Path Analysis of the Effect of Supply Chain Management and Total Quality Management on Improving Employees Services Quality

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ABSTRACT

This study was done to integrate Total Quality Management (TQM) and Supply Chain Management (SCM) in a unified framework to study improving the employee service quality of rural cooperative companies and obtaining an important tool for competition in future management. All employees of rural cooperative companies of Tehran Province were selected as a statistical population (N= 500). The stratified sampling method (n= 217) was used. To collect information, the questionnaire for SCM and TQM was developed based on an extensive literature review, and its reliability and validity was verified by experts, pilot test, and various statistical techniques. According to the proposed conceptual framework, the direct and indirect impact of the variables was investigated by the Path Analysis in the LISREL software. The results showed that there was a positive significant relationship between dimensions of SCM and TQM. The results of path analysis show the direct impact of all aspects of TQM on internal integration and the effect of "support and leadership of the top management of the organization", "strategic planning", and "customer focus". Also, based on the research results, the management support and "support and leadership of the top management of the organization", strategic planning, and customer focus have an indirect effect on internal integration. Overall, our findings reveal that building SCM and TQM by strengthening the effect of each other is an effective way to achieve services quality among the employees of rural cooperatives in Tehran Province.

Keywords: Internal integration, Quality strategy, Rural cooperative companies.

INTRODUCTION

The growing competition, globalization of economies, and the need to increase the competitiveness of organizations through operational efficiency promoted new opportunities and challenges in the management and organization of the entire supply chain. Thus, Supply Chain Management (SCM) appears as an essential tool for competitive advantage in the market, since it allows the development of a link between the market, the distribution network, the production process, and procurement activities (Ramos *et al*., 2007; Agus, 2011; Mahdiraji *et al*., 2012; Zeng *et al*., 2013; Huo *et al*., 2014; Dellana and Kros, 2018; Fernandes *et al*., 2017). Despite this competition, results of researches have founded the need to focus not only on improving intra-organizational quality management practices but also on SCM aspects, such as quality strategy and leadership and process integration (Sidhu *et al.,* 2019; Zimon and Madzik, 2020; Fynes *et al*., 2005; Kaynak and Hartley, 2008;

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Foster *et al*., 2011; Song *et al*., 2017). Most of these studies found that SCM and TQM separately can help an enterprise coordinate and implement all activities, thus improve the quality of its operations (Safari and Mohebibakhsh, 2010; Ghanbari Nejad and Mohammadi, 2015; Quang *et al*., 2016; Soares *et al*., 2017). However, there has been rather limited research on strengthening each other effects, SCM and TQM capabilities, how they can affect firm performance, and the direct and indirect mutual impacts of them on each other and firm performance more thoroughly. It is still unclear how these capabilities interact together that eventually enhances the overall performance of the firm and its supply chain. Furthermore, another major limitation of existing studies on this problem is that, although they might be able to explain the impact of SCM and TQM practices on a firm's operational performance, few researches have investigated how mutual practices affect each other's performance, which is the key for long term competitive advantage. Meanwhile, the rural cooperative companies of Tehran Province, during recent years have attempted to continuously control the internal activities of the company and offer the best services; this issue is studied in the present research. To fill the research gaps mentioned above, in this paper, we first examine how a firm can obtain its SCM and TQM capabilities and how they interact with its practices. Also, the goal of the present research was to investigate the relationship between Supply Chain Management and Total Quality Management in improving the quality of services of rural cooperative companies' employees in Tehran Province, and study the direct and indirect effects between SCM and TQM that make their effectiveness stronger.

