

## The Evaluation of Factors Influencing Knowledge Sharing to Improve Supply Chain Performance in Oil Industry

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### Abstract

Nowadays, knowledge sharing as a part of knowledge management process has determining role in organization development. Despite the growing importance of knowledge sharing for competitive organizations, the lack of proper understanding of its barriers and facilitators makes problematic knowledge sharing which is one of the most important goals of knowledge management by organizations. This study aims to evaluate the factors influencing knowledge sharing to improve supply chain performance in the oil industry. In this study, the opinions of 98 managers and experts of Oil Company were studied as sample. Then the structural equation modeling technique was used to analyze the data. The results showed that knowledge sharing has direct and significant relationship with competitive strategies of supply chain and competitive strategies of supply chain have the same relationship with supply chain performance.

**Keywords:** knowledge sharing, supply chain performance, the efficiency of supply chain performance, supply chain responsiveness.

### Introduction

Supply chain management is an interest area of many researchers in various fields. Actually, supply chain management refers to the integration of supply chain processes from the primary supplier to the final customer in order to create satisfaction for final consumers (Nakhili et al,2008 ). As ordinary people interacts with others to use their skills, knowledge and ability, companies also like to create relationships and partnerships with companies that have the skills, knowledge, abilities and perhaps more complete resources than themselves (Ryke, 2009). Since the end of last century to the present, the management of intangible assets of organization is regarded as a part of the organization's vital resources. Among these assets, knowledge attracted the most attention to itself and has been emphasized as an important intangible asset of the organization. Now, knowledge management discussion has become a major topic of management researches all around the world (Krog & Nonaka, 2000).

Furthermore, issues such as the complexity of the business world, economic developments, intense competition, new technologies and the rapid change of customers' needs impel existing organizations to benefit from advantages such as the rapid flow of information, group decision-making, greater coordination with commercial partners and view comprehensively. These developments can be seen in a series of discussions that generally entitled supply chain management. The goal of these discussions can be expressed as "Achieving Maximum Value" (Chopra et al, 2007). Gains resulting from supply chain management which includes all material handling activities (raw material to final product stage), information flows and financial transactions (field et al, 1999), can enhance the business performance and the competitiveness of companies in global markets (Kannan et al, 2005). In the present era, changes' acceleration in high level science and technologies have risen to the extent that many scholars believe that the acceleration of

innovation in products produced with high level technology and the creation of knowledge and its development are exceeded from human learning speed. So, if trustee organizations even employ all the strategies and their human capital and time for learning, they may not still be able to properly cope with this acceleration. Knowledge in the long term is considered as a key resource for organizations and also its effective management is essential for success (Nevo & Chan, 2007). According to Nonaka and Taguchi (1995) companies are successful that consistently discover or create new knowledge to solve new and unfamiliar problems and develop this knowledge purposefully and systematically and strategically and tailored to specific strategic targets in all layers and different parts of the organization and try to convert it to new technologies and products. Knowledge management terminology has different definitions and approaches and different approaches are created because of the movement of industry-based economic systems toward the knowledge-based society and knowledge-based economic development. One of the earliest definitions has considered knowledge management as a conceptual framework that includes activities needed to build organizational performance in sustainable basis (Wiig, 1994). But over time, these definitions become more diverse. For example, in another definition, knowledge management is a process that individual knowledge is its input and this created knowledge are transferred and integrated in work teams and its output would be organizational knowledge that will be considered as a competitive advantage (Zarrage et al, 2003).

#### ***The role and importance of information in the supply chain***

Supply chain management in conjunction with materials circulation in the chain also covers information circulation. The relationship among components in terms of information flow is two-way. As early as 1980, information among organizational units was based on paper documents and this information often was along with error and unrealistic (Hill, 2000). With the introduction of the concept of supply chain, supply chain members understood the fundamental importance of information and information technology. In the present era, information in a supply chain is a key tool in the decision to survival and development of enterprises. Communication is established through information between all operations and processes in the supply chain and the development of the communications will enable enterprises in the supply chain to decide accurately in order to develop themselves and generally to maximize the profitability of the supply chain. In the supply chain, information is used with two following purposes:

- 1- The coordination of activities related to the production, storage, positioning and transportation
- 2- Forecasting and planning in order to estimate the future demand and responding method.

Accurate, timely and available information leads to the coordination in various activities of supply chain as well as the precise and efficient planning in various fields such as demand planning, production, purchasing and material requirements planning and transportation. Also information in strategic planning has many applications which its aims in a supply chain include developing to the new areas and markets, establishing new facilities, getting the desired success in the market. The detailed information can make efficient the operational decisions and planning to a large extent but on the other hand, the information acquiring and installing information systems that provide this information may be very costly.

