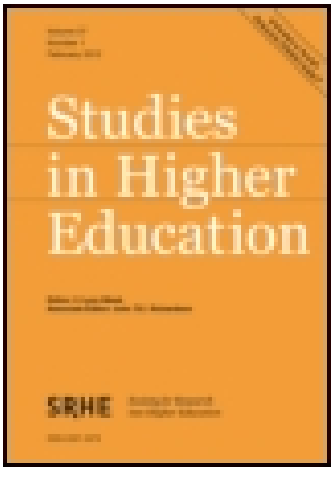

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The effect of the total quality management on organizational innovation in higher education mediated by organizational learning

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Many scientists have suggested that both total quality management (TQM) and organizational learning can separately and effectively reinforce innovation. But is there any relationship between TQM and organizational learning? This study has two main purposes: (1) determining the causal relationship between TQM, organizational learning and organizational innovation and (2) deciding on whether TQM has any impact on the organizational learning and can play the role of mediator between TQM and organizational innovation. The research methodology is descriptive – survey and correlational, and is specifically based on the structural equation modeling. To assess the research variables, three standard questionnaires based on a five-point Likert scale were used and these were distributed among 253 staffs and faculty members of universities of Sabzevar city. The findings showed that TQM positively and meaningfully affects the organizational learning, that organizational learning has a significant effect on the organizational innovation, but that TQM has no positive and meaningful effect on the organizational innovation. The results showed that organizational learning could mediate the effect of TQM on the organizational innovation.

Keywords: organizational innovation; organizational learning; total quality management; higher education; Sabzevar

Introduction

In todays' business environment, changes happen very rapidly. In the international competition of business environment, organizations need to react effectively to the continuous changes or go down. The world of business changes from capital domination to the knowledge priority. To act better than others, an organization should develop human resources and increase the amount of available knowledge and information. Staffs and their knowledge are precious sources for the organization. Knowledge and how to know the organization's strategic sources should be managed and developed. Therefore, organizational learning and knowledge production have come to the focus of attention in recent years (Otala 2000; Hornstein 2006). In an organized structure, education can play a key role in the transfer of knowledge. Education can be based on national need and in line with the improvement of culture and knowledge of modern management only when a client-centered and quality-wise management

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system has been set. In this regard, the structure and system of the educational management come to the attention of quality management (TQM) system. Educational organizations as a bridge between knowledge producers and knowledge researchers need serious changes to answer to the social, political, economic and cultural changes (Qaltash and Salehi 2008). TQM is a method that can bring this change to the education. As Salice (2000) believes, TQM is a philosophy of continuous improvement that can provide a set of skills and scientific tools to fulfill the current and future needs and expectations of any educational institutions. Since the educational organizations and entities are the main and determining factors for preparing human resources for other productive and service organizations in the society, the need to study and implement the principles of 'TQM' in the education is felt more than before. Many researchers have shown that TQM is a powerful tool to improve organizational learning and increase the competitive advantage (Hendricks and Singhal 2001; Martinez-Costa and Jiménez-Jiménez 2008). Based on the researchers' ideas, the learning ability can trigger the organization's innovation and keep the competitive advantage in todays' complicated environment. Learning strengthens the innovative activities and quality is one of the main characteristics of success in todays' competitive environment. Therefore, organizations can stay in todays' competitive environment by continuous production of goods and keeping the management of their quality (Martinez-Costa and Jiménez-Jiménez 2009). The most important characteristics of higher education in the third millennium are learning, dynamic structures, flexibility and quality. Today, higher education system, for achieving more success, needs adapting to continuous changes. The most important tool for a better adaption is organizational learning. In order to have proper performance, the entire system of higher education must be founded on a very high level of quality. On the other hand, in the current era, the changing environment forces higher education managers to use knowledge more and better in coping with uncertainty and for maintaining existing situation. This requires that higher education managers consider high priority for organizational innovation and innovation management. Implementation of TQM in higher education leads to adapting to environmental changes. When higher education emphasizes on customers and quality thorough TQM, it should consider organizational learning and organizational innovation for providing better services to students and society. Many factors are involved in the fulfillment of the society's purposes among which attention to the quality and role of TQM and organizational learning is very important. Also, due to the importance of TQM, organizational learning and organizational innovation in the efficiency of educational organizations and since no research studies have been done in public universities (governmental universities), Islamic Azad University (IAU) and Payam Noor Universities (PNUs) of Sabzevar city, the present study is done. This research helps to identify the situation of these variables in different types of universities with different managements and the causal relation between these variables.

