Investigating the influence of information technology implementation and information sharing on supply chain operational performance (case study: ISACO company)

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Received: 01.02.2015; Accepted: 06.06.2015

Abstract. Supply chain is the related activities with providers of raw materials and services, producers of products or services and customers or users. To answer correctly about the supply chain it is necessary to confirm perfect services to customers, low cost and shorter circle time with higher flexibility. The aim of this study is investigation of information technology implementation and information sharing on the operational performance of supply chain. The method used in this study is descriptive and in terms of aim is applicable. Population of this study includes the staffs of system and planning, sale and marketing, economic and financial, supports and preparations and human sources departments of ISACO Company. Sampling of this study is random. 94 staffs were selected to collect data. To analyze data and to test hypotheses, approved factor analysis by Amos software has been used. Results indicated that there is a meaningful relation between information sharing among supply chain partners and productivity cost and answering to customers.

Keywords: Information technology implementation, information sharing, the supply chain of the operation performance, ISACO Company

1. INTRODUCTION

Today regard to competitive environment, management of supply chain is recognized as a strategic factor in success of organizations, and it can have positive and perceptible results on the activities of organization. The increasing changes of technology, market conditions changes, business change, various and variable expectations of customers and… are of effective factors on changing supply chain. On this commercial environment, innovation on productions and organizational procedures is of a sensitive and vital factor on companies’ success (Amid, et al, 1386). Supply chain is not only connected with producer and supplier, but also it consists of transportation, stores, retail and even the customers and their information (Shoor & venkatalacham, 2003). In general, the supply chain is the chain that includes all activities related to flow of goods and conversion of materials from row material stage to delivery stage of final product to customer ( shankari &taivari, 2007). About the flow of goods there exist two other flows namely information flow and the flow of financial and credit sources, therefore, management of chain supply is responsible of integration of organizational units through supply chain and synchronization of material flow, information and financial to meet customer demands and with the aim of competitiveness improvement of a whole supply chain (Patterson & et al, 2003). One of the initiative fields that had attained more concentration and attention is the adoption of information technology. New informative technologies, has the capability to affect the organizational structure, company strategy, exchange of correspondences and communications, operational procedure, seller and buyer relations and the bargaining power, also, there is possible to increase the productivity, flexibility and competitiveness (Dwait, 2001). Competition is the first principle of existence and knowledge is the pre condition of entrance to competition. If micro organizations and macro nations neglect the progress, they will lose economic and effective production to their rivals; in brief we can say that the importance of information technology and supply chain management on the operation of
organizations and their competitiveness are undeniable. The main aim of this survey is recognition of effective factors on operational procedure of supply chain and investigation of the influence of IT implementation information sharing.

Therefore, there are questions taken into consideration

1. How IT implementation and information sharing, influence the operational procedure of ISACO Company?
2. How ISACO Company improves IT implementation by information sharing on company supply chain?

2. REVIEW OF RELATED LITERATURE

Information Technology

IT is an integration of telecommunication achievements, ways and methods of problem solving and a strategic ability by computer knowledge moreover, it includes topics related to advanced computer technology and science subjects, implementation of information systems and their application. IT is an integration of traditional computer knowledge and IT to save, process and exchange any data (either text or voice, picture…) (Jiang & Jiang, 2007). IT include all types of technology used to create, save, use various form of information, such as commercial information, voice calls, moving pictures, multimedia data and… (fin, 2006)

IT implementation

IT implementation as an attribute of intercompany information technology is investigated in this study. IT implementation enhances the productivity of coordination among supply chain partners (sanders, 2005). Intercompany barriers could be removed by well-connected IT systems (Byred & Terner, 2001; kim, et al., 2006).

Information sharing

Inter-organization information sharing, as defined in the operational management, includes simultaneous information about material flow, order entrance, transportation and bill issue, in addition, predictions and common and collective plans ((marks, et al, 2004)), (liu, Sahinidis, 1996), information sharing can be classified into various types of demand information, goods existence data and transportation data. These types of data are considered as a part of supply chain integration (Welker, et al., 2008)

Supply chain management

Supply chain management is a set of activities through which goods and services suppliers, producers, stores and sellers are integrated as though goods are produced optimally, and optimum amount are sent to suitable place in convenient time and in a way that doing this set of operation satisfies customer, the least cost are reached (Benito, 2007). The aim of supply chain management is information exchange related to market demands, development of new products, decreasing the number of supplier for makers and also activation and releasing of managerial sources in the way of long term relation development and with the importance made from the beginning (Berry, et al, 1994). Supply chain management includes a set of suppliers’ elements, logistic service providers, manufacturers, distributors, which are on the flows of related to row materials, products and information flows among these elements( Kopezak, 1997). An external chain of the whole chain of exchanges extends from the initial point of row materials supply to various companies which involved in extracting and processing of row materials, manufacturing, assembling, distributing and finally selling to ultimate customer (Sanders, 1995).