In a supply chain, the efficiency and responsiveness of enterprises depends on the accuracy and the amount of information that they share with each other. In fact, information sharing and distributing must be balanced and measured that competitors could not use this information for their own benefit and to the detriment of the enterprise and this is one of the concerns of the enterprise. Customer satisfaction is one of the concerns of the enterprises (Chopra & Meindl, 2001). Customer servicing in efficient and effective manner is formed with information such as order status, product

availability, timing of delivery and invoices. Therefore, the importance of information in the field of customer servicing and their satisfaction is clear. Another area that highlights the importance of information refers to its role in relation to strategic planning and resources separation. Many enterprises know their success in sharing information with each other.

### ***Supply Chain Performance***

Performance evaluation of supply chain has always been a challenge to researchers in this field. Performance of desirable quality leads to the higher financial and commercial performance. Quality can increase customer satisfaction and enables the company to charge higher prices or lower costs that this would increase the profit margin. Also, the ability of the supply chain in establishing coordination and integration concurrently in the upstream and downstream flows increase the supply chain flexibility in meeting customers' demands (Kaynak & Hartley, 2008).

In a general classification, the supply chain measurement methods can be classified into five classifications including traditional performance evaluation methods, performance appraisal systems in the world level, Balanced Scorecard model, SCORE model, specific models for each supply chain (Wisner et al, 2005).

### ***Knowledge sharing***

McDermott (1999) described knowledge sharing in this way that when someone is sharing his knowledge; it means that the person leads another person by his knowledge, insights, and thoughts and helps him to see his position better. Furthermore, the person who is sharing his knowledge should know about the aim of shared knowledge and its application, as well as the information needs and gaps of the knowledge recipient person. This point indicates that all employees do not need to share their knowledge because their knowledge may not be used or re-used. In other words, knowledge sharing will be useful when all employees need it in their work or at least apply most of the knowledge that they receive. For this reason, in some organizations, the knowledge repositories and databases is accessible for all employees and in some others accessing to some parts of this knowledge repositories and databases is possible for all employees and accessibility to some portions is defined for special people. Knowledge sharing as a complex activity, but value creation is the foundation and basis of many of the knowledge management strategies of organizations (Riege, 2005). Knowledge sharing is the knowledge transfer behavior to the partners in the communication process within or outside the organization, and knowledge refers to that knowledge which one has acquired in the organization (Ji et al, 2009). Knowledge sharing is to share useful and suitable information, ideas, suggestions and expertise with others in the organization (Maniyan et al, 2011). Knowledge sharing is a set of behaviors that involve the exchange of information with each other. When expressed individually Share your knowledge, it means that the person, another person with knowledge, insight and thoughts in order to strengthen the position of the guide. When someone shares his knowledge, actually it means this person through his knowledge, insight and thought leads other person to reinforce his position. Additionally, a person who shares his knowledge should ideally be aware from shared knowledge's purpose, its application as well as the information needs and gaps of the knowledge recipient person (Sarlack et al, 2011).

Knowledge sharing refers to the company's ability to share knowledge with supply chain partners in effective manner. The shared information on communication system of supply chain information covers the information between direct partners and also the entire supply chain network (Clemons & Row, 1993). Knowledge sharing is needed for efficient and effective use by partners. This information should be transmitted from the reliable source to the appropriate format (Mohr & Sohi, 1995). Effective information sharing is considered as one of the basic capabilities of the supply chain process (Shore et al, 2003).

### ***Responsive supply chain***

Responsiveness of the supply chain is defined as how supply chain members respond to environmental changes with coordination. Responsiveness of the supply chain considers the dynamic nature of capabilities of supply chain that allows the company to expand and renew the special merits of company, and provide a better response to environmental changes (Collis, 1994, Teece et al, 1997). Today's complex market requires continuous, efficient response from all members of the supply chain (Rogers et al, 1993) in order to be able to act and react variously to data collected which is the final shape of the learning (Sinkula et al, 1997). Thus, responsive supply chain is considered as a supply chain strategy. If capabilities of supply chain acts well, the supply chain strategies will be more successful.

### ***Supply chain efficiency***

The purpose of supply chain efficiency refers to the cost of production and delivery of products to customers (Chopra & Meindl, 2007). In the topic of supply chain efficiency, continuous reduction of the costs of purchasing materials, production and so on are proposed for all supply chain partners. In other words, each member of the supply chain instead of producing products with high cost and selling with higher prices to other members of the supply chain tries to reduce its cost. This leads to the overall cost reduction of product of this type of supply chain and improves the company's performance. So, it can be considered as a supply chain strategy.