PNU was established in 1988 after aggregation of IAU and Aboureihan Biruni University facilities, as the only Open University and distance education in the Islamic Republic of Iran. The PNU currently has 499 centers and units across the country, which have organizations in 32 provinces and an offshore center named International Centers Planning and Coordinating Office. This university has 3148 faculty members and more than 1,088,812 students (http://pnu.ac.ir). This university is semi-public and it is somewhat funded by government and the other financial resource is students tuitions.

The IAU, commonly referred to as Azad University, is the world's fourth largest private university system. The IAU was founded in 1982, currently has an enrollment of 1.5 million students, making it the world's fourth largest. Azad University has over 100 branches across the country and also in other countries. The main revenue of this university is from students' tuitions.

Public universities are governmental and are entirely funded by the government. All these types of universities are centralized and so have bureaucratic management system.

Theoretical background

Different approaches to the concept of TQM have led to different definitions. For example, Persico (1989) defines TQM as a method to change the organizational culture and involve the staffs more in different parts of the business and also to continuously increase the quality through teamwork to achieve the organization's specific purposes.

Evans and Lindsay (1996) mention that TQM is a management approach that focuses on the quality and moves toward flexibility. Easton and Jarrell (1998) state that TQM produces goods with high quality and decreases the costs and satisfies the staffs and clients and so leads to financial efficiency. Although TQM includes different kinds of history, Rahman (2004) showed that TQM is a management approach for improving the organization's efficiency and solving behavioral and technical problems. Different researchers have provided different definitions for TQM to assess its effect on the quality of the organization's goods and other non-financial results. Prajogo and Sohal (2003) have considered six dimensions to assess the result and performance of the TQM in productive organizations: (1) leadership, (2) strategic planning, (3) customer orientation, (4) IT and analysis, (5) human resources and (6) management of the processes. Mittal, Vineet, and Amit (2011) believe that TQM's success factors in providing services include customer focus, continuous improvement, teamwork, getting involved in activities, top management commitment and identification, learning and development, communication, assessment and feedback.

Organizational learning is one of the main effective theories in leadership that was first discussed by March and Siert in 1963. In this viewpoint, organizational learning is a confirmative process by the emphasis on the standard practical methods to achieve the organization's goals (Aghahosseini 2003). Tempelton, Lewis Brucer, and Synder (2002) define organizational learning as a set of organizational actions such as acquiring knowledge, distributing the information and interpreting the information which consciously or unconsciously affects the positive organizational change. Argyris and Schon (1996) consider organizational learning as the process of identification and amendment of error. Organizations can learn not because they can think or react independently from those who work in them, but because of substitution of people or group's learning in the organizational processes, daily activities, structures, data bases, rule systems, etc. (Hedberg 1981).

Nowadays, world's developed universities try to change education system and teach knowledge transfer skills to the next generation of students and change the research process and with regard to the practical nature of development and are in search of new ideas. Also, they study the innovations related to the knowledge transfer and record them and change the way of thinking, policy-making and reaction about knowledge transfer and entrepreneurship in university, industry and government. Development of human skills through empowering plans so that graduated students could act innovatively in a communicative environment between industry and university is

among the main goals of theses universities (Torabi and Goodarzi 2009). The concept of innovation has attracted many researchers. According to Di Jong's opinion, this concept was first introduced by Shompeter in 1934 which was presented as the process of making new brands, products, services and processes and its effects on the economic growth. Thereafter, various scientists have provided different interpretations of this concept for a long-term duration of organizations, and innovation has been regarded as a critical factor in organizations (Khan, Rehman, and Fatima 2009). Bariqe et al. believe that innovation as the production of new knowledge and interior business ideas is the structure and willingness of market toward products and services (Mirkamali and Choopani 2011).

Organizational innovation is regarded as the development or acceptance of an idea or behavior in organizational operations which is new for the whole organization. The fulfillment of new technology or new management actions is achieved based on the new products or new processes. New products include tangible products and intangible services, and new processes include direct processes and supportive operations in the organization. New technology or new management actions may have existed before or have developed recently (Wong and Chin 2006). Nowadays, innovation in the organizations is classified in three different ways: (1) administrative and technical innovation, (2) product and process innovation and (3) radical and incremental innovation. In the present research, we have chosen administrative and technical innovation as our research variable and will elaborate on them in the following.

