

Effect of Transformational Leadership and Knowledge Management Processes on Organizational Innovation in Ardabil University of Medical Sciences

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Abstract

Uncertainty, complexity, globalization and increasing technological change are among the most important features of the current era. Success in such circumstances requires changes in activities, organizational tasks, the management especially the leadership of organizations, knowledge management and innovation. The aim of this study was to investigate the effect of transformational leadership and knowledge management on organizational innovation in Ardabil University of Medical Sciences. Standard questionnaire was used in order to collect data for all variables of the research. Statistic population of this research consisted of all managers, employees, and faculty members of Ardebil University of Medical Sciences of whom 277 subjects were selected based on Cochran formula and convenience sampling method. For data analysis, structural equation modeling and LISREL software were used. The²obtained results showed that transformational leadership has a positive effect on knowledge management and organizational innovation. Moreover, the impact of knowledge management on organizational innovation was shown to be

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positive. Finally, the mediating role of knowledge management was confirmed in the relationship between transformational leadership and organizational innovation.

Keywords: Transformational Leadership, Knowledge Management, Organizational Innovation, Ardabil University of Medical Sciences

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Introduction

Innovation nowadays has attracted the attention of scientists and researchers from different fields, because innovation is considered as a critical factor in organizations in order to create value and sustainable competitive advantage in today's changing and complex environment (Parhizkar et al, 2013). In recent years, knowledge has been regarded as an important organizational resource and the basis of sustainable development, especially in highly competitive environments or environments with radical discrete and extensive changes. There are many organizations which have been drowned in a massive amount of information; however, these organizations are facing with many problems regarding the conversion of this information into knowledge. Thus, in today's economy, physical and financial capital has been replaced by knowledge, as the most important capital (Woods and Cortada, 2013). Knowledge management, through the development of an organization's knowledge assets, is associated with the attitude of going beyond the goals of the organization and involves the activities that are related to identification, sharing, and creation of knowledge. This requires systems such as the maintenance of knowledge resources, training and facilitation of knowledge, and organizational learning (Sa'edi and Yazdani, 2009). The accomplishment of ideals requires strong leaders in all organizations; Leaders who can best guide their employees in line with organizational goals (Muethel and Hoegl, 2013). Successful organizations need leaders who, through deliberation, can determine the organization's future appropriate direction, guide the people to the right direction and motivate employees to create changes in the organization. Transformational leaders, through creating new ideas and prospects, provide the organization with a new path of growth and prosperity; they also promise the improvement of organizational performance and competitive advantage and lead to more innovation in the organization (Mazloumi et al, 2013). Transformational leaders refer to those leaders who have a deep and wonderful influence on their followers. They are those who, through determining the roles, requirements, and assigned tasks, guide their followers towards some specific goals. Transformational leadership focuses on inspiration that will lead to high performance (French and Bell, 2003).

According to Hackett (2000), healthcare network, in its general form, refers to a set of entities that are engaged in the processes of prevention and treatment and are responsible for management services including planning, organizing, leadership, monitoring, organizational communication, decision-making, creativity and innovation, and community involvement. The weakness of management system and managers' unfamiliarity with leadership styles throughout the nation, have led to increased costs,

reduction of efficiency and effectiveness, loss of financial resources, lack of motivation in employees, loss of job satisfaction, and irresponsibility in doing one's tasks (Nsiripour et al, 2007); University of Medical Sciences is also no exception. On the other hand, healthcare services in every society predispose physical and mental health of individuals and are a prerequisite for sustainable development. The healthcare sector, as an organization that is in need of skillful and knowledgeable personnel, is known as professional services organization (Yadollahi and Fazaeli, 2005). This sector, because of being related to the health of society, requires the use of efficient and innovative ways in providing services in order to improve the quality, reduce healthcare costs, and meet the clients' needs. These are possible only through the use of modern methods of information management and allocation of right time to knowledge management (Yadollahi and Fazaeli, 2005).

In the current era, in order to achieve innovation, the use of knowledge management and transformational leadership style is inevitable. Therefore, conducting such researches, especially in the area of healthcare, seems essential. According to what was said, this study examines the effect of transformational leadership and knowledge management processes on organizational innovation among the employees of Ardabil University of Medical Sciences. Additionally, there will be an attempt to answer this question that what impacts transformational leadership style and the use of knowledge management processes have on organizational innovation in Ardabil University of Medical Sciences.

Litrature Review

Organizational Innovation

Innovation has been defined as a prelude to ideas, processes, and new and useful products. Innovation is an important organizational feature that brings a sustainable competitive advantage to the dynamic environments of markets (Lee et al, 2015). Innovation is conceptualized as the creation and use of new ideas in the role of an individual within a team (Lee et al, 2015). Innovation is the application of innovative ideas or behaviors. Organizational innovation refers to the creation of products and services which are usable and valuable to the organization. Organizational innovation is the willingness of an organization to develop new and advanced products and services and supply them to the market to gain success (Gumusluoglu and Ilsev, 2009). Innovation is the creation of new knowledge and business ideas to facilitate new products and aims at improving internal business processes and structures and creating a market for the products and services. Innovation is the adoption and implementation of new ideas, processes, products, and services (James et al, 2012). Innovative behavior of employees is very important in organizational effectiveness and survival that finally leads to organizational development. Innovative behaviors will result in the creation of new ideas, efficient multitasking processes and work-related motives (Song Boong et al, 2016). In this research, according to the existing models and the points common among researchers, organizational innovation has been investigated in three dimensions of process innovation, product innovation, and administrative innovation that according to the study of Choupani et al are as follows:

