The Role of Supply Chain Management Integration in Quality Management System for Hospitals

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ABSTRACT

Fierce competition forces organizations to implement different approaches such as supply chain management and quality management in delivering results. Hospitals should apply total quality management and integrate a smooth running strategy for their supply chain management. This study aims to determine the possible role of supply chain integration in quality management systems for hospitals. Results indicate that there is a positive relationship between supply chain integration and quality management systems in healthcare organizations.

The sub-dimensions of supply chain integration which are internal customer integration and external customer integration have also strong effect on quality management system. As being critical, vital and inseparable, the nature of the healthcare results in providing service simultaneously with demand which makes internal integration very important for hospitals. Hospital integration with internal and external customers is realized as important factors in implementing and empowering the overall integration process in quality management system in hospitals. Quality management system ensures that product or service is realized with a planned, systematic and analytical approach in hospitals.

Keywords: Supply Chain Management, Quality Management System, Supply Chain Integration, ISO 9001, TQM, Hospital.

INTRODUCTION

With the increasing importance of outsourcing in today's global market supply chain management (SCM) is usually seen as a way to improve competitive performance by integrating the internal functions of a company and linking them with the external operations of suppliers, customers, and other channel members. This may also lead to change the traditional structure of the organization. The benefits of supply chain integration may be realized by an effective linkage among various supply chain activities (Kim, 2006). Besides, this link should also contain effective construction and utilization of various supply chain practices for an integrated supply chain. This means that a firm that is pursuing the effective construction of SCM practices needs to pay attention to SC integration.

TQM is based on the premise that customers should be the focus of the organization. All the studies and improvements should aim the customer satisfaction (Tutuncu and Kucukusta, 2007; Tutuncu and Dogan, 2004). The term customer reflects both internal and external customers. The ISO 9001: 2000 certification

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has its own chapter due its strong emphasis in customer satisfaction and the importance of quality management systems to improve organizational performance in all aspects (Chan, 2000). The ISO can be "a safe way" to get and offer quality. The quality offered by the establishment may or may not meet the customer's expectations but one important advantage for the establishment is having the certification of the establishment as a whole, from top to bottom after the firm has been submitted to hard quality procedures.

The aim of this study is to analyze supply chain integration (SCI) and quality management system (QMS) in hospitals and to determine which factors are perceived most important by staff. The results of the study enable hospital managers which factors should be considered in order to integrate supply chain and quality management. This study can lead to further research as it's being the first empirical study on this subject in Turkey.

LITERATURE REVIEW

SCM practices that are implemented to improve supply chain performance require internal cross-functional integration within a firm and external integration with suppliers or customers in order to be successful (Narasimhan, 1997). In real life situations, it is difficult to integrate all the logistics functions within an organization. The supply chain consists of many different activities, which contains different types of operations, using different systems. The usual approach is letting the integration developing over time. One department might slowly take over all aspects of ordering and receiving raw materials. Another department might slowly take over all aspects of delivering finished products to customers (Waters, 2003).

Evolution of the global markets forces supply chain managers to face with continuously changing market dynamics, new global markets and stressful competitive environments (Mehra and Agrawal, 2003; Mehra and Inman, 2004). Traditional supply chain management, where suppliers are selected based on price (Chen and Yang, 2002), may lead to results that deter an organization from competing in global markets. Supplier quality management should now transform from measuring supplier compliance to gathering knowledge, risk management and project management.

Quality management applications help reduce process variance, which has a direct impact on supply chain performance measures, such as cycle time and delivery dependability (Flynn, Schroeder and Sakakibara, 1995). As process variance is reduced, there is less need for safety stock and cycle stock inventory. Quality management practices results in setup time reduction, allowing the use of smaller lots, which reduces cycle stock. Because quality management practices reduce the number of items requiring rework, cycle times are shortened by speeding product output (Mefford, 1989; Flynn, Schroeder and Sakakibara, 1995), allowing improved schedule attainment and correspondingly faster response to market demands (Flynn and Flynn, 2005). This allows a greater extent of synchronization across the entire supply chain (Ferdows, Lewis and Machuca, 2004). The use of certified suppliers and long-term supplier relationships based on quality criteria reduces pre-processing cycle time delays for incoming inspection (Heiko, 1990). Total quality management ensures processes are followed and customers are satisfied. In the processing and post-processing phases, quality at the source (Hayes and Wheelwright, 1984), feedback, statistical process control and effective product designs reduce or eliminate time delays for rework and process inspection of in-process and finished goods, respectively, and transportation times (Flynn *et al.*, 1997).

