

STUDYING THE RELATIONSHIP BETWEEN THE EMPOWERMENT OF INFORMATION TECHNOLOGY, SUPPLY CHAIN FLEXIBILITY AND COMPETITIVE ADVANTAGE

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Abstract

Nowadays in global market, several factors have led to organizations seeking competitive advantage by focusing on their supply chain. Customer demand for high quality and fast service is caused to increase pressures that there is no previously. As a result, the company more than this alone cannot handle all the work. In the current competitive market, businesses and manufacturing firms addition to the organization and internal resources needs to manage and monitor resources and related elements outside the organization. National Iranian Oil Company was selected as a case study and 127 questionnaires were distributed among professionals and managers. The results of the questionnaires were collected and required data was extracted and entered into SPSS software and the required analysis was performed by LISREL software. The results showed that capabilities of sharing information technology are associated with capabilities in supply chain of manufacturer which in turn is associated with competitive performance of company. This result suggests that a company must be focus capabilities of flexibility in the supply chain to improve their performance. Capabilities of sharing information technology are a prerequisite for improving these capabilities.

Keywords: Empowerment of IT, supply chain, supply chain flexibility, competitive advantage

1. Introduction

Continuous improvements in communications and information systems and information technology create a supply chain evolution and development of techniques to manage it. Nowadays senior executives of manufacturing companies use various methods and tools to achieve their business goals and design business based on gaining more market share. In this regard, they will consider strategies that lead to provide products with higher quality and at lower prices and greater access. So they seek to reduce costs, increase flexibility to achieve competitive advantage compared to other competitors. On the other hand view of the situation prevailing in modern market that include increasing customer expectations in terms of price, quality and variety of products and timely delivery and also free flow of information that enhances knowledge and insight of customers to competing products and due to significant improvements achieved in production technologies and transport systems and

order and direct costs of labor, squeeze on body of firms which has caused firms to step back to meet the new requirement and providing customer satisfaction and survive in competition on the one hand and find relationship with suppliers in the supply chain and on the other move forward and link with customers so that they can achieve their strategic goals. In this regard, information technology and supply chain management information systems play a very important role. Many factories were searching for ways to collaborate with suppliers so that enhance management performance and their competitiveness. Material flow in the supply chain is shown in figure 1.

are considered

seriously. When there is a long-term relationship between these two variables, supply chain of company will be serious and strong obstacles in the way of competition.

Sharing information is a key element in supply chain management system and key of flawless supply chain is access to marketing data to date and unmodified at all points and nodes within the supply chain (Childhouse & Towill, 2003). With getting available data and sharing it with other groups within the supply chain, each organization can accelerate information flow in the supply chain and quickly respond to changing customer requirements (react). Hence, sharing information will bring long-term competitive advantage for the organization.

2. Statement of Problem

By increasing global competition, manufacturers are looking for ways to create viable competitive performance in order to improve their competitive position. Competitive performance can obtain from many sources, such as separation of products and services based on price, quality or service, but in case be viable it is difficult to imitate. Relationship of IT capability reveals differentiation of a potential source (Yan, Mark, T.S Ragu, & Joy, 2014).

In this research is answered to the question of "how is relationship of maintaining competitive performance with capabilities of information technology and supply chain performance?". IT infrastructure in and of itself does not distinguish a company from its competitors but better performance of company and sustainable competitive performance is achieved when IT infrastructure be used to meet organizational needs determined by customer. IT infrastructure when provides capabilities of sharing information technology in company, thus can have been many positive effects on the efficiency of the production supply chain in company. These sharing capabilities can help to participate in creating a unique capabilities, difficult to imitate, and irreplaceable (Chang & et al,2011).

To evaluate the information sharing capabilities, to understand requirements of these capabilities is important. Information sharing capabilities include two aspects: 1) Capabilities of company in exposure to intangible information that is in all parts related to the company and among suppliers, customers and distribution networks and 2) Capabilities of company in creating a tangible network to communicate both internally among different areas of the company as well as externally with supply chain partners (integration of IT systems to strengthen communication of information) (Ismail & et al,2012).

While capabilities of sharing IT without the actual experience of sharing information has very little impact on a company's competitive performance, capabilities of sharing IT increase the

possibility of using the experience and by improving the level of information processed and value of information will increase value of the company.

This research refers to worth of sharing information technology capabilities in improving supply chain performance and sustaining competitive strategy.

3. Research Model

As is shown in figure 2, this study examines an element that is vital for the success of the company i.e., capabilities of IT enablers. These capabilities represent the amount provided continuous information flow in a connection developed by manufacturers that is between companies of its suppliers. Capabilities of sharing technology information is associated directly with the manufacturer flexibility in the supply chain, including elements of flexibility, product development, production flexibility, logistics flexibility, the flexibility of suppliers, and flexibility of supply base and, in turn, this flexibility of supply chain is directly associated with competitive advantage (Prajogo & et al, 2012). So, empowerment of IT and competitive performance is directly related with flexibility in the supply chain of manufacturer.

