New York Science Journal

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MARSLAND PRESS
Multidisciplinary Academic Journal Publisher

The Effect of Information Technology on Competitive Advantage of Prices in Supply Chain of Small and Medium Industries

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Abstract: To remain competitive in today's business world depends on having more points than the competitors. Due to the rapid growth and increasing competition in the business, having an appropriate strategy can successfully address many problems. These strategies include fast delivery of goods, merchandise quality, low production costs, and after sale services. Our study over 150 small and medium companies showed that, there are positive relationships between information technology and the variables of procurement mechanisms, logistics costs, materials quality, and communications with suppliers of raw materials.
[Amir Touzandehjani, Somayye Lagzian, Mahboubeh Touzandehjani. **The Effect of Information Technology on Competitive Advantage of Prices in Supply Chain of Small and Medium Industries.** *N Y Sci J* 2020;13(9):53-58]. ISSN 1554-0200 (print); ISSN 2375-723X (online). http://www.sciencepub.net/newyork. 10. doi:10.7537/marsnys130920.10.

Keywords: information technology, competitive advantage, cost, supply chain, small and medium industries

1. Introduction

Today, organizations in the global market, due to the rising of customer expectations and global competition are forcing dramatic changes. Fierce competition in the markets today is conducted by advances in industrial technology and increased globalization and the enormous advances in information access. With the development of information technology and economic globalization, the competition between enterprises has transformed to the competition between enterprises and their supply chains with others. In this era, organizations have to re-think about their performance, continuity, relationships and strategies to cope with these and similar changes. Now, competitiveness of the supply chain is one of the most powerful tools to gain competitive advantage (Ajay Verma 2010).

Supply chains encompass a variety of topics, including: specification and methodology (Carvalho 2009) organizational structure, functional characteristics (Azevedo & Duarte, 2010), human factors (Correia, 2010) informatics and integrator model (Maleki, 2011). In the last decade, the supply chain management has converted from an intangible and secondary status to a strategic element that can affect organizations' activities. Developments resulted from technology, change of business methods, expectations of partners in the supply chain, and finally the demand for more value added by consumer, have changed the supply chain management (Lansiony, 2003). In general, competitiveness of the supply chain refers to gain competitive advantage by a supplier over another. Achieving competitiveness on supply chain is not a simple task but in include competitiveness of all components of the supply chain such as suppliers, manufacturers, distributors and retailers. A firm strategically gains competitive advantage by conducting important activities more cheaply or better than its competitors. A company's competitive strategy in relation to competitors is satisfying the needs of customers through products and services that provides. The effect of different components of the supply chain to achieve competitiveness in the supply chain can be identified. Different components of the supply chain should be competitive enough so that overall competitiveness can be achieved. Information and communication as the deepest and most significant changes, affect organizations equal to competitiveness of the supply chain. Internet use and communication systems can improve the competitiveness of the supply chain. Organizations in order to compete more effectively must be quick, agile and flexible and it cannot be achieved without cooperation among firms in supply chains. Information, intelligence and expertise are important resource for competitive advantage.

Competitiveness of the supply chain cannot be achieved solely by an enterprise but integrating of all

firms (suppliers, manufacturers and distributors) is required for supply chain competitiveness (Laudon, 2002). By increasing the importance of procurement activities, purchase decisions become, more important and since today, Organizations are more depended to suppliers, direct and indirect consequences of poor decision seems more serious (Hang Hong, 2005). Information technology plays an important role in helping to increase the supply chain's ability to resist risks and thus helps to improve the performance of the entire chain. Applying information technology in supply chain has positive effects on risk tolerance of the supply chain. Companies that want to improve their supply chain operations and reduce risks of disruption in the supply chain should have an appropriate information technology strategy and improve their abilities to use information technology in supply chain operations (Xinrui Zhang, 2011).

In the present era, information technology shows dramatic changes in the way companies conduct their business activities. Companies cannot neglect the effect of information on the results of strategies, practices and their performance. Researches, along with practitioners, are continuously developing philosophies and tools to cope with rapid possible changes in this environment.

A few decades ago, Total Quality Management (TQM) was emerged as a philosophy of integrating the activities of the organization for a common goal namely, the customer satisfaction. In this situation, companies began to re-think about the suppliers as strategic partners and argued the issue of entering suppliers to their companies. After several years, professional and academic communities looked for creating patterns of supply chain management that not only were in relation with organization but were connected to supply network and customers as the entire supply chain (Gioconda Quesada, 2004).