1. **Process innovation:** process innovation provides a tool for the maintenance and improvement of quality and cost savings and involves the adoption of new or improved methods of distribution or service delivery. In fact, process innovation means that to what extent an organization employs new technologies and puts to the test new ways of doing works. Key indicators for the measurement of this dimension include: changes in the production and service process, searching for new ways and means of doing things, being a pioneer in providing new ways and means of production (Choupani et al, 2012).
2. **Production innovation:** production process provides the means of production that refers to the development and introduction of new and improved services. To put it another way, it can be said that production innovation means that to what extent the organization is pioneered in providing new services, allocating resources to research and development, and so on. Key indicators for the measurement of this dimension include: being pioneered in the provision of new services and products, efforts to develop new services and products in the form of training individuals and teams within the organization, and the development of products and services for the new groups of customers (Choupani et al, 2012).
3. **Administrative innovation:** it refers to the procedures, policies, and new organizational forms. It includes changes that influence policies, resource allocation and other factors related to the organization's social structure. By administrative innovation it means that to what extent the managers of the organization use modern management systems in the managing process. Key indicators for the measurement of this dimension are as follows: the search for new administrative systems (e.g. the systems of recruiting, hiring, etc.), being pioneered in the provision of new administrative systems, the use of new administrative systems, and the creation of new structures and inter-organizational relationships. Many researches have been conducted on the variables of the prediction of organizational innovation. After studying the research and scientific works in the field of organizational innovation and the models mentioned in this regard, the relationship between organizational innovation and several variables was identified. Among these variables mention may be made of knowledge management, social capital, organizational culture, transformational leadership, management style and so forth (Choupani et al, 2012).

Knowledge Management

Knowledge management was introduced to decades ago to help companies create and use knowledge effectively. According to Yang (2001), knowledge management can be considered as the process of identification/creation, attraction, and use of organizational knowledge in order to exploit new opportunities and enhance organizational performance. Knowledge management includes management efforts to increase the company's performance as well as the creation, storage and development of knowledge by individuals and groups. Among the objectives of knowledge management mention may be made of innovation and knowledge retention, maximum efficiency and minimizing costs. Bukowitz and Williams model has classified the process of knowledge management in two groups of strategic and tactical. Tactical model includes the

acquisition of necessary knowledge for the activities, using knowledge to create value, learning, and the exchange and share of knowledge among individuals. Strategic model include the value earned from the tactical model in which the organization's strategy together with organizational goals is applied (Ghanbari and Obeidi-zadeh, 2016). Knowledge based era, where knowledge is the most important asset of organizations, requires a different management approach to the problems of organization and employees. Hence, successful organizations persistently measure and evaluate the production, dissemination, exchange and application of knowledge among their employees by different methods so that they can obtain the strategies required for achieving organizational objectives. Knowledge management, as one of the new concepts of management science, is considered a vital source for the success of today's organizations. Thus, organizational knowledge should be considered as a strategic asset in any organization. On the other hand, innovation is a common process even in established sectors which provides the organizations with substantial opportunities in obtaining new markets and eliminating stagnation and recession, and is a threat to existing businesses (Casticas, 2011). According to Hemmati et al (2010) five dimensions of knowledge management are as follows:

1. Knowledge acquisition: knowledge acquisition in this model refers to the function of a processor to gain knowledge from external sources and make it proportional for the use of other subsets.
2. Knowledge registration: in this process, a massive set of knowledge should be saved and organized after being entered into the database. The site of this process may be physical or non-physical. The ultimate goal of this stage is to help the organization's members to have access to the necessary knowledge in the process of decision-making (Ahmadi-e-baladehi and Arabi, 2014).
3. Knowledge creation/production: knowledge creation is to create knowledge from the existing knowledge. Knowledge can be created through discovery (creativity or insight) or extraction (procedures, logic).
4. Knowledge transfer: knowledge transfer means to enter knowledge into the outputs of the organization to be entered into the environment. These outputs are not merely goods and services but include knowledge itself.
5. Knowledge application: knowledge application is the most important process. Competitive advantage does not belong to the organizations which have the best assets, but belongs to the organizations which use their knowledge in the best way (Ahmadi-e-baladehi and Arabi, 2014).

Transformational leadership

Recent developments in leadership theories have undergone a shift from charismatic leadership theories, which assumed the leader an unusual creature and believed that followers are dependent on leadership, to neo-charismatic theories and transformational leadership that pay attention to development and empowerment of followers to have independent performance. Transformational leadership paradigm rooted in the sixteenth

century when Machiavelli conducted some research on the king. Machiavelli studied the features and behaviors of leaders to develop the leadership theory within the feudal structure of England. According to him, leader is one who, to achieve lofty goals of leadership, leads and protects others. In the early nineteenth century, Weber offered a definition of leadership which was similar to that of Machiavelli. He described leadership as a source of influence on others. Personality traits emphasized and supported by Weber are called charisma. According to the root definition of charisma, it is a divine talent with a great power which includes trust and loyalty. Description of charisma depends on the influence on and motivation of followers and the creation of a vision and insight on them and is considered as one of the key elements of transformational leadership. Other theorists of leadership such as House and Bass have defined charisma as an essential element of transformational leadership (Aghaz, 2015). In 1985, Bass defined transformational leadership as the process of a conscious influence on individuals and groups in order to make a discontinuous change in the current situation and the functions of the organization. The theory of transformational leadership emerged to distinguish between those leaders who establish a strong motivational relationship with their subordinates and followers and those leaders who largely focus on exchange or interaction to obtain the intended results. Transformational leadership helps and encourages followers to raise their level of individual creativity and prosperity for the expansion of the interests of the team, groups, organizations, and society (Birasnav et al, 2013). Transformational leaders urge their followers to disregard their interest in favor of the organization; they can have a profound and wonderful influence over their followers. Transformational leadership considers those who use the characteristic of wisdom and qualitative relationship to enhance aspirations and wishes and lead the forces and organizational systems toward a new pattern or high performance (Niazazari et al, 2010). According to Pawar and Eastman, the effectiveness of a transformational leader is the result of three factors: 1) the relative position of the organization in continuum acceptance (acceptance of change), 2) the degree of adaptation of transformative process necessary for the success of the organization and the transformational leadership which is running in the organization, and 3) transformational leadership capabilities for the implementation of an appropriate transformative process. A transformational leadership instills changes throughout the organization and provides managers and employees with a vision. If a leader is transformational, he or she creates a sense of admiration, respect and loyalty among followers and emphasizes the importance of having a strong commitment to achieve the organization's mission (Mourino and Marlowe, 2011). Transformational leadership can improve the ability of followers in understanding the organizational nature and the problems they may face. Learning takes place in the learning organizations when organizational employees analyze the issues, revise the work procedures, face the new and creative methods and appropriate solutions, and think about what they do. Transformational leaders, using intellectual stimulation and preparing an appropriate environment, encourage their followers to be such (Rafferty and Griffin, 2004). In this research, four dimensions of transformational leadership including effectiveness, inspirational motivation, intellectual/mental motivation, and individual consideration were evaluated which are described in the following:

1. Effectiveness/influence: indisputable pride, charisma, respect and loyalty of followers are because of a leader who transforms an ideal sense. Effectiveness introduces the leaders as models and a pattern of behavior for their followers.