Innovation is first divided into administrative innovation and technical innovation. Administrative innovation is a top-down approach in which high-level managers are responsible for doing the related activities, while technical innovation is a bottom-up approach in which low-level staffs are involved in the activities (Kim, Kumar, and Kumar 2012).

In this section, a review of some research studies is presented. For example, Bahrami and Rajaeepoor (2011), in an analysis of the multidimensional relationship between intellectual capital and organizational innovation in the higher education, showed that there was a meaningful relationship between human capital, structural capital, relational capital and administrative innovation. The relationship between human capital, structural capital, relational capital and technical innovation was also meaningful. Qaltash and Salehi (2011) found that there was a meaningful relationship between organizational culture and organizational learning with knowledge management. Also, there was a meaningful relationship between organizational learning and knowledge management. Chen and Chen (2012) investigated 'the hierarchical feedback system net for Tai universities based on the combination of TQM and innovation' and their findings showed that based on the combination of TQM and innovation, the hierarchical feedback system net could improve the assessment of operational performance in Tai Universities. As a result, these universities can achieve competitive advantages and increase their chance of being alive in the future. Liao and Wu (2010), in an investigation of the relationship between knowledge management and organizational learning with organizational innovation using structural equations modeling, showed that organizational learning plays the role of mediator between knowledge management and organizational innovation and therefore, knowledge management as an input is important and organizational learning has the role of a key process and finally, organizational innovation is an important output in these organizations. Jerez-Gómez, Céspedes-Lorente, and Valle-Cabrera (2005), with regard to the previous studies, have identified the contributing factors of organizational learning and divided them

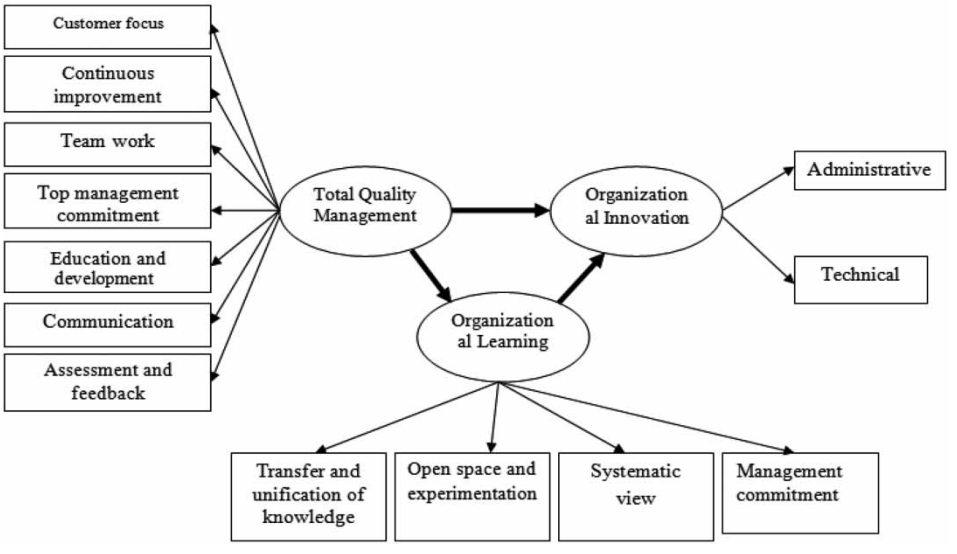

Figure 1. Research conceptual model. $Chi^2 = 136.44$, df = 57, *p*-value = .00000, and RMSEA = 0. 074.

into four factors (management commitment, systematic view, open space and experimentation, and transfer and unification of knowledge) and accordingly have suggested a model for measuring organizational learning. The empirical results of their research in 111 organizations confirm their suggested model.

Barrow (1993) showed that TQM is in deep relationship with organizational learning and eventually regarded organizational learning as the final product of TQM. The organizations with TQM are more inclined to learn than other organizations.

While some research studies have shown that TQM and efficiency of innovation have a negative relationship (Tidd, Bessant, and Pavitt 1997), others have stated that TQM is one of the fundamental principles of innovation. Previous empirical studies have indicated that TQM positively affects innovation.