Environment of today's business is more competitive and global than it has been in the past. Modern business is described with shortened product life cycles, rapid introduction of new products and informed customers. Therefore, modern supply chains are expected to respond quickly, effectively and efficiently to market changes to further develop competitive advantage (Ashish A. Thatte, 2007). Therefore, organizations need to create value for the end user, which is possible through satisfying the customer expectations in terms of quality, time, cost and flexibility in goods and services because that, supply chain management has improved procurement strategies from a separate strategy to the unified procurement. Procurement managers, in order to develop better methods, not only try to improve their activities but also attempt to improve the performance of the companies by developing supply chain performance. These new technologies have been created using a new set of technologies that force companies to lower their costs while being agile and quick. These changes and challenges that companies and supply chains are facing, prompted researchers to analyze the impact of e-procurement technologies on improving the performance of supplies (Gioconda Quesada, 2004). The e-procurement technologies refer to techniques and technologies of electronic communication networks that provide facilities such as electronic communications, electronic transactions, and electronic support of transactions in the public and private networks. E-procurement activities are not limited to the use of internet because emphasizing on internet procurement limits understanding of the individuals from strengths, benefits, and limitations of e-procurement. There are a variety of electronic technologies that are being used more than others such as Internet search engines, extranet, internet auction and tender, electronic markets, video conferencing, file transfer protocols, electronic catalogs, E-mail and electronic data interchange.

The lesser final cost of products while maintaining its quality is considered a competitive advantage. A competitive advantage exists when the product or service offered by a company to target customers are considered better product or service comparing to the competing company. Companies do their best to keep themselves ahead from competitors and thus in order to compete with them and powerful entering to the created business model, need for something like strategic competitive advantage. Competitive advantage is an advantage that is achieved by offering more value to customers, either through lower prices or offering additional services or benefits that justifies the same or even higher prices. The purpose of competitive advantage is having an advantage over the competition. In principle, competitive advantage is a response to the question that, in a competition, why a customer, prefers a product. The successful development of an economic activity is often associated with a strong competitive advantage where eventually establishes a core of loyal customers that could be expanded over time. Successful economic activities appropriately conduct a combination of business activities including marketing, manufacturing, distribution, financial management, customer service, or other important activities for the business unit. However, a competitive advantage is often an independent key component that grants and advantage to the business unit that is beyond what competition can give (Cole Ehmke, 2008).

In this study, we have are trying to show how network technologies affect procurement performance, supply chain performance and firm

performance. Moreover, we are trying to investigate the influence of information technology on the function of procurement, reducing the cost of procurement, adjusting the price levels and adjusting supply costs.

Nirvikar Singh (2008) has investigated the impact of transaction costs on economic development and prosperity and the role of information technology in reducing these costs. He, in a dynamic model, showed that, transaction costs reduce long-term development level and in extreme status may completely avoid it. Therefore, he presented numerical evidences of the Indian agricultural industry to describe how to reduce transaction costs through the use of information technology. Singh's research showed that, every developing country can take advantage of information technology to lower these cost as much as is possible in India. He also mentioned the impact of information technology on educational and process of innovation in addition to economic development (Nirvikar Singh, 2008).

According to research conducted by Bars et al. for determining and evaluating the costs that affect the effectiveness of company's overall costs on the supply chain management. It was determined that, the acceptance of e-business has positive impact on its performance in several fields. They concluded that, the mode of e-commerce as one of today's business needs creates the willingness to assess its qualitative and quantitative impact on the results of the results of business. Moreover, the theoretical analysis of the adoption of e-commerce in supply chain management, introduces four main areas of costs where E-commerce can positively affect, as follows:

- Cost of materials ordering process
- The average inventory costs that affects the average inventory maintaining costs
- The cost of the searching and identifying of suppliers
- Cost of competition level of suppliers

Nevertheless, their empirical research revealed that, the cost factors that were directly related to the adoption of e-commerce are not the major part of the company's cost structure meaning the lower growth in the effectiveness of the business. It describes the fact that, there is a considerable gap between theoretical and practical analysis of the impact of e-business on the effectiveness of supply chain management (Petras Bars, 2007).

In the literature of the topic, there are various definitions for supply chain: supply chain includes all steps that directly or indirectly attempt to meet the demands of customer and not only include manufacturer and supplier but also include transportation, warehouses, retailers and customers (Chupra & Mindell, 2007).

2. Methodology and Data

Independent variable in this study is the use of information technology and the dependent variables are: 1- the mechanisms of procurement that include data collection 2- contact with suppliers, follow-ups, contracts, etc. 3- reduce procurement costs, including the search for suppliers and 4- supplying materials with good quality and low price.

The overall objective of this study is to investigate the effects of information technology on competitive advantage of final product cost through studying mentioned factors. Specific objectives of this work are as follows:

- Identifying the impact of information technology on procurement mechanism and its efficiency
- Reducing procurement costs
- Providing possibility to supply materials with lower price
- Providing possibility to supply high quality materials

2.1. Research Hypotheses

1. Information technology is effective on procurement mechanism and efficiency.
2. Information technology reduces procurement costs.
3. Information technology, by creating flexibility in the selection of suppliers, reduces procurement costs.
4. Information technology provides the possibility of supplying high quality materials with lower cost.

2.2. Type of the study, methodology and implementation

Software used for data analysis was the LISREL software. LISREL is self-reliant software that has been provided by scientific software international (sst). The software, using correlation and covariance between measurement variables can calculate the values of the factor loadings, variances, and the errors of latent variables.

Data collection tools of this study were library, Internet, and questionnaires. The questionnaires used in this work were a part of a standardized questionnaire used on doctoral dissertation of Gioconda Quesada (2004) to assess the impact of information technology on procurement performance and company's performance.

