

The Role of Information Sharing on Supply Chain

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Abstract

Information Technology (IT), by facilitating and accelerating information exchange, enables organization and suppliers to become aware of each other's needs and meet them in a timely manner which enhances on-time production philosophy. In this respect, a study was conducted with the aim of investigating the role of information sharing in drug supply chain using the views of experts in the field of pharmacy in Tehran and Hormozgan University of Medical Sciences as well as relevant organizations such as drugstores, hospitals, and drug deputies in 1392-1393. The findings revealed that 71% of the experts completely agree with the impact of information sharing on the integration of drug supply chain, and 45% agreed with the effect of information sharing on the efficiency of drug supply chain. Also, 45% of the experts confirmed the effect of information sharing on the performance of drug supply chain. Based on the results of inferential statistics, information sharing has a significant effect on the efficiency, integration, and performance of drug supply chain.

Keywords

Information Sharing, Drug Distribution, Integration, Efficiency, Information Technology

1.Introduction

Nowadays, organizations in order to deal with global competition require to manage their supply chain in a best way , so, that organizations are obliged to better manage the supply chain [Marinagi, et al. 2014, Paulraj,et al. 2017]. Supply chain includes all activities related to the preparation of goods from raw materials to deliver the final products that the follow of information and financial resources are both in this process [Feng, 2012]. The drug sector plays an important role in the health and medical system. In most countries, the drug market is hardly regulated due to the unique nature of drug supply and demand. Depending on the competition in drug market, the governments need to regulate both economic and clinical side [Yu,2010]. The drug supply chain guarantees availability of drugs appropriate for individuals in the right time. This availability is a big challenge, unless it becomes simple and effective on the basis of customers' needs and demands [Chandrasekaran,Kumar,2009]. Cooperation among supply chain partners is the main way to achieve competitive advantage and information sharing among the members of this

chain is the main principle [Beaumont,2008. Beaumont,et al,2008]. Effective interaction in supply chain is vital for the improvement of its performance as it effectively shares information. The performance of supply chain focuses on materials flow while information sharing focuses on information flow [Zhou,2007. Mitchell,Kovach,2016]. In this regard, the present study was conducted with aiming at investigation of the effect of information sharing on the efficiency and integration of drug supply chain using the views of experts in the field of pharmacy in Tehran and Hormozgan University of Medical Sciences as well as relevant organizations such as drugstores, hospitals, and drug deputies.

2. Supply chain management in health care services

Health care sector is rapidly changing in recent decade. Considering the increase in competitions, patients' referrals, and the necessity to provide effective and efficient health care services, many health care organizations are pursuing researches on patients logistics, data exchange and integration [Aptel,et al,2009, Sheikhi,et al,2017]. Undoubtedly, the complexity of technologies used, presence of different partners, internal and external dynamic environment, and unique features of health care services prevent the direct application of managerial approaches in supply chain. Many projects which target using integrated planning systems for patients flow and making connection between different health care organizations are examples of problems of health care organization in facing supply chain management philosophy [Huijsman,Vries,2011]. Recent studies indicate that a major part of expenses of supply chain in health care sector can be reduced by using an effective supply chain [Burns,L,et al,NA]. Health care supply chain, like supply chain management, can be specified by different integration methods such as process integration and coordination, information flow integration and coordination, and integration of intra and inter-organizational processes. Supply chain management in the area of health care services often refers to information, equipment and budget which gain importance due to transfer of materials and services from the supplier to the end user in order to achieve clinical results and control expenses [Huijsman,Vries,2011].