Rothaermel and Deeds (2004) showed that organizational learning resulting from external relationships between coworkers and partners is influential on the improvement of new products and innovation. Organizational learning moves the organization toward mutual communication that is formed based on trust, and establishes the culture of knowledge sharing. Therefore, organizational learning plays the role of a mediator between TQM and improvement of innovation.

According to the presented definitions and previous studies, researchers have suggested the following conceptual model in order to investigate the effect of TQM on the relationship between organizational learning and organizational innovation (Figure 1).

Research hypotheses

H1: TQM has a direct, positive and significant effect on the organizational learning.

H2: TQM has a direct, positive and significant effect on the organizational innovation.

H3: Organizational learning has a direct, positive and significant effect on the organizational innovation.

H4: Organizational learning has the role of mediator between TQM and organizational innovation.

Research methodology

Since the aim of this research is the causal relationships between variables of TQM, organizational learning and organizational innovations, the research is practical and descriptive and specifically based on the structural equation modeling. In analytical research model, TQM is the exogenous latent variable and organizational learning and organizational innovation are endogenous latent variables. In other words, TQM is regarded as the independent variable, organizational learning as the mediator variable and innovation as the dependent variable. A questionnaire was used for data gathering in this research, 34 questions for assessing TQM, 16 questions for organizational learning and 30 questions for organizational innovation were considered in a 5-points Likert scale. The criteria for assessing TQM are given from Mittal, Vineet, and Amit study (2011) which include seven factors such as customer focus, continuous improvement, teamwork, getting involved in activities, top management commitment and identification, learning and development, communication, assessment and feedback. To measure the organizational learning, the questionnaire of Jerez-Gómez, Céspedes-Lorente, and Valle-Cabrera (2005) has been used which include four dimensions of management commitment, systematic view, open space and experimentation, and transfer and unification of knowledge. Also, Hongming, Changyong, and Chunhui model (2007) has been used to assess organizational innovation. Based on this model, organizational innovation is divided into two dimensions: administrative and technical. To determine the reliability of the used instruments, Cronbach alpha was applied which was 0.97, 0.89 and 0.90 for TQM, organizational learning and organizational innovation, respectively. These values indicate that the questionnaires possess the necessary reliability.

To assess the validity of the questions, content validity and construct validity were considered. Content validity was determined by the experts and construct validity was done through the confirmatory factor analysis. The population included all the faculty members and staffs of public, Azad, and PNUs of Sabzevar city who were at work in the educational year of 2012–2013. They were 800 in number. The sample for the study based on the Morgan table was decided to be 260 persons and the questionnaire was distributed among 300 persons in stratified random sampling. Two hundred and seventy-five questionnaires were returned. Among them, 253 questionnaires were chosen and statistically analyzed. Different statistical methods were used for testing the conceptual model such as Kolmogorov–Smirnov test for testing normality, Pearson correlation for testing the relations between variables and structural equation modeling for testing the fitness of model.

Research findings

According to Kolmogorov–Smirnov test, all the variables had normal distributions. The results of one sample *T*-test showed that TQM had suitable conditions, but

Table 1. The results of one sample *T*-test of variables.

Variable	Mean	Std. deviation	*P*	Lower	Upper	State of the variable
TQM	3.2383	0.7635	<.001	0.1471	5.146	Suitable
Organizational learning	2.4601	0.57666	<.001	−0.6113	−0.4685	Unsuitable
Organizational innovation	2.6338	0.49480	<.001	−0.4274	−0.3049	Unsuitable

organizational learning and organizational innovation had unsuitable conditions in Sabzevar's Universities (Table 1).

Before starting the testing of the hypotheses and conceptual models, it is necessary to ensure the accuracy of the measurement models for independent variable (TQM), mediator variable (organizational learning) and dependent variable (organizational innovation). So, the measuring models for these three variables are presented in the following which were done through confirmatory factor analysis. Factor analysis is one of the old statistical methods which is used for investigating the relationship between latent variables (factors) and observed variables (questions) and is indicative of the measuring model (Byrne 1994).