Services Quality:

In the first step, it is necessary to have a clear understanding of the concept of quality management to improve the quality of services; moreover, the definition of quality not only is important from a semantics viewpoint, but also is more important for the employees to provide higher quality services. Perry and Sohal (2001), Khan (2014), and Bon and Mustafa (2013) defined Quality Management (QM), as a "management philosophy". Thus, it should be focused on a broad set of issues, ranging from sourcing activities to the final product delivery and after-sales service. Furthermore, Terziovski (2006) believed that QM is characterized by the constant search for continuous improvements in the processes and procedures, to achieve excellence and to attain efficiency, sustainability, and competitiveness. Under the QM framework, companies can improve their organizational performance and business, customer and employees' satisfaction, relationships with suppliers, and create positive attitudes, by improving organizational quality culture (Talib *et al*., 2011; Reed *et al*., 2000). Continuing our evolutionary journey, we will focus on the concept of service quality as a subset of quality management. One of the tools for assessment of services quality variable is a model that is offered in 5 aspects including: (1) Tangible issues, (2) Credit, (3) Responsiveness, (4) Guarantee, and (5) Evaluated cooperation (Parasuraman *et al.,* 1991) (Figure1).

Parasuraman *et al.* (1991) have referred to 10 main factors concerning the quality of perceived services including: (1) Access, (2) Communication, (3) Agility, (4) Respect, (5) Validity, (6) Trust, (7) Responsiveness, (8) Security of customers, (9) Tangible, and

Figure 1. Parasuraman's model for services quality.

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(10) Perceive. Some of these researches suggest that further studies on QS practices should be made clear to stakeholders so that they understand how internal and external factors affect these practices and how they interact with each other.

Supply Chain Management:

Stadtler (2005) has defined the supply chain as follows: Supply chain is a set of organizations that are divided into upstream and downstream and via offering products and services and different activities and processes are in search of creating value for end-customer. Moreover, Rahman Seresht and Afsar (2008) has referred to 5 surfaces of performance of supply chain management. Shafiei *et al*. (2017) believe that the supply chain is dependent on the nature of the dependent company, and indicate that the members of the supply chain are the cumulative structure for saving, continuous saving, customized produce, canal assembly, and global supply chain. Tanninena *et al*. (2017) in their researches showed the following issues: (1) Strategic quality management has a positive significant effect on profit-making and (2) Strategic quality management have a significant effect on profit-making and customer satisfaction; nevertheless, among the 3 dependent variables, the aspects of strategic quality management have the highest influence on customer satisfaction. Maskel (2015) announced that the reference model for supply chain or SCOR is regarded as a tool for management and standardization of supply chain performance systems that offer several criteria for evaluating performance. Youssff *et al*. (1994) in their research recognized tangible, respect, certainty, and sympathy as effective variables in quality service. Johnson *et al*. (2013) performed comprehensive empirical tests on aspects of quality of services; however, they offered 18 factors including access, aesthetics, respect, serving, availability, attention, cleanness, comfort,

obligation, communication, qualifications, respect, and humble, flexibility, friendship, performance ability, integrity, trust, responsiveness, and security. In today's increasingly dynamic business environment, supply chain responsiveness has become a highly prized capability (Lin *et al*., 2013). Overall, supply chain responsiveness capability could sometimes be reinforced by firm agility and firm quality performance since these activities promote the performance.

Supply Quality Chain Management

Cardoso *et al*. (2016) defined SCQM as "The formal coordination and integration of business processes involving all partner organizations in the supply channel to measure, analyze, and continually improve products, services, and processes to create value and achieve the satisfaction of intermediate and final customers in the marketplace". The study of Ajalli and Mozaffari (2018) on key factors in SQCM shows that the key factors are defined as bellow: Customer focus or oriented customer، suppliers' quality management, supply chain quality leadership, quality strategies in supply chain, process approach, and supply chain quality information systems, and development of human resources in supply chain. The main objectives of the SQCM include: (1) Showing external customers, (2) Introducing in the company of such a management system, (3) Enabling the company to creatively adapt the general requirements of the SQCM (Chiarini *et al*., 2020; Dellana and Kros, 2018). A study was done by Sidhu *et al*. (2019) revealed that there is a synergistic relationship between TQM and SCM paradigms, and revealed that combined (TQM–SCM) initiatives have effectively contributed to the realization of significant competitive dimensions, progressively from introduction to maturity phases. Yu *et al*. (2017) state that some studies need to indicate the direct and

indirect impacts of different drivers of SCQM on firm performance at multiple levels more thoroughly. Therefore, the study stresses the need for improving coordination between various manufacturing parameters as well as competitive dimensions of TQM and SCM paradigms to enjoy the higher potential of the business.