TQM is a philosophy of quality management, the earliest conceptions of which were derived from Deming's lectures to the Japanese in the 1950s and 1960s (Holness, 2001). With the help of TQM, the quality of Japanese products has been regarded as being superior to that of the rest of the world. Therefore, in the early 1980s, the USA utilized TQM concepts as tools to compete with Japan. Subsequently, Europe also

recognized the need for a keener focus on quality, and in the 1990s, TQM concepts spread to Europe (Sanghera, 1999). However, making the step towards TQM was much more difficult as there was widespread confusion about the elements of TQM and how they could be implemented. This was because TQM was a rather abstract philosophy and did not have clear guidelines on its implementation (Mann and Voss, 2000). TQM is accepted to improve the effectiveness, efficiency and motivation in the short term in order to survive in the long term (Joseph *et al.*, 1999). Therefore, organizations in the hospitality industry should consider the organizational commitment and job satisfaction levels of their employees in order to increase productivity (Tutuncu and Dogan, 2003).

The ISO 9000 series of quality management systems standards is an exceptionally widely diffused management practice. By December 2001, it had been adopted by over 560,000 facilities in 159 countries (Corbett, Montes-Sancho and Kirsch, 2005). Its origins, however, rest in earlier American and British standards (Naveh and Marcus, 2005). Standardization has served an important role in promoting quality and compatibility of products on a global basis. The work of standardization is performed by ISO technical committees comprised of representatives from interested member countries to address specific standards. Over the years the concept of standardization has evolved from specific technical specifications to a broader concept of generic quality management system standards (Levett, 2005). This study is significant in terms of its uniqueness in Turkey. There is a lack of literature examining the relationships between SCM integration (SCI) and quality management systems (QMS).

The study's research questions and related hypotheses are presented as follows;

Q1. Are independent variables of supply chain management (SCI) valid for Hospitals of Turkey?
H1: There is a difference between the independent variables of SCI.
H2: There are some differences between the items of independent variables.

Q2. If there is a new construct, is there a relationship between the independent variables of SCI?
H3: There is a correlation between the internal customer integration and external customer integration.

Q3. Is there a relationship between Quality Management System (QMS) and SCI?
H4: There is a correlation between QMS and SCI.

Q4. Does the construct explain the SCI for Hospitals?
H5: Both internal customer integration and external customer integration explain the SCI.
H6: Internal customer integration is more important than external customer integration for SCI.

Q5. Does the construct of SCI explain the QMS and has the similar effects on QMS?
H7: Both internal customer integration and external customer integration explain the performance.
H8: Internal customer integration is more important than external customer integration for performance.

METHODOLOGY

Data was obtained by administrating a structured-questionnaire survey consisting two parts. The first part of the survey inquired 9 statements about level of supply chain management integration under three dimensions. The second part of the survey consist dependent variables and the last part inquired demographic and nominal questions about the employees. The total 11 items which have been resulted in 2 independent factors and 2 dependent variables are rated on a five-point scale (1= strongly agree; 2=agree;

3=neither agree nor disagree; 4=disagree; 5=strongly disagree). The employees were asked to rate these statements. The survey instrument was pilot tested among 30 employees. The pilot results were used to improve the clarity and readability of questions.

Snowball sampling is used for the survey and the survey was conducted among staff working in various fields of supply chain. The study was carried out in seven hospitals in Ýzmir. Totally, 300 questionnaires distributed by the researchers and usable 160 questionnaires were returned, with a usable response rate of 53%, which is statistically acceptable for data analysis. Data obtained was analyzed by using a SPSS program. Data analysis consisted of frequency distribution, descriptive statistics, factor analysis, and regression analysis at the base of derivative and inferential statistics.