The measuring model for TQM, organizational learning and organizational innovation

The results of the factor analysis for TQM showed that the measuring model has goodness of fit. It means that all factor loadings of questions are acceptable (more than 0.5) and significant (*t*-values are more than 1.96 for all questions), and among the dimensions of the TQM, learning and development was the most important one. Also, goodness-of-fit indices (GFIs) of the model indicated that the amount of root mean squared error of approximation (RMSEA) was 0.075 and the amount of X^2 to the degree of freedom was 2.40 which was indicative of the goodness of the measuring model.

The results of the factor analysis for organizational learning showed that the questions 15 and 16 had the factor loadings of less than 0.5, so they were deleted. These items are 'In this university, teamwork is not the usual way to work' and 'The university has instruments (manuals, databases, files, organizational routines, etc.) that allow what has been learnt in past situations to remain valid, although the employees are no longer the same.' Then, the results of the factor analysis showed that all the factor loadings and significant numbers related to the model's parameters were in a good state, and GFIs of the model showed that the value of RMSEA was 0.077 and the value of X^2 to the degree of freedom was 2.51, which were indicative of the suitability of the measuring model for the related variable.

The results of the factor analysis for organizational innovation showed that questions 1, 4, 6, 11, 17, 20, 22 and 30 had the factor loading of less than 0.5, so they were deleted. These items are 'all faculty members cooperate sincerely in applying new teaching methods,' 'reforming faculty members selection way leads to attract specialist and effective members,' 'allocating grants to research projects can increase the motivation of faculty members,' 'open communication atmosphere has been

established among faculty members, ' university graduates are needed in the labor market,' 'the university has registered patents,' 'the university is so active in launching new different study courses' and 'faculty members welcome new teaching methods for improving teaching–learning process.' Then, all the factor loadings and significant numbers related to the model's parameters were in a good state, and GFIs of the model showed that the value of RMSEA was 0.08 and the value of X^2 to the degree of freedom was 2.73, which were indicative of the goodness of the measuring model for the related variable.

The research variables' correlations

After the first- and second-order factor analysis and ensuring the conformity of the indices with dimensions and the dimensions with the variables, the correlation between variables is determined. This is done to determine the type and degree of the relationship between the two quantitative variables. In the present study, Pearson correlation coefficient was used. The results of the statistical hypotheses are presented in Table 2.

According to Table 2, the first and third hypotheses are confirmed, but the second research hypothesis is rejected and the null hypothesis is confirmed.

Since this type of correlation just shows the existence or non-existence of a correlation between two variables and it is not possible to include the mediator variable in this relationship, doing path analysis seems necessary.

Structural equations modeling

From the investigation of the measuring models and assessing their validity through confirmative factor analysis, it is possible to examine the relationship between research variables based on the structural model. Therefore, the causal relationships based on the structural equations modeling are used in order to investigate the accuracy of the research main hypotheses. As can be seen in Figures 2 and 3, the model is in good condition in terms of GFIs. About the relationships between the model's components, the followings are the results:

Table 2. Pearson correlation coefficients.

No. of hypothesis	Research hypothesis	Pearson correlation coefficient	Probability (*P*)
1	There is a positive and meaningful correlation between TQM and organizational learning	**0.165	.008
2	There is no positive and meaningful correlation between TQM and organizational innovation	0.052	.410
3	There is a positive and meaningful correlation between organizational learning and organizational innovation	**0.584	.000

**Correlation is significant at the .01 level (two-tailed).

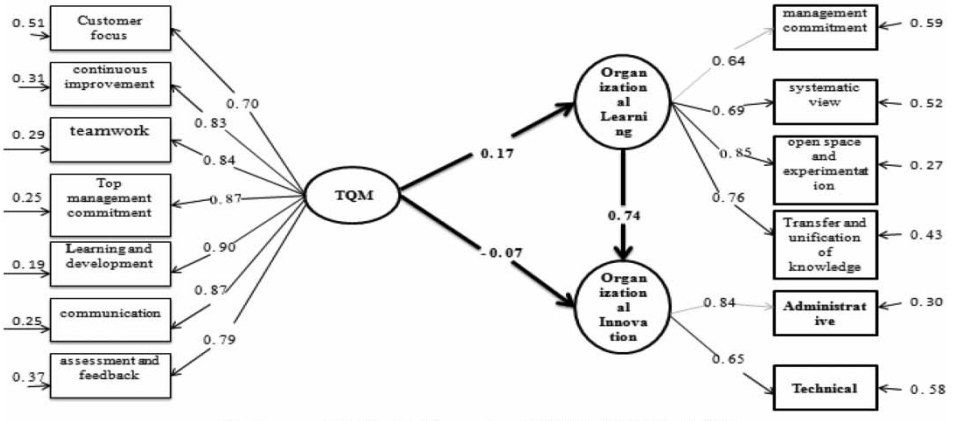

Figure 2. Model in the standard state. $Chi^2 = 136.44$, df = 57, *p*-value = .00000, and RMSEA = 0. 074.