2. Inspirational motivation: the motivation of followers can be done by appealing to their emotions. The emphasis of inspirational motivation is on emotions and inner motivations not the daily interactions between leaders and followers.
3. Intellectual/mental motivation: stimulating followers in order to discover new solutions and re-thinking about solving organizational problems.
4. Individual considerations: considering individual differences of followers and relationship with each of them and stimulating them through delegating responsibilities to them to learn and experience. People are supported by leaders and leaders are concerned with their personal feelings and needs (Niazazari et al, 2010).

Hypotheses Development

With the arrival of the knowledge economy, we need a new model of organizational assets; because in the past most organizational assets were tangible but today, a large part of an organization's assets are intangible and the general maneuver of organizations is around people and their knowledge (Singh and Mishra, 2015). In this regard, transformational leaders in any organization can open the doors to some constructive measures in order to use knowledge management and increase organizational innovation. To achieve organizational progress in the knowledge economy and developing environment, transformational leaders, on the one hand, and knowledgeable workers, on the other, provide the organizations with a wider vision (Fischer and Fröhlich, 2013). Accordingly, the first hypothesis is as follows:

H₁: transformational leadership has impact on knowledge management.

The importance of innovation has led to the search and discovery of the factors which are related to innovation and creativity. Evidence suggests that leader's behavior may play an important role in fostering innovation in individual, group and organizational levels (Timothy et al, 2016). Understanding the manners of management can potentially increase innovative behaviors to pave the way for achieving competitive advantage. Thus, one important question is that how leaders can create employee innovative behavior (Li et al, 2015). Relationship between leadership and innovation has gained a considerable importance in recent literature. Some researchers argue that leadership is one of the most powerful creators of innovation (Li et al, 2015). Transformational leadership is considered as one of the influential factors in promoting organizational innovation (Suk Bong et al, 2016). From a theoretical point of view, transformational leadership, more than other leadership styles, encourages followers and employees to have innovation. Transformational leadership helps the increase of innovation in an organization in three ways: 1) promotion of self-efficacy in employees through internal motivation which affects creativity; intrinsic motivation forces of employees lead to unity in a higher level. 2) Stimulation of intellectual thinking which helps employees think beyond a fix framework. Thinking outside a framework brings about long-term prospect and makes employees and organization have commitment in the realization of prospect. Moreover, during organizational activities, employees enhance their skills and problem-solving capacity. 3) Transformational leadership promotes a unique organizational culture in

which employees feel challenged to create new ideas (Suk Bong et al, 2016). Previous researches have examined the importance of leadership in achieving innovation. In addition to theoretical discussions, there are some strong empirical evidence regarding the role of transformational leadership as an important factor of innovation in all organizational functions and levels. Transformational leaders argue that behaviors such as self-confidence, independence, commitment that inspires prospect, and encouraging followers to challenge assumptions can have a positive impact on innovation. In fact, transformational leadership theory, as its main task, focuses on the creation of innovation in the organization. Some evidence shows a negative relationship between transformational leadership and innovation results (Li et al, 2015). Vargas (2015) examines the impact of transactional and transformational leadership on innovation at the firm level and comes to the conclusion that a flexible leadership style is both innovative and the best organizational facilitator (Timothy et al, 2016). According to what was said, the second hypothesis is as follows:

H₂: transformational leadership has impact on organizational innovation.

Organizations without creativity and innovation cannot survive and will disappear over time. Hence, organizations are constantly looking for ways to strengthen creativity and innovation (both at the individual and organizational levels) and remove their obstacles in the organization (Rafferty and Griffin, 2004). Foundational/fundamental innovation includes regular innovations which are used for the creation of new industries. Researchers have realized that Foundational innovation is essential for the long-term success of organizations (McDermott and Christopher, 2012). Knowledge, both as an input and a power resource, is of strategic importance for individuals and organizations. Knowledge influences how to create prosperity for a person, organization, or even a nation. Long-term success of organizations depends on how knowledge is acquired, stored and shared. Strategies which are designed based on the accumulated knowledge of human resources are the key to competitive advantage. Therefore, successful knowledge management is the main characteristic of an organization's survival. To put it another way, innovations are the extract and result of knowledge management. In the face of a changing environment, innovations equip the organization with flexibility against the change and are the key to survival and success (Liao et al, 2013). Gupala et al analyzed the impact of knowledge and its features or typology on innovation and concluded that knowledge has a positive impact on innovation probabilities. The importance of innovation can hardly be understood. They potentially lead to more rewards, sales, profitability and increased market shares. Moreover, innovation can destroy existing markets and create new ones. The interest of organizations in knowledge management is due to its positive impact on profitability results such as increased production and innovation in goods and services. In fact, the impact of knowledge is through creating new thinking in production and general innovations (Borghini, 2005). In order to drive innovation processes, organizations use a variety of stimulations to promote innovative behaviors among employees (Suk Bong et al, 2016). A clear expression of innovation in both individual and organizational levels of employees depends on knowledge sharing and consideration of oneself as a part of the organization. In this regard, Conlly and Kloy (2003) have argued that sharing the considered knowledge is a key factor in shaping an innovative organization; however, they investigated the factors which promote or discourage knowledge sharing (Suk Bong et al, 2016). Employees' innovative behaviors

are influenced by both transformational leadership and the sharing of knowledge (Suk Bong et al, 2016). Leadership development activities in working environment either encourage or discourage the sharing of knowledge among employees. However, the results of several studies show that transformational leadership has provided a labor protection and a sufficient resource for the effective performance of things (Konk Book and lin, 2016). Hence, the third and fourth hypotheses are as follows:

H₃: Knowledge management has an impact on organizational innovation.