ANALYSIS AND RESULTS

Demographic dispersion and profile of employees under the base of descriptive statistics are stated in Table 1. 160 hospital staff has gone under the research.

The reliability tests have been implemented on data at the base of derivative statistics. To increase the reliability coefficient of the test, two data have been taken out of study. As a result of the test, the general Cronbach's alpha of data is found to be as 0.850. This result is within the acceptable limits.

In accordance with Cronbach's alpha result obtained, the factor analysis has been implemented on data. The Barlett's Test result is realized as the value of 670.489 and $p<0.001$ level and Kaiser-Meyer-Olkin illustration value as 0.829 and this value is within the acceptable limits. In the principal component analysis implemented on data, the varimax alternative is used up and in accordance with scree plot dispersion obtained; data of which Eigenvalue (main value) is above one is taken under consideration.

Table 1. Numerical and percentage dispersion of sample profile

	Number	%		Number	%
Sex			Education		
Female	114	71.3	High school	30	18.7
Male	45	28.1	University	105	65.6
Missing	1	0.6	Post graduate	25	15.6
Total	160	100.0	Total	160	100.0
Age			Total working years		
15-21	15	9.4	Less then 1	5	3.1
26-32	41	25.6	1-5	24	15.0
33-42	69	43.1	6-10	34	21.3
43-50	27	16.9	11-20	62	38.8
51 or above	7	4.4	21 or above	35	21.9
Missing	1	6.9	Total	160	100.0
Total	160	100.0			
Tenure					
Less then 1	25	15.6			
1-3	43	26.9			
4-6	43	26.9			
7-9	13	8.1			
10 or above	35	21.9			
Missing	1	6.9			
Total	160	100.0			

The variables of which loading rates are less than 0.30 have been taken out of evaluation so as to have the topic be presented much more clearly. Together with it, there is no expression of which factor load is below 0.30. In the light of this data, it is found that 9 variables are formed under two factors and with total difference (variance) in the rate of 0.689. The summary results of factor analysis are presented in the following table (Table 2). H1 is supported here.

The participants have given the lowest average as 3.24 to the first factor which represents hospital integration with internal customers (5 as the highest and 1 as the lowest). Together with it, they have given the highest average with 3,97 to the factor of hospital integration with external customers (patients), which represents the level of contact and the service process. Indeed, two factor averages are representing that staff has positive approach and perception about all the dimensions of integration. H2 is rejected here as items are unchanged.

Table 2. Results of factor analysis

	Factor Loadings	Eigenvalue	Mean	Variance Explained	F Value	Alpha
FACTOR 1 –		4.199	3.24	46.660	10.728	0.886
Hospital Integration with Internal Customers						
- The establishment of quick ordering system	0.873					
- The level of strategic partnership with suppliers	0.846					
- Data integration through departments within the hospital	0.830					
- Integrative inventory management	0.754					
- Periodic interdepartmental meetings among internal function	0.737					
- Stable procurement through network	0.704					
FACTOR 2 –		2.010	3.97	22.333	1.781	0.828
Hospital Integration with External Customers (Patients)						
- The level of communication with patients	0.912					
- The level of contacts with patients	0.897					
- The agility of service process	0.777					

In order to analyze the relationship among independent variables, correlation coefficient values were calculated. As Table 3 shows, there is a positive relationship (r = 0.292 and p=0.0001) between two factor attributes. H3 is supported here. There is also one more correlation statistics made in order to test the relationship between two dependent variables, overall supply chain integration and overall quality management system.

Table 3. Correlation matrix between factors of integration

		Hospital Integration with Internal Customers	Hospital Integration with External Customers (Patients)
Hospital Integration with Internal Customers	Pearson Correlation	1	0.292
	Sig. (2-tailed)		0.0001
	N		160
Hospital Integration with External Customers (Patients)	Pearson Correlation		1

Table 4 represents the correlation results. There is also positive and very strong relationship between the dependent variables (r = 0.731 and p=0.0001). H4 is supported here.

