The Impact of Information Technology Application on Supply Chain Performance

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Abstract

Huge advances in information technology, has already taken place, the industry has developed both changes, including changes in the supply chain. A fast data transfer and information technology in supply chain resulting in increased cooperation between the supply chain and finally, increased efficiency throughout the supply chain. An effective supply chain are considered as the key to creating network of sustainable competitive by improving relations inside and outside the organization. Effective information sharing as one of the most basic capabilities of the supply chain process is considered. Purpose of this paper seeks to the effect of information technology on supply chain performance. One of the cases worked by researchers in the fields is mentioned for instance related to steel companies.

Keywords: Supply Chain, Information Systems, Supply Chain Management

1- Introduction

Organizations are not in a vacuum. In recent years, the issue of competitive advantage in companies has been considered specially (Gilaninia & et al, 2011). Any organization, including corporations, public companies or small businesses will have to make various demands of customers and shareholders. Thus, they need materials, equipment, facilities and supplies Participants from other organizations and a performance is affected by the activities of other organizations that make up the supply chain. Organizational efficiency and effectiveness of each organization is obtained of performance of management and its supply chain structure (Rahman Seresht and Afsar, 87). Supply chain management means to integrate these activities through improving chain relationship in order to access stable competitive advantage (Gilaninia & et al, 2011). Supply chain consists of a network of partners and various channels operating throughout the organization which affect on the utility of supply chain headquarters. The main purpose of supply chain management activities related to satisfy customers demand. (Amid et al, 2007)
Nowadays a potential way to maintain competitive advantage and improving organizational performance; is labor supply chain (Amid et al, 2007). As an application of the Internet, e-commerce depends on information infrastructures and telecommunications for its development (Gilaninia & et al, 2011). One capability that is essential for achieving competitiveness and supply, is sharing of information. The information sharing is referred to ability of company in order to knowledge systems of supply chain partners in effective and efficient way (Rajab Zadeh et al, 2010). On the other hand, the role of information systems in organizational performance is changed effectively, and nowadays information systems for organizations are creator of value (Choou & oh, 2001). Information systems play the role of integration between different parts of the supply chain and the performance of this system has a direct impact on the efficiency of supply chain performance. (Amid et al, 86). Jiang and his colleagues believed that the creation and deployment of information systems requires a variety of information technologies. Information technology can also support cooperation between companies and their internal operations in supply chain and effective use of technology is a key factor in the success of the company. Major cause of uncertainty is, poor information flow, which can include inaccurate, being premature or incorrect information management. Information technology with ability of managing information flow affect on dimensions of supply chain, Such as cost, quality, flexibility and timely delivery of goods and services and ultimately profit of organization (Droodchi & Nikmehr, 2007). Systems supported by Information technology are applicable in major field of supply chain management. Major fields in supply chain management products and services are including design, production, marketing and sales, customer service and logistics (Droodchi & Nikmehr, 2007).

2- Theoretical framework

Current arena is the period of accelerated and unpredictable evolutions and companies confront with the most difficult and unprecedented competition conditions (Rezvani & et al, 2011). Supply chain management, is result of logical progression in logistics management. Logistics management has been created by adding construction, manufacturing, supplies and orders into distribution management (Droodchi & Nikmehr, 2007). Karbassian in a survey performed in 2003 concluded that supply chain management were studied as a serious discussion in the scientific community, from the early 1980s and many researchers, provides framework and model for that. (Droodchi & Nikmehr, 2007). Ellinger (2000) An effective supply chain are considered as the key to creating network of sustainable competitive by improving relations inside and outside the organization. Wu and others have shown, using resource-based view that supply chain capabilities by using information technology (IT) cause distinctions in companies compared to competitors and inimitable to competitors, in this study the impact of IT development and IT to theoretical convergence on supply chain capabilities marketing and financial performance were assessed. Their finding has provided a new perspective in evaluating IT investments in the supply chain process. They reviewed the role of supply chain capabilities as a moderating variable between progress of IT and organizational performance and believe that the supply chain capabilities are able to transfer resources relate to IT to a higher level of value (Rahman Seresht and Afasar, 2008). Based on studies role of information systems in supply chain and articles in this field is divided into six categories, including: Strategic planning of information systems in supply chain, IT infrastructure and knowledge in supply chain, information technology implementation in the supply chain, virtual organizations and supply chain. (Amid et al, 2007). Lee and others reviewed five common dimensions of supply chain management (strategic partnerships with suppliers, communicating with customers, and the level of information sharing, quality, information sharing and exchange) and the
relationship between the size of a typical supply chain, competitive advantage, and organizational performance. Results of this research according to resource-based view indicate that higher levels of common Scm can result to gain competitive advantage and organizational performance improvement. Also competitive advantage can have direct and positive impact on organizational performance. (Rahman Seresht and Afsar, 2008).

According to the literature, we seek to impact of application of information technology on supply chain performance in studies that were reviewed by the gentlemen of the steel supply chain as an example the study mentioned. They suggested the following model that includes four hypotheses:

1 - Sharing and information technology of supply chain, affect accountability of steel supply chain.