### **Background of study**

Wu and others (2006) by using resource-based view have shown that the capabilities of supply chain by applying information technology (IT) differentiate company compared to competitors and make it inimitable to competitors. In this study, the effect of IT development and IT alignment is evaluated on capabilities of the supply chain and marketing and financial performance. Their findings have provided new perspective on evaluation of IT investment in supply chain process. They should consider the role of the capabilities of supply chain as a moderating variable between IT advancement and organizational performance and believe that the capabilities of supply chain are able to transfer the resources related to IT to the higher levels of value.

Hafez et al (2000) have analyzed the relationship between knowledge management and organizational learning in the supply chain. In this research, knowledge management and its processes are not analyzed separately in relation to organizational learning.

Study of Gould and colleagues (2001) demonstrates a positive and direct relationship between infrastructures and functional capabilities of the knowledge management process and functional variables of the business. Shaw and colleagues (2003) with special emphasis on information sharing have studied the positive relation of knowledge management with performance of the chain. They have conducted this study in the automotive industry and in the service parts' section to improve the ordering process for these parts.

Lee and others (2006) were investigated five typical dimensions of a supply chain management (strategic partnerships with suppliers, relationship with customers, level of information sharing, quality of information sharing, and postponement) and the relationship among the typical dimensions of the supply chain, competitive advantage and organizational performance. Findings of this study by using the resource-based view suggest that the higher levels of conventional SCM can lead to the competitive advantage acquirement and organizational performance improvement. Also, competitive advantage can have direct and positive impact on organizational performance. Liu and Tsai (2007) in a study have also indicated the positive impact of the knowledge management processes on 5 to 10 percent improvement in the customer orientation dimensions, financial, internal business processes, and 10 to 15 percent in the learning dimension and organizational development.

Also, Abbasi and Maki (2010) in their descriptive study without referring to the innovation dimensions know innovation as one of the most important factors in the implementation of knowledge management. Also, Kisling and colleagues (2009) in a research have pointed to the positive relationship of knowledge management processes on organizational outcomes (intangible but apparent assets increasing) such as organizational innovation, product and human resources improvement. Another study is the research of Krigeht et al (2009) which aims to evaluate the effect of innovation- cost strategy, knowledge and practice in the supply chain on company's performance. Additionally, Fogit and colleagues (2009) in an experimental study have investigated the positive relationship of knowledge management processes with operational, organizational and logistical processes.

### **Research hypotheses**

- 1- Information sharing of supply chain influences the responsiveness of supply chain of the oil industry.
- 2- Information sharing of supply chain influences the efficiency of supply chain of the oil industry.
- 3- The responsiveness of supply chain influences the supply chain performance of the oil industry.
- 4- The efficiency of supply chain influences the supply chain performance of the oil industry.

### **Methodology**

Considering that this study aims to evaluate factors affecting information sharing to improve supply chain performance in the oil industry, so the descriptive research method is selected. On the other hand, since, the supply chain strategies as a mediator variable, information sharing as the independent variable and supply chain performance of the oil industry as the dependent variable are evaluated by questionnaire and recognizing indicators of each of the above mentioned variables is done by direct reference to organizations and interviewing with experts, managers, and experts of the oil company, therefore, this study will be descriptive from survey type. For evaluating each hypothesis, the research components' indicators such as information sharing, responsiveness, efficiency, and performance which are determined and status of each of them is evaluated through confirmatory factor analysis to measure the effect of each component on each other. Then, structural equation modeling is done by using LISREL software.

#### ***The statistical population***

The statistical population of this study consisted of managers and experts associated with the oil company's supply chain. In this study, 98 managers and experts associated with the supply chain of the oil company are selected as the sample by using a stratified random sampling method.

#### ***Data collection tools***

The library resources, articles and books were used to collect information on the theoretical foundation and research literature of the subject and questionnaire was used to collect data for data analysis. The credibility factor was used to assess the validity of the questionnaire and to ensure its feasibility. The factorial validity is a form of construct validity which is obtained through factor analysis. The Cronbach's alpha method was used to determine the reliability of test.

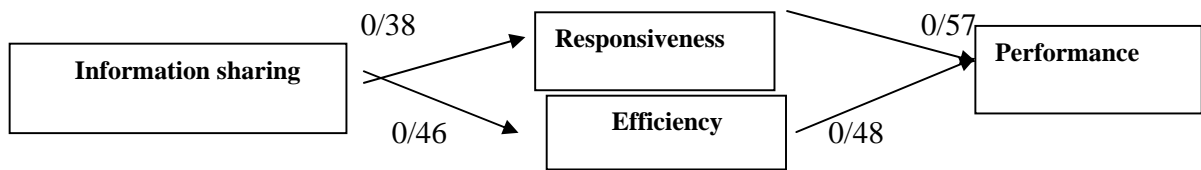
#### ***Data analysis***

Table 1 indicates the relevant components and indicators along with the status of factor analysis and t-value after structural equation modeling. Considering that 95% is considered as the reliability level and t-value for sample which is more than 30 numbers is 1.96 in the standard table,