TQM has a positive, direct and meaningful effect equal to 0.17 on the organizational learning (first hypothesis). Organizational learning also has a positive, direct and meaningful effect equal to 0.74 on the organizational innovation (third hypothesis); therefore, the fourth hypothesis – the mediating role of the organizational learning between TQM and organizational innovation – is confirmed. The relationship between TQM and organizational innovation is equal to –0.07 and its meaningfulness is –1.07 which is less than the allowed value (1.96) which shows that TQM has no positive and meaningful effect on the organizational innovation, so the second hypothesis is rejected.

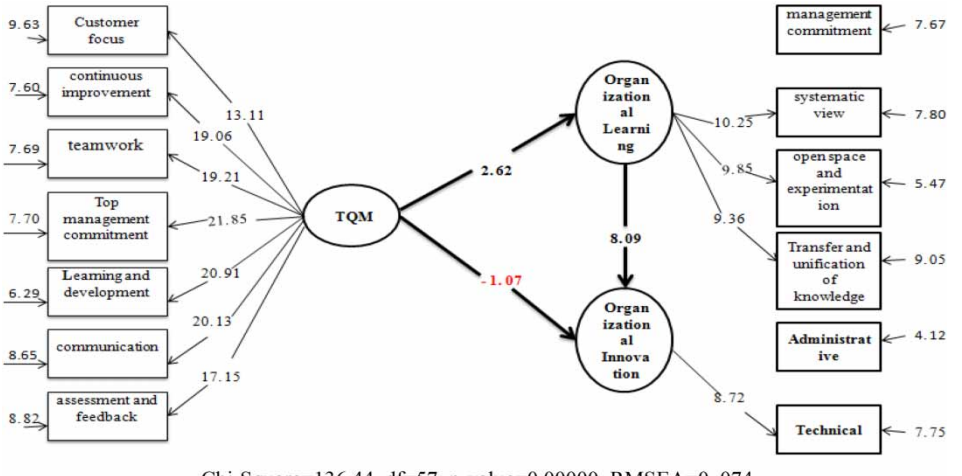

Figure 3. Model in the meaningful state.

Table 3. Model's GFIs.

Name of the index	Calculated amount	Allowed amount
Chi^2/degree of freedom	2.39	3
RMSEA	0.07	0.08
CFI (Comparative Fit Index)	0.97	0.90
GFI	0.91	0.90
AGFI (Adjusted Goodness of Fit Index)	0.85	0.80
NFI (Normed Fit Index)	0.95	0.90

In Table 3, the GFIs of the model along with acceptable amount of each index are presented. The achieved values for GFIs indicate that the research model has proper goodness of fit.

Discussion and conclusion

TQM means to apply the mental and physical abilities of the staffs at different levels of an organization. In TQM, the responsibility of the teaching, learning and quality is on all the employers of the educational organization and not just on one special unit. So, it involves all the people and makes use of different abilities of the staffs at different levels. The role of organizational learning as a mediator variable in the relationship between TQM and organizational innovation is less investigated by the researchers.

The results of this research were analyzed through path analysis. The existence of the empirical proofs about the relationship between organizational learning and organizational innovation suggests that learning can be defined as a mediator mechanism in the relationship between TQM and organizational innovation. The findings showed that TQM positively and meaningfully affects the organizational learning. This is in line with the findings of Barrow (1993). Also, it conforms to the studies of Conner and Prahalad's (1996). They have indicated that the main function of the TQM is to establish a culture which is based on trust and knowledge sharing. TQM helps in improving the organizational processes, strengthens the quality and produces knowledge. Also, it leads to the transfer and unification of knowledge which motivates learning. When the concept of the TQM starts in the organization, the most important point to be considered is that the staffs' cooperation should be increased so that they are encouraged to improve the quality of the activities.