3. Information sharing

One aspect of supply chain is information sharing. Different studies have proven the positive effect of information sharing on costs reduction which in turn improves supply chain management. One of the main advantages of information sharing is reduction of need to inventory. As a result, supply chain would have better performance in terms of financial returns, level of services, and time of doing jobs. In information shared between the producer and retailer, the producer can use the information about the retailer's inventory level for time management [Marinagi, et al. 2014. Yan,2004]. Information sharing is one of the key components of any supply chain management system. By adopting the exiting data and making them available to other sectors of supply chain, such information and data can function as a source of competitive advantage. The quality of information has a positive impact on customers' and partners' satisfaction, as well. Identification and perception of factors affecting information sharing are required for the betterment of information shared throughout the supply chain. According to the findings of a study on the role of IT in supplier-producer partnership, IT can offer information solutions for the relationship between suppliers and retailers, and the data and technologies should be exploited for better understandings of customer needs [Grear, Shaw,2002. Kembro,et al,2017]. The availability of different types of information in appropriate time makes managers use such information in different situation according to market demand [Spaho,2011]. The findings of a study show that trust and information have positive effect on the commitment of interaction among distributors, retailers, wholesalers, and important business partners [Abdullah, Musa,2014]. In another study, it was found that it is needed to develop and analyze information sharing among different actors of supply chain such as distributors, suppliers, retailers, producers, and sellers. The findings of this study revealed that information sharing issue still need more attention on the part of researchers [Montoya-Torres, Ortiz-Vargas,2014]. In a study which proposed an analytic model for the evaluation of the advantages of information sharing and coordination with any new partner in the supply chain, it was indicated that information sharing, alone, leads to savings in costs and reduction of inventory for the supplier. By exchanging information like inventory level, the prediction of data and sale trends of companies, it becomes possible to decrease production cycle time, rapidly complete orders, and improve customer services [Simich, Zhao,2003. Yousefi, Alibabaei,2015]. The goal of the present study is to determine the role of information sharing in the performance of drug supply chain.

4.Theoretical framework

Reviewing the literature revealed that many factors affect the performance and management of drug supply chain one of which being information sharing.