Productivity concept

The word “Karayee” is the Persian equivalent of the word “Efficiency”. The history and the way of its entrance to the economic literature are not clear, but we can guess since (Adan Smit), the
father of economic science the concept of productivity has existed. accountability refers to responsible people and organizations about operation and include financial, organizational, political and social responsiveness (byrd & turner, 2001). Responsiveness includes the purpose such as assurance of correct operation according with plan, correcting the mistakes, determining the weakness to prevent their repetition, affecting behaviors, maintaining the entrepreneur spirit with knowing their efforts, and respecting their efforts and services, effective use of physical, financial and human sources, and achieving the most efficacy, achieving facilities and sources with the most economical gain, preventing from misusage of sources intentionally or inadvertently, on time and true presentation of reports on organizational hierarchy, on time giving salary and bonus of government, increasing the efficacy of proceedings, gaining the client satisfaction of every department, proper enforcement of regulations and rules and adjudication of client (sandars, 2005).

3. BACKGROUND OF RESEARCH

Iranian studies

Amir Manian, et al (1389) in a study dealt with recognition of the effective factors on supply chain (case study of car manufacturing segment industry) and by using factor-exploration and approval analysis (regression-correlation study) form the determined indices 21 indices were achieved in the format of 6 factors to measure supply chain operation of manufacturing industry of car segments. This model provides factors of customers, processes, costs, flexibilities and introduces time in respect with influence in the operation of this industry and for every factor has presented indices to measure and assess.

Rahman Seresht (1387), investigated the effect of information sharing on competitive strategies and supply operation, results of the study showed that information sharing has a direct and meaningful relation with competitive strategies of the supply chain.

In a study Amid, et al. (1386) dealt with analysis and investigation of the influence of strategic planning of information systems in improving management operation of the supply chain. By using the process of strategic planning of information systems, a model was presented which showed the performed activities at every stage of supply chain management in the end. Samizade & Hoseini (1384), in a review of discussions about supply chain which deals with the role of IT after general concepts and principles. This study tries to clarify the main concept of supply chain management while explaining the challenges that this chain is faced, recognize the reasons of a tendency toward technology and deal with the investigation of systems and solutions presented.

Worldwide research

Bayraktar, et al. (2009), investigated the companies which used IT ability, considered 203 companies in Istanbul, Turkey and studied the advantages have been made by the supply chain. Results showed that these companies have been profited highly of coordination of the internal activities of organization with technology and their application on external activities of organization and this positive effect through the organization and supply chain management were observable. Sezan (2008), dealt with the investigation of relative results of designing, integration and coordination and sharing of information on supply chain productivity. Results showed that information coordination and sharing are the reliable ways to increase productivity in the supply chain. Also, designing of a supply chain has an important role to achieve the optimum level of productivity.

Betino (2007) dealt with the study of the relation between investment in IT and operational productivity in the purchase, and showed that investment in IT has a positive effect on the productivity of purchase operation. Basically to do and also to enhance some of developed purchase activities such as cooperating with providers, assessing the suppliers, involving the
suppliers in the product developing and designing and also logistic coordination, accepting IT in supply chain is necessary.

In continue Woo, et al (2006) investigated the impact of IT on supply chain capabilities and company operation and explained that putting IT on the supply chain system can result in preparation of better facilities in supply chain in the field such as information exchange, integration of activities and sensitivity (impressible) of supply chain.

Fin (2006), dealt with survey to investigate the results of size company on the relation between IT and three levels of performance: operational, strategic, financial, and showed that size of the company is an important moderate variable in operational productivity. In the other word by effective use of IT in communication with superior and inferior partners in the supply chain, big companies can shorten the delay time and, therefore, results in enhancement of operational productivity.

Research hypothesis

H1: there is a meaningful relation between IT implementation among supply chain partners and information sharing.

H2a: there is a meaningful relation between IT implementation among supply chain partners and productivity of cost.

H2b: there is a meaningful relation between IT implementation among supply chain partners and customer responsiveness.

H3a: there is a meaningful relation between information sharing among supply chain partners and productivity of cost.

H3b: there is a meaningful relation between information sharing among supply chain partners and customer responsiveness.