H₄: knowledge management has a mediating role in the relationship between transformational leadership and organizational innovation.

In this research, dimensions of transformational leadership include effectiveness, inspirational motivation, intellectual/mental motivation, and individual consideration; dimensions of knowledge management include knowledge acquisition, knowledge registration, knowledge creation/production, knowledge transfer, and knowledge application;

And dimensions of organizational innovation include product innovation, process innovation and administrative innovation. According to the first to fourth hypotheses, the conceptual model of the research will be as the following Figure 1.

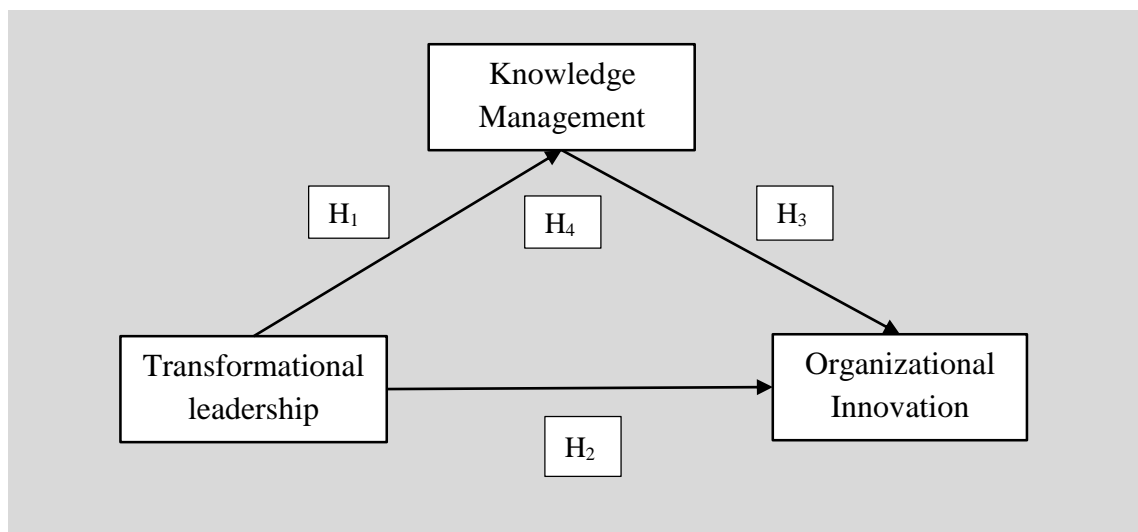


Figure 1. The conceptual model of the research: Hemmati et al. (2010), Nourshahi (2009), Choupani et al (2012)

Research Background

The local and foreign empirical literature of the research is briefly shown in Table 1.

Table 1: Background of the Research

Author	Research title	Findings
Eagle (2003)	Transformational, transactional and Laissez-Fair Leadership Style: A Meta-Analysis Comparing Women and Men	Women more than men use transformational leadership style.
Tucker & Turner (2007)	Apologies and Transformational Leadership	Female readers more than male ones are willing to use transformational methods. This means that most women are interested in working with others holistically not just transactionally. This research also found that when women leaders have used transactional leadership style, they have focused only reward elements of that style. In other words, when men use transactional style, they focus more on the punishment dimensions of this style.
Niazazari et al (2010)	The effect of transformational leadership and Transactional Leadership styles on job conscience/work ethic of high school teachers	Education level and years of service have no effect on transformational leadership and Transactional Leadership styles. Moreover, the effect of education level and years of service on work ethic is not significantly different in men and women. Finally, transformational and transactional leadership styles are not significantly different between men and women.
Javdani (2011)	Investigating the relationship of transformational and transactional leadership with organizational commitment of teachers	There is a significant positive relationship between transformation of managers and organizational commitment of teachers. On the contrary, there is no significant relationship between the managers' amount of interactionism and organizational commitment of teachers. Moreover, transformative interaction and interactionism of managers has no significant effect on organizational commitment of teachers. Additionally, a significant difference was observed between the transformation of the male and female managers (female managers were more transformative). However, no significant difference was observed between the interactionism of the male and female managers. In addition, regression analysis showed that charismatic leadership (one of the dimensions of transformational leadership) has the greatest impact on organizational commitment of teachers.
Sadeghi and Mohtashami (2011)	Relationship strategic human resource practices and organizational	The findings show that there is a positive and significant relationship between strategic human resource practices and organizational innovation. Strategic human resource practices including recruitment, training, participation, performance appraisal and reward have a positive impact

Author	Research title	Findings
	innovation in a military center	on organizational innovation; it also influences attitudes and behaviors of employees and the creation of organizational innovation.
Dehghan et al (2012)	Determinants of innovation and organizational entrepreneurship at Iran Universities of Medical Sciences.	This research showed that three categories of structural, behavioral and contextual factors have effect on innovation and organizational entrepreneurship at Universities of Medical Sciences. According to the results of this research, it is recommended that the change of management attitude to administrative system, structural reform based on new strategies, decentralization, and the reform of systems and working methods be put into consideration by universities of medical sciences in order to improve innovation and organizational entrepreneurship.
Birasnav et al (2013)	The role of transformational leadership and knowledge management processes on predicting product and process innovation: An empirical study developed in Kingdom of Bahrain	The results of multiple regression showed that transformational leadership has a direct impact on product and process innovation; and the daily involvement of employees in knowledge management has a positive impact on organizational innovation.
Li et al (2014)	Differentiated transformational leadership and knowledge sharing: A cross-level investigation	Innovation, justice, and proper distribution in organizations will lead to the right and reasonable sharing of knowledge among employees.
Oliver et al (2015)	Asymmetric modeling of organizational innovation	Organizational innovation can have effect on technological innovation including innovation in product and process.
Voyce Li et al (2015)	The Divergent Effects of Transformational Leadership on Individual and Team Innovation	The findings show a contrasting effect for group-level transformational Leadership, which motivates team member innovation but has a negative influence on individual innovative output.
Ghanbari & Abedzadeh (2016)	Relationship Between Transactional Leadership and Knowledge Management	Findings demonstrate a positive relationship between transactional leadership and knowledge Management.