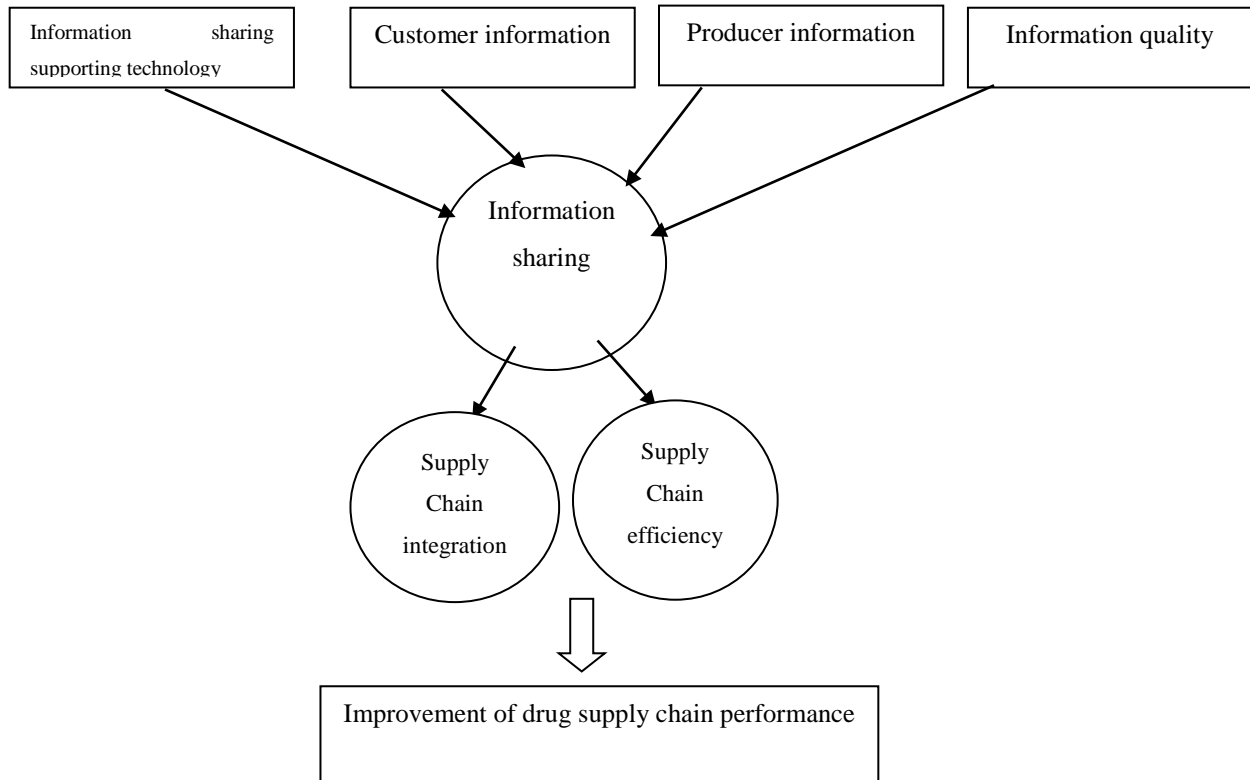


Figure1:General framework of the study

On the basis of theoretical framework of the study, information sharing leads to the improvement of drug supply chain by affecting the improvement of efficiency and integration of the chain and on-time response to customer.

The hypotheses of the present study are as following:

1. Information sharing has a positive effect on the integration of drug supply chain.
2. Information sharing has a positive effect on the efficiency of drug supply chain.
3. Integration of drug supply chain improves its performance.
4. Efficiency of drug supply chain improves its performance.

5.Research methodology

The present study is a cross-sectional, analytical-descriptive study. The research was conducted in 8 drug-stores affiliated to Tehran and Bandar-Abbas University of Medical Sciences, and the population of the study included all pharmacists of these universities selected randomly. A questionnaire was used for data collection and the scores of the items were determined on a likert basis. The questionnaire was validated using experts' views and its reliability was estimated through Cronbach's Alpha. In this questionnaire, integration and efficiency were investigated as mediating variables, information sharing as independent variable, and performance of drug supply chain as dependent variable. The indices of each variable were specified by referring to the experts and managers of Tehran and Hormozgan University of Medical Sciences. The

population of this study was composed on 95 managers, experts, and physicians involved in drug supply chain who were selected through random sampling. SPSS(Statistical Package for the Social Sciences) was employed for data analysis.

6.Findings

On the basis of results obtained from the questionnaires completed by 31 respondents, the table of demographic information was developed as follows.

Table 1: Respondents' Frequency, Education, Job records, Gender, and Age

Education	Frequenc y	Age	Frequenc y	Gender	Frequency	Job record	Frequency
Masters	3.2%	Belowe 30	%25.8	Female	%35.5	5-10 years	%3.2
MD	%38.7	30-40	%74.2	Male	%16.1	10-15 years	%93.5
Ph.D	%45.2	40-50			%32.3	15-20 years	%3.2
	%12.9	Above 50			%16.1	Above 20 years	
Total	100%		100%		100%		100%

6.1.Descriptive statistics of the study

6.1.1The effect of information sharing on the integration of drug supply chain

According to the results obtained by analyzing the questionnaires, about 16.1% of the experts agree with the effect of information sharing on the integration of drug supply chain, and around 71% of them were in complete agreement. About 12.9% of them had no idea about this issue (Mean=4.12, SD=0.49)(table2).

Table 2: Frequency of Experts' Responses about the Effect of Information Sharing on the Integration of Drug Supply Chain

Choice	Frequency	Percentage
Complete disagree	0	0
Disagree	0	0
No idea	4	12.9%
Agree	5	16.1%
Completely agree	22	71%
total	31	%100

6.1.2 The effect of information sharing on the efficiency of drug supply chain

The analysis of the questionnaires revealed that about 16.1% of the experts have no idea about the effect of information sharing on drug supply chain, 38.7% agree, and 45.2% completely agree with it (Mean=3.98 , SD=0.52)(table3).

Table 3: Frequency of Experts' Responses about the Effect of Information Sharing on the Efficiency of Drug Supply Chain

Choice	Frequency	Percentage
Complete disagree	0	0
Disagree	5	16.1%
No idea	2	6.5%
Agree	13	41.9%
Completely agree	11	35.5%
total	31	%100

6.1.3 The effect of the performance of drug

information sharing on supply chain

The results showed that about 16.1% of the experts disagree with the role of information sharing in the performance of drug supply chain, 6.5% have no idea, 41.9% agree, and 35.5% completely agree with it (Mean=3.87 , SD=0.74)(table4).

