing or operations manager. The electronic survey is designed using google forms to enhance easy distribution to the sample. The participants were given two weeks to return a filled-in survey. As a result of this technique, 118 respondents were available to obtain information. This research uses the Multiple Regression Model. The nominal values were allocated to measure the dependent and independent variables. In specific, the model can be demonstrated as:

$$CA\ (Y) = \beta_0 + \beta_1\ X_1 + \beta_2\ X_1 + \beta_3\ X_1 + e \tag{1}$$

where the dependent variable is:

CA (Y) = competitive advantage (significance at level 0.05).

where the independent variables are:

X_1 = information capability

X_2 = logistics capability

X_3 = supply chain management

e   = Error term.

SPSS version for Windows was used to complete data analysis. To describe the demographic variables, an analysis of descriptive statistics using frequencies and percentages was used. The research question was addressed using a simple regression.

3. Empirical findings

In order to run the multiple regression successfully, the dependent and independent variables were checked for their reliability using Crobach's Alpha. In this study, the Cronbach's Alpha coefficient used is based on the average correlation of items within a test if the items are standardized. The reliability test shows the Cronbach's Alpha coefficients. The instruments are reasonably accepted for the purpose of reliability as depicted in Table 1:

Table 1
Reliability test

Variables' abbrev.	Variables' names	Alpha
IC	Information capability	.662
LC	Logistics capability	.642
SCM	Supply chain management	.636
CA	Competitive advantage	.669

Multiple Regression was used to evaluate the level of association of information capability, logistics capability, supply chain management and competitive advantage. As shown by Table 2, the R^2 is 0.731 which means that this model has explained 73.1% of the total variance in the competitive advantage.

Table 2
Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.855	.731	.724	.5004

Table 3 depicts that the F-value for the model is statistically significant at the 1% level which means that the overall model can be interpreted.

Table 3
ANOVA Analysis

	Model	F	Sig.
1	Regression	103.503	.000[b]

Table 4 illustrates the Multiple Regression results. As shown by Table 4 that there is a significant and positive association between information capability and competitive advantage ($\beta = .401$, $t = 4.356$, $P = .000$, one-tailed significance). Thus, H_1 is supported. This result gives a support to the previous studies (Shang and Marlow, 2005; Lall, 1993; Closs et al., 1997; Handfield and Withers, 1993; Dawe, 1994; Zulkiffli, 2010; Bowersox et al., 1990; Cooper and Gardner, 1993; Lambert et al., 1996; Burgess, 1998).

Table 4
Multiple Regression

Variables	Coeff.	t	p-value	Tolerance	VIF
(Constant)		.016	.987		
Test variables					
IC	.401	4.356	.000	.278	3.595
LC	.352	4.983	.000	.472	2.117
SCM	.186	2.014	.046	.275	3.637

As shown by Table 4 that there is a significant association between logistics capability and competitive advantage ($\beta = .352$, $t = 4.983$, $P = .000$, one-tailed significance). Thus, H_2 is supported. This result gives a support to the previous studies (Zhao et al., 2001; Olavarrieta and Ellinger, 1997; Hayes and Pisano, 1994; Morash, Droge and Vickery, 1996; Cho et al., 2008; Sezhiyan, Page & Iskanius, 2011). As for the association of supply chain management with competitive advantage, a significantly positive association was reported ($\beta = .186$, $t = 2.014$, $P = .046$, one-tailed significance). Therefore, hypothesis H_3 is accepted. This result gives support to the findings of the previous studies (Sezhiyan, Page and Iskanius, 2011; Armistead and Maps, 1993; Bowersox and Closs, 1996; Oliver and Delbridge, 2002; Tan, 2002).

4. Conclusion

The objective of this research was to evaluate the relation of logistics capability, information capability, and supply chain management with a competitive advantage among 118 participants in the X industry in Saudi Arabia for the year 2020. The research discovers that information capability, logistics capability, and supply chain management correlate positively with a competitive advantage. This presents Saudi X industry with an opportunity to improve their strategies of information capability, logistics capability, and supply chain management as a fundamental management strategy tool, which as a result, would enhance the competitive market advantage of the industry and impact their performance in a positive way. Besides, the X industry has the opportunity to review balancing its relationship with the customers and suppliers at the same time. Therefore, it can improve their financial performance. The outcomes of this research are essential to the top management to incorporate strategies of supply chain management within their firm's strategic plan. This study has achieved its objectives; however, some challenges still exist. This research can be duplicated using information from other industries. Consequently, the new independent variables can be added to the model, including supply effort management, benchmarking, and competitive capabilities. Therefore, these limitations may act as an obstacle to the generalization of the results of this research to other countries or sectors.

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