Hypothesis

Fynes *et al*. (2005) and Grosvold *et al*. (2014) suggested a positive relationship between SCRQ and design quality through enhancing collaboration with supply chain partners. Gu *et al*. (2017) demonstrated the benefits of TQM strategy deployment of the supply chain. Jabbour *et al*. (2014) identified a relationship between SCM, QM, and sustainability performance. Kuei and Lu (2013) developed a conceptual framework, integrating TQM principles and sustainability management. Kuei and Madu, (2013) and Lin *et al*. (2005) identified four major SCQM themes, utilizing SCM and EFQM approach for developing a hybrid integrated framework. Lin (2013) and Maiga and Jacobs (2005) studied the relationship between TQM practices, supplier selection, supplier participation, and organizational performance. Mellat Parast (2013), Truong *et al*. (2017), and Tse *et al*. (2018) demonstrated a positive impact of SCM practices on a firm's operational performance. Thus, we proposed the first hypothesis as follows:

H1. Integrated SCM and TQM practices have a positive impact on Services Quality.

The researches done by Quang *et al*. (2016), Schmidt and Schwegler (2008), Agrawal *et al.* (2018), and Dubey *et al*. (2015) showed direct and indirect relationships between SCQM with firm performance. Auailani *et al*. (2016) redefined the important success factors of their relationship to strengthen organizational sustainability through QM processes and shared value creation. Asif *et al*. (2011), Azizi *et al*. (2016), and Beske

and Seuring (2014) showed that TQM practices are interdependent in the supply chain. Flynn and Flynn (2005) presented empirical evidence that demonstrates synergies between Q practices and SCM practices. They suggest a positive relationship between QM and SC performance. Shalij *et al*. (2009) exploited the synergy offered by SCM integration, resulting in IS 9001 based supply chain quality management system. TQM and SCM concepts have attracted attention in recent years. However, the analysis of the relationship between SCM and QM and their integration in the service quality is still very limited (Robinson and Malhotra, 2005; Azar *et al*., 2009).

Thus, we proposed the second hypothesis as follows:

H2. SCM and TQM factors have a positive interaction impact on each other.

MATERIALS AND METODS

Measurements

The three key constructs in our research are SCM practices, TQM capabilities, and operational performance. Based on Chopra and Meindl (2014), Truong *et al*. (2017), and Nosratpour *et al*. (2018), SCM practices can be measured in three dimensions: Internal integrity, External integrity, and Competitive ability. The Circular model with 5 basic dimensions has been used to measure the quality of services. These dimensions are physical characteristics, service reliability, customer interaction, commitment, and being one heart with the customer (Parsuraman *et al*., 2016). Total quality management has the following eight basic pillars: support and leadership of the top management of the organization, strategic planning, customer focus (customer orientation), identification and training of employees, empowerment of employees and teamwork, quality measurement, and analysis, quality insurance, and the consequences of improving quality and

productivity (Beheshtinia and Moghimi, 2015).

Questionnaire Design

This research tested the proposed conceptual model through survey data. The survey was distributed to 217 employees of rural cooperative companies of Tehran Province (n= 500). The sampling method was stratified with suitable selection and to determine volume sample, it benefited from Morgan table. According to this table, the number of statistical samples was obtained as 217. The questionnaire is divided into 4 parts. All items were measured using a 5-point Likert-type scale with responses ranging from "strongly disagree" (1) to "strongly agree" (5) (Robinson, 2014). We conducted a pilot test with 30 employees of the Tehran branch of agricultural management to ensure that the questions were meaningful, relevant, and easy-to-understand. Finally, we made minor alterations to the scales according to the feedback from those practitioners.

Data Collection and Sample Description

Surveyed employees were located in Tehran Cooperative Organization in Iran. Some of these employees had useful experience and background to the kind of management and they knew the actual needs closely. We sent questionnaires to senior executives, senior managers, and first-line managers, in 2019. The return rate was about 82%. SPSS 21.0 and LISREL 8.5 were used to analyze the collected data

Data Analysis

Preliminary analysis

Research findings concerning central indices and dispersion of research variables show that, according to Table 1, the average supply chain management was 2.90, comprehensive quality was 4, interior integration equaled 2.69, exterior integrity was 3.04 and competitive ability was 0.26 (Figure 2).