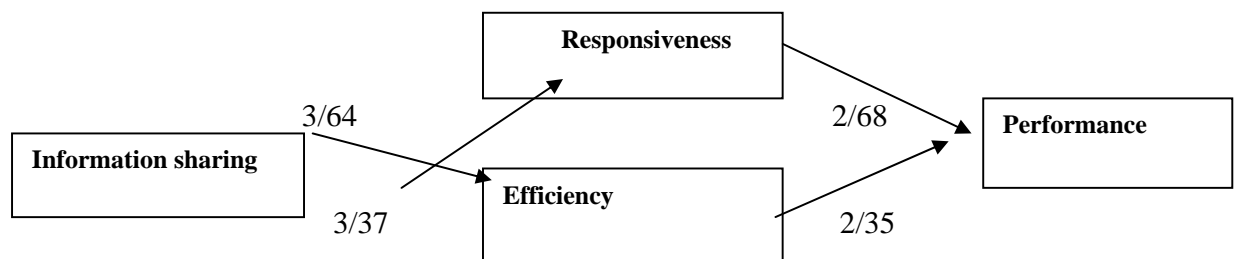
in cases that the value of t in Table 1, is higher than 1.96, that indicator can be used to measure the relevant component.

**Table 1- Research variables status**

description	Factor analysis	value of t
<p><b>Knowledge sharing</b> Our company exchanges more information with our partners. Information flows easily between the company and we. Our company benefits more from sharing relevant information with our partners. Our partners provide us all the information that affects us.</p>	<p>Confirmed Confirmed Confirmed Confirmed</p>	<p>Stabilized 6.73 5.36 4.68</p>
<p><b>Responsiveness</b> Our supply chain respond more quickly and efficiently to customers and providers change. We periodically review our products to ensure the alignment with the requirements of the customers. When we become aware from customers' dissatisfaction of products, we check it and do corrective action. We continuously measure our customer satisfaction.</p>	<p>Confirmed Confirmed Confirmed Confirmed</p>	<p>Stabilized 7.74 8.32 5.76</p>
<p><b>Efficiency</b> Our company continuously plans to reduce production costs. The ratio of employees' number to sales is annually reduced in our company. Capacity utilization rate (according to standards) is higher in our company compared to the competitors. The cost and quality should be simultaneously regarded in suppliers' selection.</p>	<p>Confirmed Confirmed Confirmed Confirmed</p>	<p>Stabilized 8.63 5.83 6.38</p>
<p><b>Performance</b> Waste cost of supply chain decreases in our company every year. The cash to cash cycle time of supply chain decreases in our company annually. The average profit margins of supply chain increases annually in our company. Market share is growing more in our company every year.</p>	<p>Confirmed Confirmed Confirmed Confirmed</p>	<p>Stabilized 8.99 6.97 8.38</p>



**Diagram 1. Path Analysis Model in the standard estimate state**



**Diagram 2. T values in path analysis model**

At this stage, each of the hypotheses was tested to determine the veracity or falsity of the relationship and the relationship between the variables. Therefore, confirmatory factor analysis was used that its results in terms of path analysis model in the state of standard estimation is provided in diagram 1 and in terms of t-value in diagram 2. Also, the value of t for all hypotheses is higher than 1.96, so, all four research hypotheses are confirmed. Considering that the value of chi-square is 76.92 and the degrees of freedom is 85, so, the fraction  $\chi^2 / d.f$  value would be 0.87 and because this amount is less than 3 so, model is approved.

### Discussion and conclusions

Sharing information among supply chain partners has significant benefits for each supply chain partners. On the other hand, the supply chain achieves to the competitiveness which has appropriate competitive strategies that lead to the proper performance for the supply chain. The research results show that the information sharing relates to both supply chain strategies, but has more association with supply chain responsiveness. Given that this industry has high product diversity, coordination with environmental changes and customer demands meeting are very important. Knowledge sharing leads to higher levels of information exchanging between partners and also high effectiveness of the information and thus enables the supply chain in accordance with environmental changes. The relationship between supply chain strategies (responsiveness and efficiency) and performance is verified. This means that the greater responsiveness and efficiency of the supply chain will follow higher performance for supply chain.

### References

Maniyan, A., Mira, S. A., Karimi, E. (2011). Investigating the indicators influencing the knowledge sharing among e-learning students (Case Study: E-Learning Center of Tehran University), *Science and Information Technology*, 27, 1, 47-65.

Sarlak, M.A., Islami, T. (2011). Knowledge sharing at Sanati Sharif University: Social Capital approach. *Government Management*, 3, 8, 1-18.