Conceptive model of research

Population and sampling

The population of this study includes staffs of planning and system, marketing, and sale, financial and economical, supports and supplies departments and human source of ISACO Company. Library sources with tools of books, thesis, scientific articles and the internet web site have been used to gather data on the theoretical field and research literature of topic. The method of sampling is available sampling. In this study to determine volume of sample Kokran formula is used in limited population as follow:

\[ n = \frac{N z^2 pq}{N d^2 + z^2 pq} = \frac{124 \times (1.96)^2 \times (0/25)}{124 \times (0.05)^2 + (1.96)^2 \times (0/25)} = 94 \]
Equation 1: A questionnaire has been used in order to gather data. It contains 2 parts and 4 sections and 32 questions, that the demographic questions (first part of questionnaire) related to general attributes of participants such as gender, age, education and... second part includes attitude questions with the aim of investigation the impact of IT implementation and information sharing in operational procedure of supply chain (case study: ISACO Company). A scale of Likert spectrum with five options has been used in this questionnaire that the value of comparable factors would range from completely agree(1) to disagree completely(5). To measure the reliability of questionnaire content and formal validity have been used. First, articles and books of theorists about IT, information sharing and operational procedure of supply chain studied in detail. Then, after an investigation of the sources that considered to be the literature background of this study, a standard questionnaire selected for variables from the available ones. To final approve of this questionnaire alpha Cronbach coefficient, for each variable and sum of them have been used in this study that are as follow:

Table 1. Cronbach alpha of each component.

<table>
<thead>
<tr>
<th>Factors</th>
<th>Cronbach alpha</th>
</tr>
</thead>
<tbody>
<tr>
<td>IT implementation</td>
<td>0.814</td>
</tr>
<tr>
<td>Information sharing</td>
<td>0.901</td>
</tr>
<tr>
<td>Productivity of cost</td>
<td>0.881</td>
</tr>
<tr>
<td>Customer responsiveness</td>
<td>0.880</td>
</tr>
<tr>
<td></td>
<td>0.839</td>
</tr>
</tbody>
</table>

4. METHOD
This study is a descriptive one, and its purpose is applicable and since in this study investigation of presented situation of variables has been done by information gathering through past information, therefore stay along with description- correlation studies.

Findings
Descriptive statistics
Results of descriptive analysis of data show that 58.5 percent of under studied participants were male, and 41.5 percent of them were female. 43.1 of them have Bachelor, and 55.2 percent have a master of degree and 1.7 percent have the degree of Ph. D. 24.5 percent of research populations have were from 25 to 30, 41.5 percent were from 31 to 35, 25.5 percent were from 36 to 40, and 8.5 percent were above 40. 12.7 percent of staffs have 5 to 10 years work experience, 27.6 percent have done from 11 to 15, 40.4 percent from 16 to 20 and 19.3 have worked more than 20 years. 1.1 percent of staffs had the position of manager, 4.3 percent are vice president, 80.8 percent of them were expert, and 13.8 percent have other position at work.

Inferential Statistics
Hypothesis testing
To do this analysis, first, tests of KMO and Bartelt have been given to determine being proper of sample size to do analysis and also being heterogeneous of the covariance matrix. The results of this testing for research variables have been presented in Table 2.

Table 2. KMO and Bartlet Results.

<table>
<thead>
<tr>
<th>Test</th>
<th>Criteria</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test of adequacy KMO</td>
<td>KMO</td>
<td>0.909</td>
</tr>
<tr>
<td>Homogeneity test of covariant matrix (Bartlet)</td>
<td>Ki Square Statistics 2126.473</td>
<td>Degree of freedom 496</td>
</tr>
</tbody>
</table>
The results of KMO test was bigger than experimental criteria 0.7 and showed that the size of under studied samples to do factor analysis of variables is proper and also shows meaningful level of Bartlet test that is smaller than first type of error 0.05 achieved shows that correlation matrix of indices is not heterogeneous, and there is ability to do factor analysis of indices related to independent variables. To determine the number of main components of the questionnaire’s questions or i.e., the number of written content of questionnaire that are micro scales, scree plot has been drawn.

![Diagram 1](image)

**Diagram 1.** The main components point by point diagram. 
Scree plot of main components shows that 4 written contents and in other word, four micro scales are recognizable among questions of this questionnaire.

Final privileges of variables have been examined by using a simple average of marks of calculated questions and by assuming the normality of these privileges by Kolmogorov Smirnov test. Table 3 shows the results of normality test of research variables.