Moreover, descriptive analysis of the variable of quality of services shows that the

Table 1. Level of correlation between research variables.

Row	First variable	Second variable	Correlation coefficient		Sig
			Type	Amount	
1	Supply chain management	Improving the quality of service	Pearson	0.162*	0.017
2	Total quality management	"	"	0.625**	0.000
3	Interior integrity	"	"	0.324**	0.000
4	Exterior integrity	"	"	0.051	0.456
5	Competitive ability	"	"	0.188**	0.006
6	Support and leadership of supreme management of the organization	"	"	0.189**	0.005
7	Strategic planning	"	"	0.852**	0.000
8	Concentration on customer	"	"	0.902**	0.000
9	Recognizing and educating employees	"	"	0.077	0.262
10	Empowerment	"	"	0.548**	0.000
11	Consequences of improving quality and productivity	"	"	0.309**	0.000

** P value≤ 0.01, * P value≤ 0.05.

average quality of services is 3.63, leadership support is 3.11, strategic planning is 4.09, customer concentration is 4.16, recognition and education is 2.61, empowerment is 3.79, and consequences of improving quality is 3.21 (Figure3).

Assessment of the Relationship

To test the research hypothesis and study the relationship between research independent variables and the dependent variable in compliance with each scale, we calculated the correlation coefficient and studied the corresponding significant level.

According to the results of Table 1, because of the significance level of test error (less than 0.01) in %99 confidence levels, it can be concluded that there was a significant

relationship between the dimensions of Total Quality Management (TQM) and improvement of service quality. The correlation coefficient between total quality improvement with the support and leadership of top management is 0.18, strategic planning is 0.85, customer focus is 0.90, empowerment is 0.54, and quality and productivity improvement consequences is 0.30. There was no significant relationship between staff identification and training.

Assessment of Effectiveness

Table 2 shows the result for regression analysis by the stepwise method. Independent variables that were significantly related to the Improved Service Quality were subjected to regression analysis. The
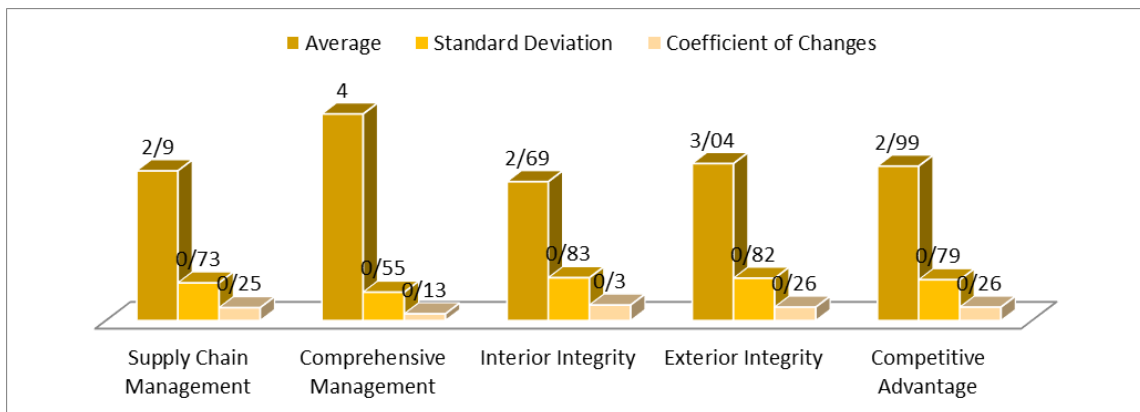