Furthermore, organizational management teams should form the direction and goals and effects of learning and finally improve and reinforce the culture. These results conform to the results of Watkins and Marsick's (1993) and Lien, Hung, and McLean (2007). Their organizational learning's theoretical framework supposed that strategic leadership of learning is a vital factor in the structure of organizational learning.

The research findings showed that TQM has no positive and meaningful effect on the organizational innovation of the Sabzevar's Universities and cannot increase innovation. This is in line with the results found by Tidd, Bessant, and Pavitt (1997) and Costa and Lorente (2008). However, TQM is not a simple managerial tool to improve and reinforce the quality; it can also reinforce the culture of knowledge

sharing and innovation while the top management, staffs' involvement, continuous improvement and customer-orientation support them.

The results of this research in Table 1 show that TQM, compared with other variables, has a suitable situation in these universities. The structures of these universities are so bureaucratic and it seems that despite the results of suitable TQM, the specific rules and guidelines do not allow staffs to be more innovative. The managers expect staffs to perform according to these rules and regulations, and it reduces the creativity. Also, the organizational learning and organizational innovation have a mean lower than the average, and it means that these variables have unsuitable situation in these universities. These findings say that the management system of Sabzevar Universities does not encourage organizational learning and organizational innovation at an acceptable level. One of the main features of management system of these universities that lead to lower organizational learning and organizational innovation is centralized management. The central organization makes decision and notifies decisions to the subsidiary universities and they do not have any freedom and autonomy in their performance. These specified decisions and rules reduce innovation in universities. Also, the trend of changes in these universities is slow and because of that, the managers do not feel the necessity of continuous learning, so the culture of organizational learning does not institutionalize the culture of organizational learning.

Research findings show that organizational learning has a significant effect on the organizational innovation. This study emphasizes that organizational learning can reinforce and increase the organizational innovation. Philosophers also have mentioned that in organizational learning theory, the concept of organizational learning is the process of achieving and improving new knowledge and capacities and this process can improve the organizational activities (Garvin 1993; Lien et al. 2006). The improvement in knowledge also helps efficiency, effectiveness and capability of innovation. Suitable sharing and use of knowledge and its proper transfer provide an opportunity for organization members to learn and participate and also motivate the staffs to produce new knowledge and apply that new knowledge for innovation and transfer the resulting knowledge to other staffs.

The results also showed that learning can play the role of a mediator between TQM and innovation. Therefore, if the organizations seek the maximum use of their TQM, they should pay special attention to organizational learning. In addition, the experience of TQM showed that training the staffs has been one of the influential principles in the success of the TQM. It says that the universities should teach the staffs to implement TQM in order to reach the main capabilities of TQM and organizational learning activities.

According to the research findings, it is suggested that policy-makers, managers of science, research and technology ministry and also the universities' managers do the following interventions about the relationship between TQM, organizational learning and organizational innovation.

It is suggested that through holding some instructional meetings, the managers of Sabzevar's universities first amend and reinforce the understanding of their staffs about their support for the increase in the quality and learning in the university and then, by presenting the consequences of the quality improvement and efficiency to the members, they can encourage them in knowledge sharing and to value creativity and innovation in solving the organization's problems more.

Since the mean of the organizational learning and organizational innovation in Sabzevar's universities is less than the average value, it is suggested that through

instructional courses, the higher education managers get familiar with the theoretical bases of the organizational learning, models for assessing and measuring it, and TQM and its strategies.

Since the results showed that there is a meaningful relationship between organizational learning and organizational innovation in the universities of city of Sabzevar, it is suggested that higher education managers play an influential role in the fulfillment of the organizational innovation through providing the conditions of professional cooperation between faculty members, designing instructional courses based on the learning of the up-to-date topics, having proper cooperation between university and other governmental and non-governmental organizations, providing new instructional facilities, changing the organizational structure of the university, amending the professors' selection methods and accepting the suggestions and criticisms in the universities.

Also, it was found that the organizational learning can play the role of a mediator between TQM and organizational innovation. So, it is suggested that through holding the instructional courses, higher education managers pave the way for the promotion of the organizational learning.

In addition, it is suggested that instructional plans be as creative as possible and help the continuous improvement in training. These plans should be prepared with cooperation of the organization's different levels and be indicative of the goals and programs of different sections of the organization.

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