**Table 3.** Kolmogorov-Smirnov test results.

<table>
<thead>
<tr>
<th>Factor</th>
<th>Test statistics</th>
<th>Level of significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>IT implementation</td>
<td>0.622</td>
<td>0.833</td>
</tr>
<tr>
<td>Information sharing</td>
<td>0.954</td>
<td>0.322</td>
</tr>
<tr>
<td>Productivity of cost</td>
<td>1.221</td>
<td>0.101</td>
</tr>
<tr>
<td>Customer responsiveness</td>
<td>0.963</td>
<td>0.311</td>
</tr>
</tbody>
</table>

According to meaningful level of kalmogrof & Smirnov test for the marks of each variable which achieved bigger than first kind of error 0.05, we can accept that experimental distribution of these privileges in the level of first kind of error 0.05 is normal. Regarding normality of experimental distribution of a number of variables and to measure their paired communication, the sum of Pearson correlation efficient has been used, that the results of this test reflected in Table 4.

**Table 4.** Correlation coefficient and normal distribution test of information technology, information sharing, and supply chain dimensions.

<table>
<thead>
<tr>
<th>Factors</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. IT implementation</td>
<td>1.0</td>
<td>0.719</td>
<td>0.909</td>
<td>0.675</td>
</tr>
<tr>
<td>2. Information sharing</td>
<td>0.719</td>
<td>1</td>
<td>0.884</td>
<td>0.800</td>
</tr>
<tr>
<td>3. Productivity of cost</td>
<td>0.909</td>
<td>0.884</td>
<td>1</td>
<td>0.826</td>
</tr>
<tr>
<td>4. Customer responsiveness</td>
<td>0.675</td>
<td>0.800</td>
<td>0.826</td>
<td>1</td>
</tr>
</tbody>
</table>
Investigating the influence of information technology implementation and information sharing on supply chain operational performance (case study: ISACO company)

Regarding the findings of Table 4, we observe that meaningful levels of communication among variables are less than first kind of error 0.05 and, therefore, there has been a meaningful relation among the whole of research variables. Also by referring to the sign of coefficient correlation we claim that there has been a direct relation among research variables. To measure simultaneous relation among variables and estimate conceptive research model, the practice of structural equations has been used. Figure 2 shows the results of estimation model with standard coefficients.

![Figure 2. Structural modeling estimation with the standardized coefficients.]

As if in this model each of the variables defined as follow IT implementation, information sharing, cost productivity, customer responsiveness.

Table 5. Structural equation modeling results.

<table>
<thead>
<tr>
<th>Test case</th>
<th>Path coefficient</th>
<th>Test sta.</th>
<th>Level of sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>IT implementation→ Information sharing</td>
<td>0.72</td>
<td>9.978</td>
<td>0.0001</td>
</tr>
<tr>
<td>IT implementation→ Productivity of cost</td>
<td>0.57</td>
<td>15.031</td>
<td>0.0001</td>
</tr>
<tr>
<td>IT implementation→ Customer responsiveness</td>
<td>0.21</td>
<td>2.373</td>
<td>0.018</td>
</tr>
<tr>
<td>Information sharing→ Productivity of cost</td>
<td>0.48</td>
<td>12.644</td>
<td>0.001</td>
</tr>
<tr>
<td>Information sharing→ Customer responsiveness</td>
<td>0.65</td>
<td>7.484</td>
<td>0.0001</td>
</tr>
</tbody>
</table>

According to the results of Table 5, we observe that meaningful level of communications less than first kind of error 0.05 achieved, and therefore we can accept that the model of presented practice is the proper practice.

Meaningful level of khi-do test that examine the situation of structural model, is achieved bigger than the first kind of error 0.05(Value = P-0/086) and therefore in this level of error we can accept that the presented practice model has consistency with expected model of research.

Table 6. Model goodness of fit.

<table>
<thead>
<tr>
<th>index</th>
<th>result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chi Square</td>
<td>8.878</td>
</tr>
<tr>
<td>Degree of freedom</td>
<td>1</td>
</tr>
<tr>
<td>P-Value</td>
<td>0.086</td>
</tr>
<tr>
<td>GFI</td>
<td>0.916</td>
</tr>
<tr>
<td>AGFI</td>
<td>0.909</td>
</tr>
<tr>
<td>P(RMSEA&lt;0.05)</td>
<td>0.107</td>
</tr>
</tbody>
</table>
Also, we observe that the proper indices of practice GFI and AGFI have been achieved bigger than 0.9 that show the properness of model and its high capabilities in defining the relations among variables. The error of practice model is small and ignorable at the level of 0.05, and therefore results are referable and reliable.