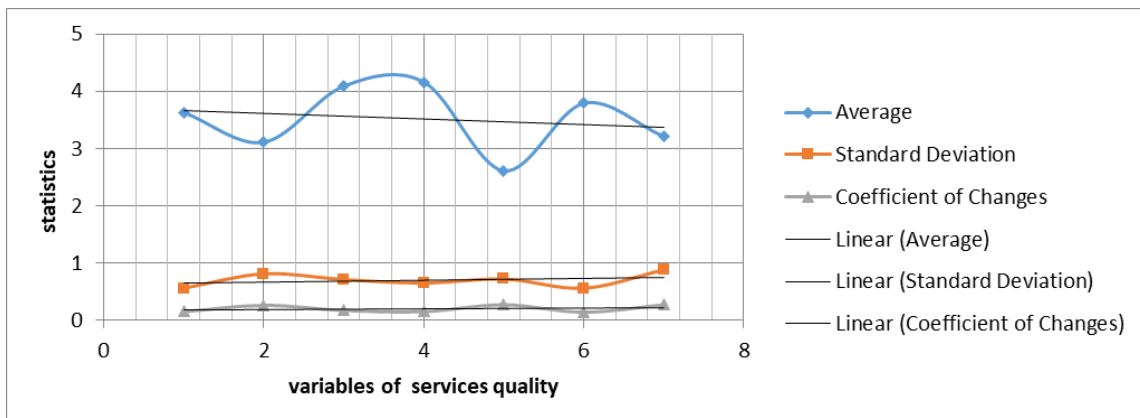**Figure 2.** Central indices and dispersion of main research variables.

Figure 3. Central indices and dispersion of variable of services quality.

Table 2. Multivariate regression analysis.

	Non-standard coefficients		Standard coefficient Beta	t	Sig
	B	SD			
Constant	0.549	0.107		5.128	0.000
Management support and leadership	0.030	0.031	0.04	0.927	0.345
Strategic planning	0.232	0.038	0.30	6.070	0.000
Customer focus	0.505	0.041	0.60	12.248	0.000
Identification and training	0.074	0.036	0.10	2.058	0.041
Empowerment	0.034	0.49	0.03	0.69	0.490
Consequences of improving quality and productivity	0.118	0.031	0.19	3.74	0.000

result indicates that 87% of the variance in the Improved Service Quality could be explained by six dimensions of TQM.

The impact dimensions of TQM (support and leadership management, strategic planning, customer focus, identification and training, empowerment and outcomes of quality and productivity improvement) as predictor variables and improvement of service quality as the criterion (dependent) variable were analyzed by multiple regression analysis using the stepwise method. According to results (Table 2), the "P-value" observed in these variables is significant, except for "the support and leadership" and "empowerment". Also, the results show that the strategic planning variable ($\beta = 0.30$), customer focus ($\beta = 0.60$), identification and training ($\beta = 0.10$), quality and productivity improvement outcomes ($\beta = 0.19$) can predict service quality improvements.

Linear Equation of Improvement of Service Quality

Moreover, to determine the effect of supply chain management aspects (interior integrity, exterior integrity, and competitive empowerment) as anticipation variable and improving quality of services as criterion variable, the multi-regression analysis was performed. The level of "P-value" in this variable is significant and results showed that the variable of interior integrity with the

maximum amount of β: 0.56 and exterior integrity β: 0.53 and competitive empowerment with a minimum amount of β: 0.23 anticipate the variable of improving quality of services.

Linear equation of improving the quality of services was as follows:

$$Y = 3.590 + 0.56x1 + 0.53x2 + 0.23x3$$

Y: Quality of Services; x1:Supply chain management, x2:Comprehensive quality management, x3:Interior integrity, x4:Exterior integrity, x5:Competitive ability, x6:Support and leadership of supreme, x7:management of organization, x8:Strategic planning, x9: Concentration on customer, x10:Recognizing and education of employees, x11:Empowerment, x12:Consequences of improving quality and productivity

Assessment of Path Analysis:

By using LISREL, path analysis was done to know the direct and indirect effects of all variables. Result extracted from path analysis shows that SCM had a maximum total effect (direct and indirect effect) on TQM and conversely (Table 3). This means that the weight of SCM to determine TQM variance is 0/80, and the weight of TQM to determine SCM variance is 0/76. Indices of Integrated SCM and TQM practices affected each other so that the general effect of the causative effect of SCM and TQM on each other (directly and indirect) is 81.1 in the

table for an index of model fitting and the sum of chi-square and degree of freedom is 712.22. Moreover, the level of IFI with CFI 1.072 and RMSEA is 279.1 and, in sum, the value of one of the indicators is in the desired range and the others are in the acceptable range. have a small difference with ideal mode. Generally, it is stated that the model has a suitable level of the fitting.