Author	Research title	Findings
Suk Bong et al (2016)	How transformational leadership facilitates innovative behavior of Korean workers: examining mediating and moderating processes	The study reveals that TL has a positive effect on knowledge sharing and thus promotes innovative behavior.
Timothy et al (2016)	The impact of leadership on small business innovativeness	Leadership style, negotiation style and organizational efficacy affect new product innovation. Specifically, we find evidence to support the idea that small business leaders who are inspirational, who negotiate competitively, and who lead efficacious organizations establish environments that are more likely to yield new product innovations.

Research Methodology

The present study, in terms of objective is an applied research and in terms of data collection and data analysis method is a descriptive-survey and correlational one; because it describes the situation of variables and the relationship among them and, using statistical analysis techniques, tests and explains the simultaneous relationship among the variables.

The population of this research consists of managers, employees, and faculty members of Ardebil University of Medical Sciences. Ardebil University of Medical Sciences includes five schools of Nursing and Midwifery, Medicine, Paramedical, Pharmacy and Dentistry and contains 810 managers and employees and 193 faculty members (total number of 1003). Sample size was determined using Cochran's formula for a limited population that is as follows:

$$n = \frac{\frac{t^2 pq}{d^2}}{1 + \frac{1}{N} \left(\frac{t^2 pq}{d^2} - 1 \right)} = 277$$

Where P is equal to 0.5 that shows the relative existence of the intended trait; q is equal to 0.5 and shows the lack of intended trait relatively; d is the error percentage that is equal to 5% in this research. The value of t for the confidence level of 95% is 1.96. N is the number of managers, employees and faculty members of the University of Medical Sciences which is equal to 1003; n is the sample size that according to the formula was estimated 277 subjects. Finally, according to the population of the research, convenience sampling method was used to select the sample members.

For data collection, two methods were used; that is, for the compilation of the research literature and for the collection of statistical data, library and field methods were used

respectively. Standardized questionnaire is the tool used for data collection. The resources used to set the questionnaire for each of the research variables are shown in Table 2.

Table 2. Resources for setting the questions of the questionnaire

Variable	Number of questions	Resource
Organizational innovation	9	Choupani et al (2012)
Knowledge management	15	Taghizadeh et al (2010)
Transformational leadership	12	Nourshahi (2009)

In data analysis process, the methods of Kolmogorov–Smirnov test, confirmatory factor analysis, path analysis and structural equation model were used. Normal distribution of data related to each of the research variables was evaluated using Kolmogorov–Smirnov test. The measurability of the research variables by the questions of the questionnaire was examined using confirmatory factor analysis. In the current research, before testing the original model and the research hypotheses, using confirmatory factor analysis, the measurability of the variable of shareholders' relationship management was tested by the questions of the questionnaire. Structural equation modeling includes the testability of the research conceptual model in the form of relationships between the variables. This method allows the researchers to analyze their data with respect to measurement error. Using structural equation modeling has important advantages the most important of which include the estimation of multiple relationships, the measurability of latent variables, the calculation of measurement error, evaluability of linearity effect, and testing the forged and false relationships of the research model structures (Davari and Rezazadeh, 2013). In this research, structural equation modeling was used to test the main hypothesis. Finally, path analysis in another advanced statistical method by help of which not only direct but also indirect effects of each independent variable on the dependent variable can be detected. Therefore, the most important advantage of path analysis is that in addition to direct effects, the indirect effects of each of the independent variables on the dependent variable are identifiable. In the present study, path analysis method was used to test the research sub-model. The analysis of the research data and implementation of the mentioned statistical methods was performed using SPSS and Lisrel software.

Results

Demographic characteristics of the sample members

The results obtained from the evaluation of demographic characteristics are shown in Table 3.

Table 3. Demographic characteristics of the sample members

Demographic characteristics	Classes	%
Sex	Male	55.27
	Female	41.45
Marital status	Married	83.2
	Single	12
Age	Under 30	15.64
	31-40	46.91
	41-50	21.09
	Over 50	12.36
Education	Diploma or lower	2.91
	associate degree	5.82
	Bachelor's degree	62.18
	Master's degree or higher	25.09

As the above table shows, 41.45% of respondents are female and 55.27% are male respondents. 83.2% of respondents are married and 12% are single. The age of 15.64% of respondents is under 30, 46.91% are between 31 and 40, 21.09% are between 41 and 50, and 12.36% are aged over 50. In terms of education level, 2.91% are diploma or lower, 5.82% have an associate degree, 62.18% have a bachelor's degree, and 25.09% have a master's degree or higher.

In continue, in order to test the research hypotheses, using Kolmogorov–Smirnov test, the normal distribution of the data is tested. Then, the questionnaire's validity and reliability will be checked. Finally, using structural equation modeling, the research conceptual model is evaluated.

Testing the normal distribution of data

In order to verify the claims made about the distribution of quantitative univariate data, Kolmogorov-Smirnov test (KS) is used. In this test, the null hypothesis includes the claims made about the type of data distribution that is normal data distribution (Momeni and Fa'al-ghayumi, 2012). The results of Kolmogorov-Smirnov test are shown in Table 4.

Table 4: results of Kolmogorov-Smirnov test

Variable	Significance level	Degree of freedom	Statistic
Transformational leadership	0.75	360	0.115
Knowledge management	0.77	360	0.106
Organizational innovation	0.95	360	0.83

According to the Table 4, significance level for transformational leadership, knowledge management, and organizational innovation is 0.75, 0.77, and 0.95 respectively. As the significance level of all three questionnaires is higher than 0.5, the

null hypothesis (H0) stating the non-normality of the data in all three questionnaires is rejected and H1 including the normality of the data in KS is confirmed. Accordingly, in inferential analysis, parametric tests should be used to test the hypotheses.