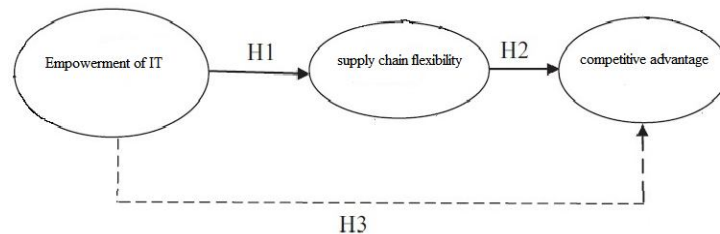


Figure 2: Conceptual model of Research (Yan, Mark, T.S Ragu, & Joy, 2014)

4. Research Hypotheses

- Capability of sharing IT has directly relationship with flexibility of manufacturing system supply.
- Capability of supply chain flexibility in company has positive relationship with competitive performance.
- Capability of sharing IT has a positive relationship with the performance of competitive advantage through supply chain flexibility.

5. Research Methodology

This study is an applied research that its results are primarily "studying relationship between capabilities of IT enablers, flexible supply chain and supply chain and competitive advantage" and is descriptive- survey research. National Iranian Oil Company was selected as a case study and 127 questionnaires were distributed among professionals and managers. In the present study the questionnaire is used as tool of data collection. In this study, have tried to achieve in necessary credibility in the design and use of questionnaires, after a pilot study about the issue examined with consultation and interviews with supervisors and advisers and their approval and opinions of experts, design questionnaire that has relatively sufficient

validity. Cronbach's alpha was used to assess the reliability that results of mentioned test has been 0.943 which confirms the reliability of research tool or in other words the reliability of the questionnaire. The results of the questionnaires were collected and required data was extracted and entered into SPSS software and the required analysis was performed by LISREL software.

6. Research Findings

To answer the research questions, at first after understanding the concept of capabilities of empowering IT was tried that by studying scientific theories and research done is detected the most important factors that are effective from the perspective of researchers and scientists of technology on capabilities of IT enablers and supply chain flexibility and competitive advantage. Then field studies and collecting the opinions of experts and specialists were tried that is studied the impact of these factors. The result of this field work has been modeling and new categories for factors extracted from the literature by method of exploratory factor analysis that the following have been reported.

The results showed that capabilities of sharing information technology are associated with capabilities in supply chain of manufacturer which in turn is associated with competitive performance of company. This result suggests that a company must be focus capabilities of flexibility in the supply chain to improve their performance. Capabilities of sharing information technology are a prerequisite for improving these capabilities.

6.1. Sort of capabilities of IT enablers based on factor analysis

The results of the factor analysis are presented in the table below.

Table 1: Sort of capabilities of IT enablers based on factor analysis

ITSC3	IT system provides accurate and timely information for the performance of suppliers.
ITSC5	IT systems support performance of units of production scheduling, planning during purchasing, manufacturing, marketing and distribution
ITSC4	IT system makes homogeneous internal performance of company
ITSC2	IT systems provide accurate and timely information for logistical performance
ITSC1	IT systems provide accurate and timely information for production performance.
ITSC6	IT system of management supports relationship between the company and suppliers.

6.2. Sort of supply chain flexibility based on factor analysis

The results of the factor analysis are presented in the table below.

Table 2: Sort of supply chain flexibility based on factor analysis

PF4	Production system of company has the ability to change various homogeneous products (different groups of homogeneous products)
PDF2	Company has the ability of profitability for new products
PDF1	Company has ability to generate new and diverse products
PDF3	Company has ability to change different products
PDF4	Company has ability to improve various products
PF3	Production system of company has ability to homogenize different products
SF4	Suppliers of company have the ability to respond effectively to changes in the company's diverse products
PF1	Production system of company has ability to work in low and high quantity of production.
PF2	Production system of company is able to effective change in the amount of Production
SBF1	Company in need to new suppliers can quickly select new suppliers.
SF1	Suppliers of company have the ability to supply various demands.
SBF2	Company has ability to regulate current relationships
SF2	Suppliers of company have the ability to respond effectively to the changing demands of the company.
LF1	transport system of company has ability to meet different demands
SF3	Suppliers of company have ability to supply and production of a variety of raw materials for company.
LF2	Transportation system company has the ability to respond to changes in different demands
SBF3	The company's ability to replace suppliers

6.3. Sort of competitive advantage factors based on factor analysis

The results of the factor analysis are presented in the table below.

Table 3: sort of competitive advantage factors based on factor analysis

CA3	Company has compete with other companies in introducing product quickly to market
CA2	Company has ability to compete with other companies in the reliable delivery for customers.
CA1	Company has ability to compete with other companies in the supply of quality products for customers .