The figures and data presented in previous pages should come under the following section on Results and discussion.

RESULTS AND DISCUSSION

H1: Integrated SCM and TQM practices have a positive impact on Services Quality.

According to the results, the first research hypothesis is confirmed and there is a significant relationship between supply chain management and improving quality of services; also, between TQM and improving quality of service. Results are compatible with the results of the hypothesis of the following researches: Khanifer and Heydarnia (2017), Chamchong and Banker *et al*. (2016), Chopra and Meindl (2014), Yildiz (2014), Johnson *et al*. (2013), Beker and Tashman (2013). Shafiei (2017), Rahman Seresht (2008), Sobhanifard (2015), Zargar (2015), Farsijani and Samiei Neiyestani (2015), Ghanbarinezhad and

Mohammadi (2014), Banker *et al*. (2016), Yildiz (2014), Johnston *et al*. (2013).

SCM and TQM practices have a positive impact on Services Quality. Results of this hypothesis are compatible with the results of the following researches: Shafiei (2017), Seresht (2016), Farsijani and Samiei Neiyestani (2015), Chamchong and Anglosilon (2016), Banker *et al*. (2016), Maxwell (2015), Yildiz (2014), Johnston *et al*. (2013), Beker and Tashman (2013), Sobhanifard (2015), Zargar (2015).

H2: SCM and TQM factors have a positive interaction impact on each other.

Path analysis with maximum likelihood estimation method was used to test our research model. By applying LISREL, we obtained the results for the hypothesis tests, as summarized in Figure 4. The overall fit indices of the primary structural model were good. The proposed model indicates that SCM dimensions have a direct positive effect on the TQM dimension, and some of SCM practices have indirect effects on TQM. Then, we used the procedure proposed by Zhao *et al*. (2010) to test the mediation effects of SCM capabilities on the relationship between TQM practices and firm performance. The results supported the hypothesis as the path coefficients of indirect effect (a×b) (β= 0.317), and direct effect (c) (β= 0.421) had the same directions.
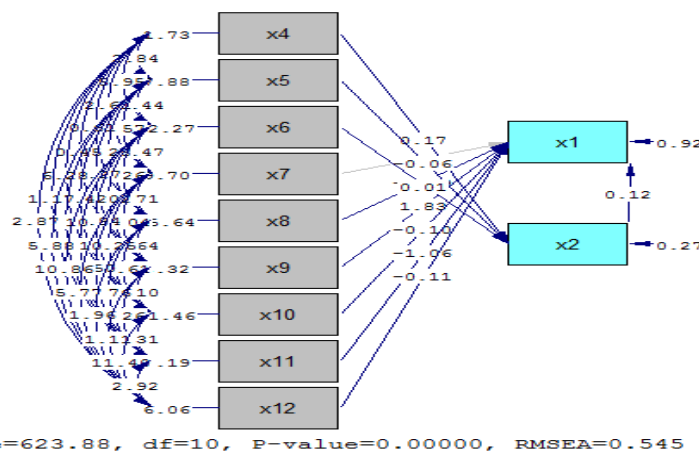

Chi-Square=623.88, df=10, P-value=0.00000, RMSEA=0.545

Figure 4. Path analysis diagram.