5. DISCUSSION AND CONCLUSION

Results achieved by research hypothesis

Hypothesis 1: there is a meaningful relation between IT implementation among supply chain partners and information sharing.

IT as a main and active factor let share high amounts of information among supply chain partners by the ability to the cooperation of supply chain. IT help to facilitate sharing and processing of information and cooperation of supply chain management.

Regard to results in Table 5 meaningful level of the hypothesis is equal to 0.0001 and less than 0.05 therefore research hypothesis was accepted.

Hypothesis 2: there is a meaningful relation between IT implementation among supply chain partners and cost productivity.

IT through needed information sharing, provide this possibility with the company to have the better operation in cost productivity. IT is a mechanism that amplifies information flow that decreases the cost in the end.

Considering results in Table 5, the meaningful level is equal to 0.0001 and is less than 0.05 therefore research hypothesis is accepted. In other words, there is a meaningful relation between IT implementation among supply chain management and cost productivity. This study is aligned with the studies of (Baharadovach, 2000) and is not aligned with the studies of (Fei & zhiaiang, 2013) and (lee, et al., 2009).

Hypothesis 3: there is a meaningful relation among supply chain management and customer responsiveness.

IT is used among companies to improve customer services. The management system of customer relation helps grouping of customers and realization of systematic control of customer relation. Also, IT increases the amplitude of communication between buyer and seller and effectiveness of customer service that could have a better operation in customer responsiveness. According to the results in Table 5, the meaningful level of hypothesis is equal to 0.018 and less than 0.05 therefore research hypothesis is accepted, in other words, there are meaningful relations among IT implementation and supply chain management and customer responsiveness. This hypothesis is aligned with (fei & zhiaiang, 2013), (Muller and Seuring, 2007) and (Saeed, et al., 2011).

Hypothesis 4: there is a meaningful relation between information sharing among supply chain partners and cost productivity.

Information sharing has been categorized into various types of demanding information, information of goods availability, transportation information. Companies share the information of production, design, engineer change, quality, delivery and cost to improve cost productivity. Companies also share the ordering, operational, strategies and competitiveness information for cost productivity with suppliers. Cost productivity is considered to be beneficial of information sharing.

Regarding the results in Table 5 meaningful level of the hypothesis is equal to 0.001 and less than 0.05 therefore research hypothesis is accepted. In other word, there is a meaningful relation
between sharing information among supply chain partners and cost productivity. This hypothesis is aligned with the studies of (Fei & shining, 2013) and (Beharadavach, 2000).

Hypothesis 5: there is a meaningful relation between information sharing among supply chain supplier and cost productivity.

Information sharing defines in the form of companies demand’s amount for vital and exclusive information exchange with supply chain partners. Producer decreases the time of product designing and manufacture planning in addition to ending of goods availability by means of the accuracy of exchanged information related to demanding and operation, therefore, prepares the responsiveness to customer needs.

Regarding the results of Table 5 meaningful level of hypothesis is equal to 0.0001 and less than 0.05, therefore, research theory is accepted, in other word, there is a meaningful relation between information sharing among supply chain partners and customer responsiveness. This theory aligns with the studies of (Fei & zhiang, 2013) and (Beharadwach, 2000).

6. SUGGESTIONS

Suggestion related to research hypothesis 1:

It is necessary that the organization have consistency with the technology of advanced industries and commercial partners about IT and communications in respect of software and hardware to be able to use opportunities and do strategic planning. Moreover, also the implementation of the Production Quality and Product Lifecycle Management and actuating system of data mining exerted to manage the needed goods.

Suggestions related to research hypothesis 2:

Expanding of use of voice over Internet protocol to communicate with different departments of organization and using the on-line meeting and web conferencing and also focus on Sale system from far distance that causes to facilitate selling and buying agencies and buyers.

Suggestions related to research hypothesis 3:

Performing and implementation of the service level agreement, continuous improving management system of ISACO customer communication and company site to improve and enhance the quality of customer responsiveness.

Suggestions related to research hypothesis 4:

Organization with updating information systems in the way of on time ordering of stoke availability in order to cost productivity and also information preparation and on time services and training the way of using these technologies can be effective in increasing competitiveness, enhancing quality and cost productivity.

Suggestions related to research hypothesis 5:

Concentrating on actuating Ikco Tele Assistant and development of electronic trading system platform of ISACO Company in the form of web base that result in removing the production and support expense.

REFERENCES


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