2 - Information technology and Information Sharing of supply chain, affect the steel supply chain efficiency.

3 - Responding of supply chain, affect the steel supply chain performance.

4 - The efficiency of supply chain affects the performance of supply chain.

- Information sharing and the role of information technology in supply chain:

Through the information is established communication between all operations and processes in the supply chain. The expansion of these communications will enable firms in a supply chain, to make decision in the correct and proper way to develop and maximize overall supply chain profits. Also information in the strategic planning that ideals of it in a supply chain is including the development to areas and new markets creating new facilities, optimal success on the market has many applications. Information can make operational decisions and planning up to the high efficiency. In a supply chain efficiency and responsiveness of firms depend on accuracy and amount of information that sharing with each other. (Droodchi & Nikmehr, 2007). Effective information sharing is considered as one of the most basic capabilities of the supply chain process, information shared in interactive systems and supply chain is including information between direct partners and also in the entire supply chain network. Effective information sharing is considered as one of the most basic capabilities of the supply chain process. (Rahman Seresht and Afsar, 2008). Supply chain according to the information and use of it has specifications and features that are as follows. (Droodchi & Nikmehr, 2007).

A - Extensive coverage:

Data in the supply chain covers the communications from suppliers, manufacturers, to distributors and retailers. Information flow consists of two different current supply and demand.

B - More access channels:
Since businesses in the supply chain are as a relationship of cooperation and integration complex, there should be many channels of information on supply chain.

C - Data quality:
Because of Being technical, the quality of information in the supply chain is much more apogee than the information in a single firm.

1- Review the effects of information technology on supply chain:
IT allows supply chain partners can function as a single entity. Generally integration, planning and coordination between supply chain institutions is with the aim to achieve the optimal solution.(Droodchi & Nikmehr,2007). Effect of information technology on supply chain of three views, collaboration, business development strategies and effects of information technology on supply chain management based on past studies are as follow:(Droodchi & Nikmehr,2007)

A - Information technology and Collaboration:
Cooperation has two distinct concepts, internal and external cooperation. Cooperation is the result of human interactions that are supported by IT. In fact information technology is a concept that will improve cooperation in two dimensions of internal and external relationships.

B - Information technology and its Impact in developing of business strategies in the supply chain:
Including: A- establish new relationships with customers in order to best identifying customer needs and market, B - development of effective sales and marketing channels C - Changing the composition of the supply chain and logistics to achieve unity of the flow of goods D- Reconstruction between company's value chains.

C - Effect of information technology on supply chain management based on past studies
Including: (a) D- Making powerful distribution and transmission of information D- helping to create complete and comprehensive model of customer demand

D - Increasing the speed of the supply chain.

2-Response of the supply chain

Response of the supply chain is defined as how a supply chain members respond to environmental changes with coordination.. Today’s complex market requires constant, efficient and ...... reply of all members of supply chain. (Rahman Seresht and Afsar, 2008). Response indicators based on supply chain, including maximizing percent of orders are being met, minimizing delays in product delivery, minimizing IT, minimizing duplication of tasks and minimizing response time to customer.(Manian et al,2010).

3- Supply chain efficiency:

Purpose of supply chain efficiency are, production cost and product delivery to the customers, in discussion of supply chain efficiency is considered minimizing costs, sales maximization, minimizing investments and maximizing ROT. For supply chain partners.(Manian et al,89). Each member of the supply chain tries to reduce its cost instead of product with high cost and selling with higher prices to the other members of supply chain.

4 - Supply chain performance:

In a general classification, methods for measuring the supply chain can be divided into five categories: Traditional performance assessment, performance assessment systems at the global level, the card balance model, SCORE; specific supply chain models are classified.

3- Research Method

Considering the aim of this study, review of relationship between sharing and role of information on supply chain performance descriptive research method was chosen,Also because the supply chain strategy as a mediator variable, sharing information as the independent variable and steel supply chain performance as the dependent variable were reviewed and index has been visiting directly to the organizations and interviews with experts, Mobarakeh steel company executives and experts, Khuzestan Steel and Zobahan, this is survey research. Population of this research including managers and experts related to supply chain businesses, and Khuzestan Steel, Mobarakeh Steel, and the Isfahan Steel. In this study, 95 people of managers and experts were selected, using stratified random sampling method as sample, related to supply chain of Mobarakeh Steel, Khuzestan Steel and Zobahan companies. To assess its validity to ensure its functionality (means ability of questionnaire to evaluate what measures should be considered) In addition to the masters opinion is used the credibility factor. Cronbach's alpha test was used to determine reliability of the method, and the general amounts are 93% and 70% for information sharing of supply chain, 80% accountability of supply chain, 83% supply chain efficiency and 82% performance of supply chain. (Rahman Seresht and Afsar, 2008).
Table 1: Status Variables