Table 3. Total and indirect effects .

	x4	x5	x6	x7	x8	x9	x10	x11	x12
Total effects of X on Y									
x1	0.020	-0.007	0.001	1	-0.694	1.831	-0.099	-1.060	-0.108
	(0.019)	(0.007)	(0.002)		(0.053)	(0.111)	(0.027)	(0.108)	(0.075)
	1.025	-1.010	0.925		-13.055	16.460	-3.625	-9.834	-1.437
x2	0.170	-0.063	0.012		- -	- -	- -	- -	- -
	(0.045)	(0.023)	(0.007)						
	3.806	-2.685	1.667						
Indirect Effects of X on Y									
x1	0.020	-0.007	0.001	- -	- -	- -	- -	- -	- -
	(0.019)	(0.007)	(0.002)						
	1.025	-1.010	0.925						
x2	- -	- -	- -	- -	- -	- -	- -	- -	- -

The results of the research have offered a new view to further improvrte organizational performance through quality management. Specifically, they reveal the effects of SCM practices and TQM on the quality performance of cooperative organizations as a public organization. This is consistent with the results of Zhang *et al*. (2017), who show that SCM related to production can improve the mass customization capabilities of enterprises, and then improve their SCM capabilities. Our finding also confirms the results of Soares *et al*. (2017).

Also, we find that SCM and TQM have significant direct and indirect positive influence on each other. Despite this, Chai *et al*. (2013) and Sharma and Modgil (2015) argue that it is not an easy task for firms and their supply chain partners to implement effective SCQM practices to achieve their various objectives simultaneously.

CONCLUSIONS

According to research results, we suggest the following recommendations to promote the service quality in the cooperative organization:

Managers of rural cooperative companies of Tehran province shall execute simultaneous processes for meeting the customer requirements, productive policies with competitive requirements, increasing the quality of their manufactured products, adaptation with their productive activities, design and execute a process of the joint partnership between all sections, maintain the coherence of different productive sections, correlate the information system of all sections, Goods, services, and productive processes shall be revised, reduce the cost of services and products, confirmed, and finally, control shall be applied.

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تحلیل مسیر تاثیر مدیریت زنجیره تأمین و مدیریت کیفیت جامع در بهبود کیفیت خدمات کارکنان

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چکیده

این مطالعه برای بررسی تاثیر ادغام مدیریت کیفیت جامع (TQM) و مدیریت زنجیره تأمین (SCM)در یک چارچوب واحد بر بهبود کیفیت خدمات کارکنان شرکت های تعاونی روستایی و به دست آوردن یک ابزار مهم برای رقابت در مدیریت آینده انجام شده است. کلیه کارکنان شرکتهای تعاونی روستایی استان تهران به عنوان جامعه آماری انتخاب شدند (۵۰۰ نفر N=). برای نمونه گیری نیز

از روش طبقه ای (n =۲۱۷) استفاده شد. بر اساس مرور گسترده ای در ادبیات تحقیق، پرسشنامه مدیریت زنجیره تأمین و مدیریت کیفیت جامع، برای جمع آوری اطلاعات، ساخته شد که پایایی و روایی آن توسط متخصصان، آزمون آزمایشی و تکنیک های مختلف آماری تأیید شده است. با توجه به چارچوب مفهومی پیشنهادی، تأثیر مستقیم و غیرمستقیم متغیرها توسط تحلیل مسیر در نرم افزار LISRELبررسی شد. نتایج نشان داد که بین ابعاد مدیریت زنجیره تأمین و مدیریت کیفیت جامع رابطه مثبت و معناداری وجود دارد. نتایج تحلیل مسیر، تأثیر مستقیم همه جنبه های مدیریت کیفیت جامع بر یکپارچگی داخلی و تأثیر "پشتیبانی و رهبری مدیریت عالی سازمان" ، "برنامه ریزی استراتژیک" و "مشتری مداری" را نشان می دهد. همچنین، بر اساس نتایج تحقیق، "پشتیبانی مدیریت" و "پشتیبانی و رهبری مدیریت عالی سازمان" ، "برنامه ریزی استراتژیک" و "مشتری مداری" تأثیر غیرمستقیمی بر یکپارچگی داخلی دارد. به طور کلی، یافته های ما نشان می دهد که ساختار مدیریت زنجیره تأمین و مدیریت کیفیت جامع با تقویت تأثیر یکدیگر راهی موثر برای دستیابی به کیفیت خدمات در بین کارکنان تعاونی های روستایی در استان تهران هستند.