Validity and reliability of the questionnaire

In the present research, to investigate the validity of the questionnaire, two methods of content validity and construct validity were used. In order to ensure the validity of the questionnaire, the opinions and viewpoints of experts and university professors of the University of Medical Sciences were used. Using the comments of these people, the questionnaire was edited during several stages and, hence, it was determined that the questionnaire can measure the features intended by the research. Construct validity also was calculated in LISREL software and using first order confirmatory factor analysis whose results for the variables of transformational leadership, knowledge management, and organizational innovation are referred to in continue. Figures 2 and 3 respectively show standardized coefficient of the first order confirmatory factor analysis for transformational leadership and significance coefficient of the first order confirmatory factor analysis for transformational leadership.

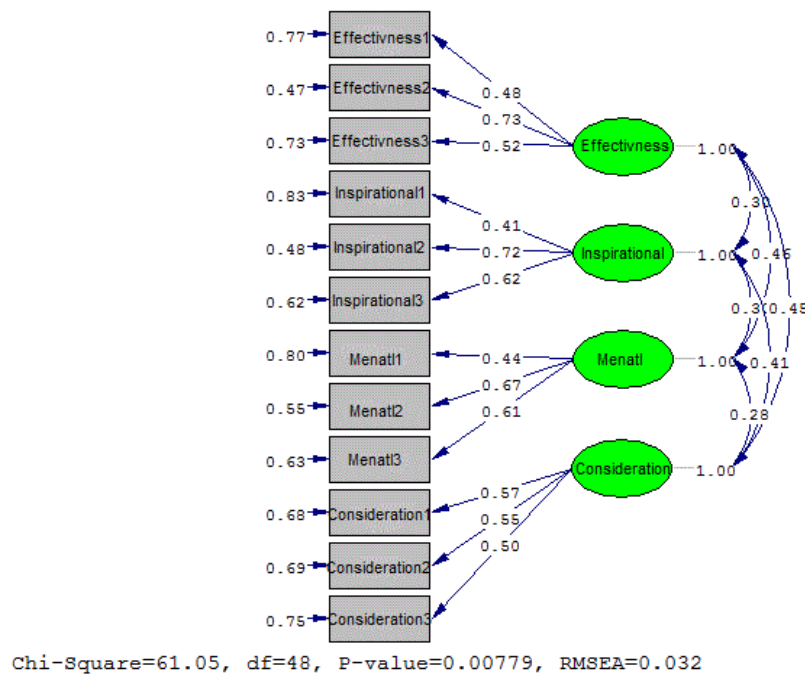


Figure 2. Standardized coefficient of the first order confirmatory factor analysis for transformational leadership

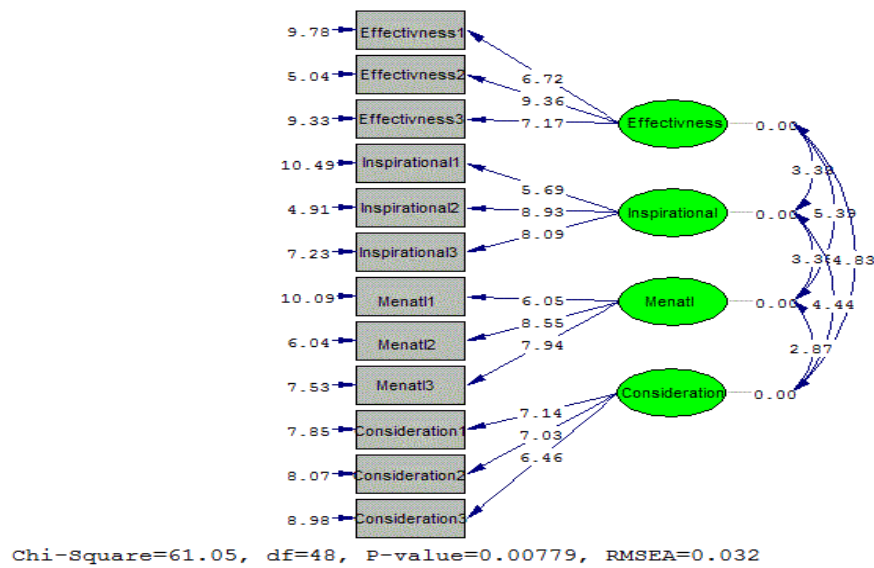


Figure 3. Significance coefficient of the first order confirmatory factor analysis for transformational leadership

According to the obtained results, since the significance level of all items is greater than 1.96, no item is excluded in confirmatory factor analysis. Moreover, standardized coefficients are significant and coefficients of error are normal. As a result, the first order confirmatory factor analysis is confirmed for transformational leadership.

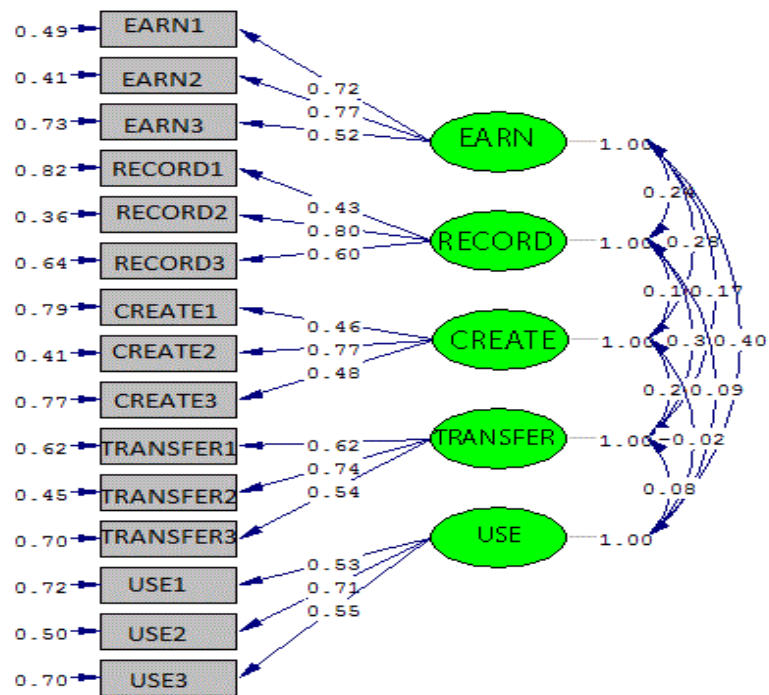
In order to ensure the obtained results, fit indices of the research model should be examined so that the obtained results can be extended to all companies. Fit indices of the first order confirmatory factor analysis for transformational leadership are shown in Table 5.