<table>
<thead>
<tr>
<th>Description</th>
<th>Factor Analysis</th>
<th>T-Value</th>
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<tbody>
<tr>
<td><strong>Information Sharing</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Our company is exchange more information with our partners than competitors with their partners.</td>
<td>Confirmed</td>
<td></td>
</tr>
<tr>
<td>Information is ongoing easier between our company and partners compared to competitors with partners.</td>
<td>Confirmed</td>
<td>5.75</td>
</tr>
<tr>
<td>Our company gets more benefits by sharing information with our partners compared to competitors with their partners.</td>
<td>Confirmed</td>
<td>4.36</td>
</tr>
<tr>
<td>Our partners provide all information that somehow have effect on us</td>
<td>Confirmed</td>
<td>4.62</td>
</tr>
<tr>
<td><strong>Responding</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Compared with competitors, our supply chain responses toward changes in customers and suppliers more efficient and quickly.</td>
<td>Confirmed</td>
<td></td>
</tr>
<tr>
<td>We review periodically to ensure the products align with the demands of customers.</td>
<td>Confirmed</td>
<td>7.74</td>
</tr>
<tr>
<td>When we are informed of dissatisfaction of our consumers from our products, review it and perform corrective action</td>
<td>Confirmed</td>
<td>7.32</td>
</tr>
<tr>
<td>We continuously measure our customer satisfaction.</td>
<td>Confirmed</td>
<td>6.77</td>
</tr>
<tr>
<td><strong>Performance</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>In our company in comparison with competitors, production is planned constantly to reduce production costs.</td>
<td>Confirmed</td>
<td></td>
</tr>
<tr>
<td>The number of employees to sales ratio in our company are reduced annually.</td>
<td>Confirmed</td>
<td>7.63</td>
</tr>
<tr>
<td>Capacity utilization rate (according to standards), in our company is higher than competitors.</td>
<td>Confirmed</td>
<td>6.83</td>
</tr>
<tr>
<td>in selecting suppliers is considering to the price and quality concurrently</td>
<td>Confirmed</td>
<td>5.58</td>
</tr>
<tr>
<td><strong>Operation</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cost of waste in our supply chain compared to most competitors is reduced each year.</td>
<td>Confirmed</td>
<td></td>
</tr>
<tr>
<td>Cash to cash cycle time in our supply chain compared to most competitors are reduced each year.</td>
<td>Confirmed</td>
<td>6.99</td>
</tr>
<tr>
<td>Our average profit margins in the supply chain compared to Competitors is increased more each year</td>
<td>Confirmed</td>
<td>8.77</td>
</tr>
<tr>
<td>In our market share compared to competitors growth becomes more each year</td>
<td>Confirmed</td>
<td>8.40</td>
</tr>
</tbody>
</table>

Next, each of the hypotheses is examined to verify the relationship, and correctness or the irregularity of relationship to be determined and also the amount of relation. Therefore, the confirmatory factor analysis was used, which the results of that in terms of path analysis estimates in the standard model in Figure 2 and in terms of value of T are presented in Figure 3.

Figure 2: Path analysis estimates in the standard model
As in Figure 3 is shown \( T \) for the four models of relationships (four hypothesis) is more than \( 1 / 96 \). So above four hypotheses are confirmed. Note that the amount of chi-square 78.86 and degrees of freedom will be 86, so the fraction of \( \chi^2 \) will be 0.92 and because this value is less than 3 model is confirmed. On the other hand good indicators of model such as NFI=0/90 , NNFI=0/90 , PNFI=0/82 , CFI=0/99 , IFI=0/99, RFI=0/89 all are near to one. So model is well fitted. Research component indicators, including information sharing, accountability, efficiency and performance are confirmed by approval factor analysis, each state has been reviewed, modeling was performed using the LISREL software.(Rahman Seresht and Afsar, 2008).

4- Conclusion and Suggestions

This study was investigated with the purpose of the effects of information technology on supply chain performance. Effective factors on supply chain performance were reviewed. According to the results determined that nowadays information in one supply chain is one important factor for favorable and optimal decision for development and survival, and Considering the importance of information in the supply chain, Can conclude that the cause of poor efficiency in the supply chain, are the lack of accuracy of the information and adequacy of information systems that are responsible for providing and processing information, The research results show that information sharing is associated with both supply chain strategy. But has more relationship with responsiveness of supply chain. Considering the variety of product and grading of steel is much. Coordination with environmental changes and meet the demands of customers is very important, information sharing leads to higher level of information exchange between the city also high effectiveness of information. The relationship between supply chain strategies (responsiveness and efficiency) and performance has also been approved. This means that higher responsiveness and performance of the supply chain would be higher performance for supply chain. Considering importance of information flow and its role in the supply chain can say that the supply chain compared with Individual firms have three specific features including: More coverage, more channels and access to high quality information. Information technology improve, distribution and exchange information and improve supply chain efficiency effectively. The effects of information technology in supply chain management that can be mentioned are: improving cooperation relationships in two internal and external dimensions ,Increasing responsibility, creating new relationships with customers to identify their needs, developing sales channels, improving performance and improving the competitive position of the chain.
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