Table 4: Frequency of Experts' Responses about the Effect of Information Sharing on the Performance of Drug Supply Chain

Disagree	0	0
No idea	5	16.1%
Agree	12	38.7%
Completely agree	14	45.2%
total	31	%100

6.1.4 Investigating the effect of information sharing on the integration, efficiency, and performance of drug supply chain from the viewpoints of experts:

According to table 6 which shows the output of one sample t-test, the P-value of drug supply chain integration is about ≤ 0.001 , and since it is smaller than significance level (0.05), it can be concluded with 95% confidence that the mean score of this variable is not equal to critical value (3). Since t value is positive, the mean score of this variable will be larger than 3 (rejection of null hypothesis $\mu \leq 3$), therefore, it can be concluded that according to the experts of the field, information sharing has a positive effect on the integration of supply chain. As it can be observed in table 4.2.1.1, the mean score of the effect of information sharing on the integrity is about 4.12. Comparison of this value with status index¹ 1 shows its high impact on the status. The P-value of efficiency of drug supply chain is about ≤ 0.001 and because it is smaller than significance level (0.05), it can be concluded with 95% confidence that the mean score of this variable is not equal to critical value (3). Since t-value is positive, the mean score of this variable is larger than critical value (3) (rejection of null hypothesis $\mu \leq 3$). Hence, it is concluded that information sharing has a positive effect on the efficiency of drug supply chain. The mean score of the effect of information sharing on the efficiency of drug supply chain was 3.98, that, when compared with status index, show the high impact of this factor on the status. The P-value of drug supply chain performance is ≤ 0.001 , and since it is smaller than significance level (0.05), it can be concluded with 95% confidence that the mean score of this factor is not equal to critical value (3). The t-value is positive, so the mean score of this variable is larger than 3 (rejection of null hypothesis $\mu \leq 3$), proving that information sharing has an effect on the performance of drug supply chain from the perspective of experts. The mean score of drug supply chain performance was obtained to be 3.87, and when compared with status index, shows the high effect of this factor on the status (table5, 6).

Table 5: Descriptive Statistics of the Study Variables

Factors	Number	Mean	SD	Standard Error
Drug supply chain integration	31	4.12	0.49	0.09
Drug supply chain efficiency	31	3.98	0.52	0.09
Drug supply chain performance	31	3.87	0.74	0.133

Table 6: The Effect of Information Sharing on the Integration, Efficiency, and Performance of Drug Supply Chain from the Viewpoint of Experts

¹ status index is [1-1.8]= very low, [1.8-2.6] = low, [2.6-3.4] = average, [3.4-4.2] = high, [4.2-5] = very high.

	Level of significance %95range in		Mean difference	P-value	Degree of freedom	t
	high	low				
Drug supply chain integration	1.296	0.938	1.12	≤0.001	30	12.735
Drug supply chain efficiency	1.173	0.79	0.89	≤0.001	30	10.49
Drug supply chain performance	1.144	0.6	0.87	≤0.001	30	6.55

7. Conclusions

Nowadays, information sharing is one of the vital aspects for the survival of different supply chain in the competitive world which has many advantages like increasing efficiency, decreasing inventory level at each time period, reducing totals costs of the chain, increasing certainty and decreasing uncertain conditions, as well as optimal use of resources and increasing productivity in all sectors involved throughout the chain. Considering its different sections, the drug supply chain is not exempt from this rule, and information sharing has a significant effect on its performance. Health and treatment supply chain, like supply chain management in a production system can lead to integration and coordination of processes, integration of information flow and coordination of planning processes. Information sharing is acquisition and dissemination of information relevant to planning and controlling supply chain operations. Information sharing is important for the efficiency and effectiveness as well as competitive advantage of the supply chain.

The results obtained in this study show that most experts completely agree with the effect of information sharing on the integration, efficiency, and performance of drug supply chain and confirm its positive effect. According to the analyses of this study, managers and policy-makers of health and treatment sector should pay more attention to the role of information sharing in drug supply chain to improve its efficiency and performance and increase the quality of drug distribution

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