Table 5. Fit indices of the first order confirmatory factor analysis for transformational leadership

Index	Description	Acceptable range	Obtained value
χ^2/df	Relative Chi-square	< 3	1.27
RMSEA	The root mean square error of approximation	< 0.1	0.032
RMR	The root mean squared residuals	< 0.1	0.083
GFI	Modified fit index	> 0.9	0.934
NFI	Soft fit index	> 0.9	0.948
CFI	Comparative fit index	> 0.9	0.965

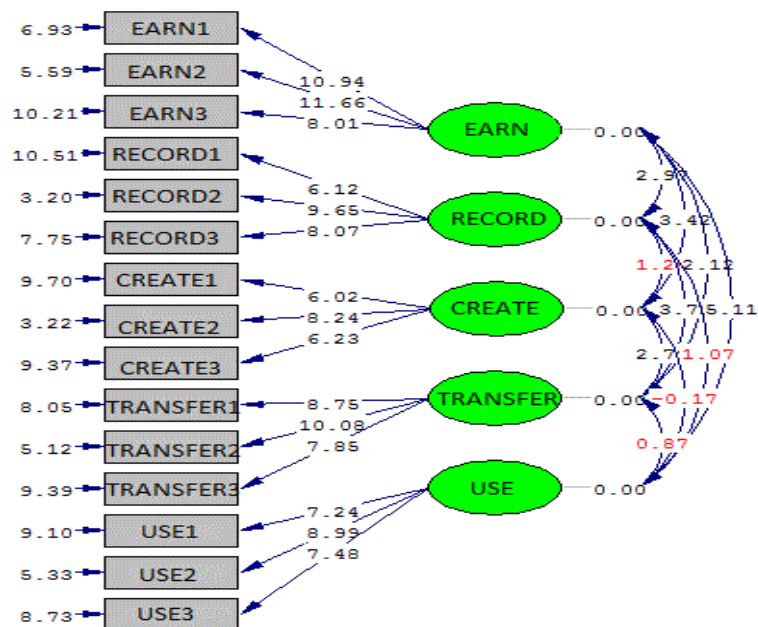
The value of RMSEA is 0.032 that is smaller than 0.1. Moreover, the ratio of chi-square to the degree of freedom is 1.27 that is between 1 and 3. The value of the indices of GFI, CFI, and NFI is more than 0.9. Therefore, fit indices generally show the appropriateness of the measurement model of transformational leadership based on the first order confirmatory factor analysis.

Figures 4 and 5 respectively show standardized coefficient and significance coefficient of the first order confirmatory factor analysis for knowledge management.



Chi-Square=126.69, df=80, P-value=0.00069, RMSEA=0.046

Figure 4. Standardized coefficient of the first order confirmatory factor analysis for knowledge management



Chi-Square=126.69, df=80, P-value=0.00069, RMSEA=0.046

Figure 5. Significance coefficient of the first order confirmatory factor analysis for knowledge management

According to the results, since the significance level of all items is higher than 1.96, none of the items is excluded in confirmatory factor analysis. Moreover, standardized coefficients are significant and coefficients of error are normal. Hence, the first order confirmatory factor analysis is confirmed for knowledge management. Table 6 indicates fit indices of the first order confirmatory factor analysis for knowledge management.

Table 6. Fit indices of the first order confirmatory factor analysis for knowledge management

Index	Description	Acceptable range	Obtained value
χ^2/df	Relative Chi-square	< 3	1.58
RMSEA	The root mean square error of approximation	< 0.1	0.046
RMR	The root mean squared residuals	< 0.1	0.086
GFI	Modified fit index	>0.9	0.901
NFI	Soft fit index	>0.9	0.923
CFI	Comparative fit index	>0.9	0.946

The value of RMSEA is 0.046 that is smaller than 0.1. Additionally, the ratio of chi-square to the degree of freedom is 1.58 that is between 1 and 3. The value of the indices of GFI, CFI, and NFI is also more than 0.9. Therefore, fit indices generally show the appropriateness of the measurement model of knowledge management based on the first order confirmatory factor analysis.

Figures 6 and 7 respectively show standardized coefficient and significance coefficient of the first order confirmatory factor analysis for organizational innovation.