6.4. Evaluation of capabilities of information technology enablers on supply chain flexibility (the correlation between capability of information technology enablers on supply chain: the first hypothesis)

Table 4: Chi-square correlation test of first hypothesis

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	505.000 ^a	481	.217
Likelihood Ratio	209.358	481	1.000
Linear-by-Linear Association	3.695	1	.055
N of Valid Cases	48		

a. 532 cells (100.0%) have expected count less than 5. The minimum expected count is .02.

Table of Symmetric Measures states value of R when the assumption of its equality is rejected with zero. It should be noted that $-1 \leq R \leq 1$ and when $R > 0$ means that there's a direct correlation between the two variables and if $R < 0$ There is an inverse relationship between the two variables. The effect of capabilities of technology empowerment on supply chain flexibility due to amount of 0.280 be direct and positive impact. ie capability of technology empowerment increases supply chain flexibility.

Table 5: value of R

Symmetric Measures

	Value	Asymp. Std. Error ^a	Approx. T ^b	Approx. Sig.
Interval by Interval Pearson's R	.280	.155	1.981	.054 ^c
Ordinal by Ordinal Spearman Correlation	.335	.135	2.409	.020 ^c
N of Valid Cases	48			

- a. Not assuming the null hypothesis.
- b. Using the asymptotic standard error assuming the null hypothesis.
- c. Based on normal approximation.

6.5. Evaluating the effect of the supply chain on competitive advantage (second hypothesis)

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	346.400 ^a	333	.295
Likelihood Ratio	181.333	333	1.000
Linear-by-Linear Association	23.805	1	.000
N of Valid Cases	48		

a. 380 cells (100.0%) have expected count less than 5. The minimum expected count is .02.

In this part, the impact of supply chain flexibility on competitive advantage due to the amount of 0.712 is a direct and positive impact. Ie, by increasing supply chain flexibility increases competitive advantage.

6.6. Evaluating the effect of IT enablers on competitive advantage (third hypothesis)

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	129.105 ^a	117	.209
Likelihood Ratio	95.328	117	.929
Linear-by-Linear Association	3.143	1	.076
N of Valid Cases	48		

a. 140 cells (100.0%) have expected count less than 5. The minimum expected count is .02.

In study effect of capabilities of technology empowerment on competitive advantage due to amount of 0.259 be direct and positive impact. It means that by increasing in capability of technology empowerment increases competitive advantage.

7. Discussion and Conclusion

By increasing global competition, manufacturers are looking for ways to create viable competitive performance in order to improve their competitive position. Competitive performance can obtain from many sources, such as separation of products and services based on price, quality or service, but in case be viable it is difficult to imitate. Relationship of IT capability reveals differentiation of a potential source. Capabilities of sharing information technology has a direct relationship with supply chain flexibility of producers including factors such as the flexibility of product development, manufacturing flexibility, logistics

flexibility, flexibility of suppliers and flexibility of supply center. In return capabilities of supply chain flexibility is directly related to the creation of competitive performance. Therefore the relationship between capabilities of sharing IT and competitive performance is directly related to capabilities of flexibility in a supply chain of manufacturer. This research shows mechanism that through underlying of information technology enables superior performance of the company and by experimental study shows the links between capability of sharing information technology, supply chain flexibility (capabilities of product development flexibility, manufacturing, logistics, suppliers and the supply center of production) and competitive performance. The results of research showed that capabilities of sharing information technology are associated with capabilities in supply chain of manufacturer which in turn is associated with competitive performance of company. This result suggests that a company must be focus capabilities of flexibility in the supply chain to improve their performance. Capabilities of sharing information technology are a prerequisite for improving these capabilities.

References

- Chang, T & ,Chuang, s.(2011). Performance implications of knowledge management processes: Examining the roles of infrastructure capability and business strategy . *Expert Systems with Applications*, 6170-6178, 38.
- Childhouse, P., & Towill, D. (2003). Simplified material flow holds the key to supply chain integration.
- Ismail, A., Rose, R., Uli, J & ,Abdullah, H.(2012). The relationship between organizational resource, capabilities, systems and competitive advantage .*Asian Academy of Management Journal*.
- Jafarnejad,A; Smaeilian,M; Rabieh,M.(2008). Evaluation and selection of suppliers in supply chain of sourcing single with phase approach, *Journal of Humanities lecturer*, Issue 4.
- Prajogo, D & ,Olhager, J.(2012) .Supply chain integration and performance: The effects of long-term relationships, Information technology and sharing, and logistics integration . *International Journal of Production Economics*,514-522.
- Yan, J., Mark, V., T.S Ragu, N., & Joy, T. S. (2014). Exploring reletionships among IT-enabled sharing capability,supply chain flexibility, and competitive performance. *Int.J.Production Economics*.