Table 4. Correlation matrix between overall integration and quality management system

		Overall Integration	Quality Management System
Overall Integration	Pearson Correlation	1	0.731
	Sig. (2-tailed)		0.0001
	N		160
Quality Management System	Pearson Correlation		1

Regression analysis is made to determine the importance of independent variables on dependant variables (Table 5). There are two dependent variables. In other words, the expression of 'Overall, our hospital's supply chain integration is successful' given with the broad expression is involved. However this expression is considered as dependent variable, due to the findings obtained in factor analysis. Especially 2 factors of supply chain management as hospital integration with internal customers and hospital integration with external customers (patients) have strong effect on this dependent variable. When we examine the Table 5 it is seen that the F value is realized as meaningful in the level of 62.285 p=0.0001. In connection with it, Multiple R=0.672 and R Square=0.452 is realized. It is examined that R square value is in the sufficient level for the researches made in social sciences. It is needed to assess the Beta values to determine the importance levels of independent variables in connection with the dependant variable parallel with the knowledge gained from regression analysis. When we examine the importance of Beta values obtained from regression analysis, it is seen that the variable of Hospital Integration with Internal Customers has become meaningful at the level of 0.648. Another variable which is meaningful is Hospital Integration with External Customers (Patients), with the Beta value of 0.243. It is understood that, these two factors affect the first dependent variable 45% together. H5 and H6 are supported here.

Table 5. Regression analysis of the factors affecting the overall integration

VARIABLES	β	T	Sig T
- Hospital Integration with Internal Customers	0.648	9.382	0.0001
- Hospital Integration with External Customers (Patients)	0.243	3.120	0.002
- Constant	0.286	1.326	0.187

Notes : Multiple R=0.672, R square =0.452, Adjusted R Square =0.445, F=62.285, Signif. F=0.0001

There is another dependent variable expressed as 'Overall, our quality management system is good'. A second regression analysis is made to determine the effects of independent dependent variables of supply chain management on the dependent variable (Table 6). H7 and H8 are supported here. In Table 6, it is seen that the F value is realized as meaningful in the level of 56.059 p=0.0001. In connection with it, Multiple R=0.652 and R Square=0.424 which is also in sufficient level is realized. When Beta values are examined to determine which factor has stronger effects on dependent variables, it is seen that Hospital Integration with Internal Customers has the highest Beta value of 0.643. The other factor is Hospital Integration with External Customers (Patients) with the Beta value of 0.198.

Table 6. Regression analysis of the factors affecting the overall quality management system

VARIABLES	β	T	Sig T
- Hospital Integration with Internal Customers	0.643	9.130	0.0001
- Hospital Integration with External Customers (Patients)	0.198	2.502	0.013
- Constant	0.411	1.874	0.063

Notes : Multiple R=0.652, R square =0.424, Adjusted R Square =0.417, F=56.059, Signif. F=0.0001

DISCUSSION AND CONCLUSION

Quality Management System is identified as an important factor in implementing continuous quality improvement and total quality management in health care. It has also been identified as an important factor in promoting patient safety and error reduction in health care organizations.

Supply chain integration has three independent variables in its original scale which are organization's internal integration, integration with suppliers and customer integration. The factor analysis process indicates that integration within the hospital and with the suppliers is realized in a single factor. It has been renamed as integration with internal customers according to factor analysis. This factor also covers the suppliers' role in the service process. Everybody who produces something to another is in the role of supplier; everybody who receives is in the role of internal customer. The other factor is named as integration with external customers, who are the patients for hospitals in order to reflect the nature of quality management system. Supply chain integration can be obtained in close co-operation with the patients.

Hospital integration with internal and external customers is realized as important factors in implementing and empowering the overall integration process in quality management system in hospitals. Respectively internal customers are perceived more important by the staff in this study. The nature of the healthcare as being critical, vital and inseparable results in to provide service simultaneously with fast interference which makes internal integration for hospitals more important than external customer integration. Hospital integration with patients (external customers) has an important role on overall integration of supply chain management.

Quality management system ensures that product or service is realized with a planned, systematic and analytical approach in hospitals. Factors affecting the integration of supply chain management have strong affect on the quality system.