Statistical population was whole set of those survey findings scheduled to be extrapolated. Madrayn therefore, it includes workers and specialists related to information technology in small and medium enterprises active in the Khorasan-e- Razavi province, Iran which have implemented the use of information technology.

2.2.1. Sampling methods and sample size

According to the qualitative state of our variables, the minimum sample size and the statistical population were calculated by the following formulas.

$$n = \frac{Z\frac{\propto^2}{2} \times pq}{e^2} \quad n = \frac{(1.96)^2 \times 0.5 \times (1-0.5)}{0.08^2} = 150$$

Given that, the number of companies that have implemented e-procurement is limited and increasing sample size requires increasing the cost of the project and considering that, the amount of e (Error limit) can be 0.1 at maximum, thus the maximum error limit for sample size was considered equal to 0.08.

Since, Small and Medium-sized Enterprises (SMEs) are active in various industries and given that, there is no difference in type of the industries (in terms of research topic), therefore, statistically, each industry is a cluster. Therefore, we conducted multi-stage cluster sampling so that, first, according to the list of the Mining and Industry organization, we identified small and medium industries. Then among each of the selected industries, we selected some companies and surveyed the responsible ones in selected companies.

2.2.2. Methods of data analysis

Present work, in terms of data collection is a descriptive (non-experimental) study. Descriptive works can be divided into following categories:

- Survey
- Correlation study
- Action Research
- Case Study
- Post-hoc study

In this work we used correlation method. Correlation studies, depending on purpose, are divided into three categories:

- Covariance of two variables
- Regression Analysis
- Analysis of the correlation or covariance matrix.

The type of this study is analyzing the correlation is the covariance or correlation matrix analysis. When researcher wants to summarize variables in limited factors through their correlation or wants to determine attributes of a set of underlying factors, the factor analysis method will be used. If researcher wants to investigate a specific model, in terms of the relationship between variables, then he needs to use structural equation modeling method. For both of the mentioned methods it is necessary to analyze the covariance matrix of the measured variables.

Methods of data analysis in this study are divided into two stages:

1. Factor analysis method using correlation matrix
2. Structural equation modeling

In the first step, in order to understand the underlying variables of a phenomenon or to summarize a set of the data, the factor analysis is used. The primary data for factor analysis is the correlation matrix. Factor analysis can be used for two purposes:

1. Exploratory purposes
2. Confirmatory purposes

In the second stage, in order to investigate the causal relationships between variables, structural equation modeling or multivariate analysis will be used. Through this method, we can test the acceptability of the theoretical models in specific populations using the correlation, experimental, and non-experimental data.

In the first hypothesis, the path coefficients of variables of information technology on procurement performance and efficiency is negative, T = - 0.062 at P <0.05, thus there is no direct relationship between information technology and procurement performance and efficiency.

In the second hypothesis, the path coefficients of variables of information technology and procurement costs is positive and significant, T = 6.83 at P <0.05, thus there positive relationship between information technology and procurement performance and efficiency.

In the third hypothesis, the path coefficients of variables of information technology and flexibility in selecting suppliers is positive and significant, T = 4.95 at P <0.05, thus there is positive relationship between information technology and flexibility in selecting suppliers.

In the fourth hypothesis, the path coefficients of variables of information technology and supplying high quality materials with lower costs is positive and significant, T = 4.62 at P <0.05, thus there is positive relationship between information technology and supplying high quality materials with lower costs.

3. Results

The main objective of supply chain management is improving the efficiency and effectiveness of organization and reducing the cost of supplying which if successful, it will lead to competitive advantage. Therefore, today, companies realized that, their purchase unit can appropriately increase their efficiency, thus, they are changing their purchasing practices to find the appropriate purchasing practices to meet the strategic objectives of the company. To accomplish this, every strategic purchase requires a

strategic purchasing plan which means establishing a strategic relationship with suppliers. To achieve the development of information technology and e-business, implementing supply chain management solutions in the organization is considered as essential. Supply chain management focuses on the integration of supply chain activities and associated information flows through the improvement in relations in the chain to achieve continuous competitive advantage. Therefore, communication technologies find special importance in the creation of this integration and it is evident that, by increasing the relationships between the parties, the effectiveness of the activities to satisfy the customer in the arena of competition would be higher.

4. Conclusion

The application of information technology in companies, especially industrial companies, is essential. Decision making on implementing information technology due to its sensitivity, high costs, and success risks, is one of the critical decisions whose all aspect must be studied before implementing. Since the authors did not have access to these data and given that, our main objective was providing overall view on these strategies to assist organizations in our country. Therefore, based on our studies on this issue and given the above, we believe that:

- Organizations and industries, as soon as possible, should extensively use information technology in planning their activities.
- This implementation must be planned and rapid and along with developing information technology strategy in the company.
- Application of information technology in the organizations should follow these hierarchical approach:

1. Development and provision of needed infrastructures
2. Human resources and skills required
3. Reengineering of the processes

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9/25/2020