REFERENCE

Chen, C. C. and Yang, C. C. (2002). Cost-effectiveness based performance evaluation for suppliers and operations, *Quality Management Journal*, *9*(4), 59-73.

Corbett, C. J., Montes-Sancho, M. J. and Kirsch, D. A. (2005). The financial impact of ISO 9000 certification in the United States: an empirical analysis, *Management Science, 51*(7), 1046-1059.

Ferdows, K., Lewis, M. A. and Machuca, J. A. D. (2004). Rapid-fire fulfillment, *Harvard Business Review, 82*(11), 104-110.

Flynn, B. B., Schroeder, R. G., Flynn, E. J., Sakakibara, S, and Bates, K. A. (1997). World-class manufacturing project: overview and selected results, *International Journal of Operations and Production Management, 17*(7), 671-685.

Flynn, B. B. and Flynn, E. J. (2005). Synergies between supply chain management and quality management: emerging implications, *International Journal of Production Research, 43*(16), 3421-3436.

Flynn, B. B., Schroeder, R. G. and Sakakibara, S. (1995). The impact of quality management practices on performance and competitive advantage, *Decision Sciences, 26*(5), 659-692.

Hayes, R. H. and Wheelwright, S. C. (1984). *Restoring our competitive advantage: competing through manufacturing*, New York: John Wiley and Sons.

Heiko, L. (1990). Production lead time minimisation and just-in-time, *Operations Management Review, 3*(3/4), 19-23.

Holness, G. V. R. (2001). Achieving quality using TQM and ISO, *ASHRAE Journal, 43*(1), 195.

Joseph, I. N., Rajendran, C., Kalamanabhan, T. J. and Anantharaman, R. N. (1999). Organizational factors and total quality management: an empirical study, *International Journal of Production Research, 37(*6), 1337-1352.

Kim, S. W. (2006). Effects of supply chain management practices, integration and competition capability on performance. *Supply Chain Management: An International Journal, 11*(3), 241-248.

Levett, J. M. (2005). Implementing an ISO 9001 quality management system in a multispecialty clinic**,** *The Physician Executive, 31*(6), 46-50.

Mann, R. and Voss, M. (2000). An innovative process improvement approach that integrates ISO 9000 with the Baldrige framework, *Benchmarking: An International Journal, 7*(2), 128-145.

Mefford, R. M. (1989). The productivity nexus of new inventory and quality control techniques, *Engineering Costs and Production Economics, 17*(August), 21-28.

Mehra, S. and Agrawal, S. P. (2003). Total quality as a new global competitive strategy, *International Journal of Quality and Reliability Management, 20*(8/9), 1009-1025.

Mehra, S. and Inman, R. A. (2004). Purchasing management and business competitiveness in the coming decade, *Production Planning and Control, 15*(7), 710-718.

Narasimhan, R. (1997). Strategic supply management: a total quality management imperative, *Advances in the Management of Organizational Quality*, 2, 39-86.

Naveh, E. and Marcus, A. (2005). Achieving competitive advantage through implementing a replicable management standard: Installing and using ISO 9000, *Journal of Operations Management, 24*(1), 1-26.

Sanghera, S. (1999). New directions with Radar: Management Total Quality Management: The 'excellence' model used by 10,000 organizations across Europe is being updated, with extra emphasis on innovation, knowledge and partnerships. *Financial Times*, 4, 21.

Tutuncu, O. and Dogan, O. (2003). *ISO 9001: 2000 in context of total quality management: Computer aided application in hospitality organizatins*, Izmir: DEU Press.

Tutuncu, O. and Dogan, O. (2004). Analysis of the relationship between total quality management and EFQM business excellence model and an implementation in Turkey. *7th. International QMOD Conference: Management Challenge for the New Millennium*, Monterrey, Mexico.

Tutuncu, O. and Kucukusta, D. (2007). Relationship between organizational commitment and EFQM business excellence model: a study on Turkish quality award winners, *Total Quality Management, 18(10),* 1-14.

Waters, D. (2003). *Logistics: An Introduction to Supply Chain Management*, New York: Palgrave Macmillan.

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