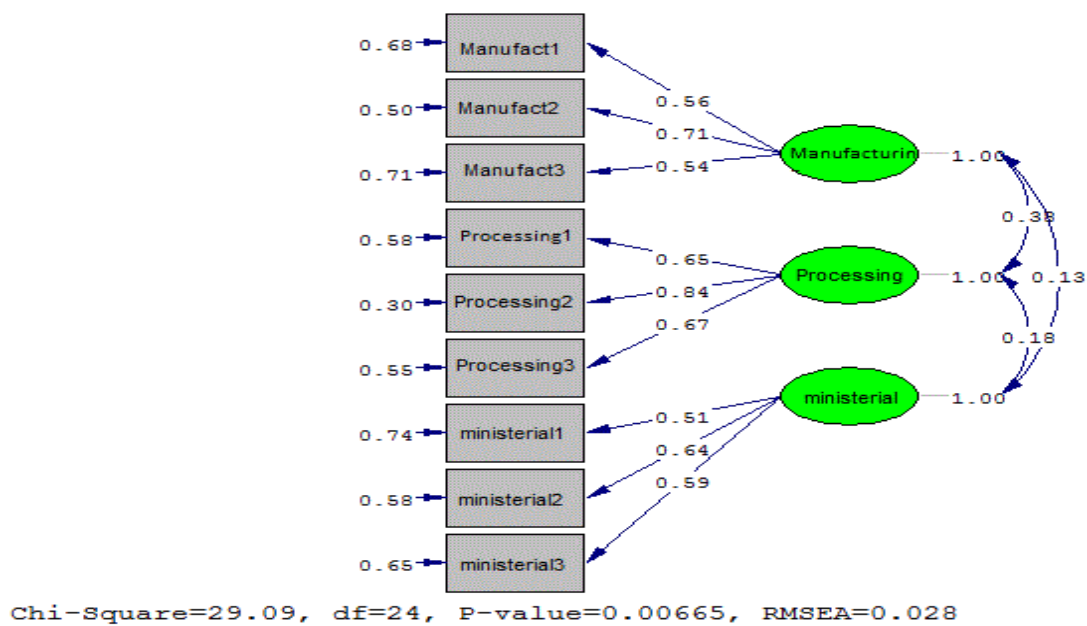


Figure 6. Standardized coefficient of the first order confirmatory factor analysis for organizational innovation

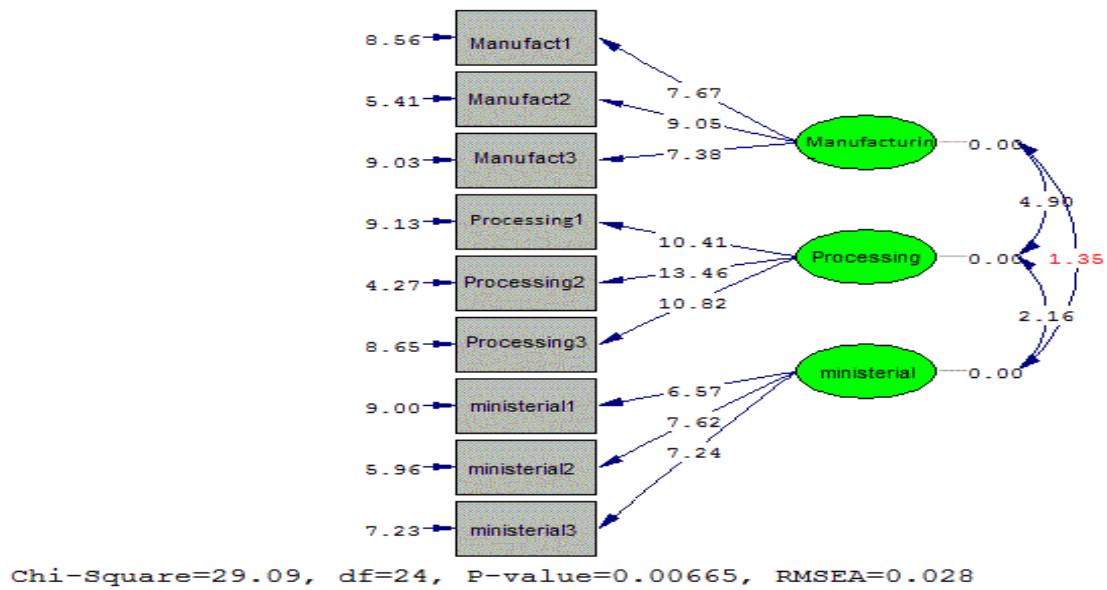


Figure 7. Significance coefficient of the first order confirmatory factor analysis for organizational innovation

According to the obtained results, since the significance level of all items is higher than 1.96, none of the items is excluded in confirmatory factor analysis. In addition, standardized coefficients are significant and coefficients of error are normal. Hence, the first order confirmatory factor analysis is confirmed for organizational innovation. Table 7 indicates fit indices of the first order confirmatory factor analysis for organizational innovation.

Table 7. Fit indices of the first order confirmatory factor analysis for organizational innovation

Index	Description	Acceptable range	Obtained value
χ^2/df	Relative Chi-square	< 3	1.21
RMSEA	The root mean square error of approximation	< 0.1	0.028
RMR	The root mean squared residuals	< 0.1	0.088
GFI	Modified fit index	>0.9	0.907
NFI	Soft fit index	>0.9	0.944
CFI	Comparative fit index	>0.9	0.989

The value of RMSEA is 0.028 that is smaller than 0.1. Additionally, the ratio of chi-square to the degree of freedom is equal to 1.21 that is located between 1 and 3. The value of the indices of GFI, CFI, and NFI is also more than 0.9. Therefore, fit indices generally show the appropriateness of the measurement model of organizational innovation based on the first order confirmatory factor analysis.

Finally, because using Cronbach's alpha coefficient is more common, this coefficient has also been used in this study to evaluate the reliability of the composition/hybrid variables. It should be noted that acceptable range for Cronbach's alpha coefficient usually ranges from zero or instability to +1 or full reliability of the variable. When the obtained value is closer to number one, the more will be the reliability of the questionnaire. According to empirical rules, Cronbach's alpha coefficient should be at least 0.7 so that the scale can be considered reliable (Sheikh-esmaeili, 2011). The reliability of the questionnaire has been calculated based on Cronbach's alpha coefficient the results of which are given in Table 8.

Table 8. The values of Cronbach's alpha coefficient

Row	Questionnaire	Dimensions	Values of Cronbach's alpha	Total
1	Knowledge management	Knowledge acquisition	0.92	0.85
		Knowledge registration	0.82	
		Knowledge creation	0.85	
		Knowledge transfer	0.92	
		Knowledge application	0.85	
2	Transformational leadership	Effectiveness	0.81	0.86
		Inspirational Motivation	0.81	
		Mental motivation	0.78	
		Individual consideration	0.90	
3	Organizational innovation	Product innovation	0.82	0.86
		Process innovation	0.88	
		Administrative innovation	0.81	

According to the results of the Table 8, Cronbach's alpha coefficient of all research variables is greater than 0.7. Therefore, it is concluded that the questions of the research questionnaire have not only a good validity but also reliability.

Testing the Research Hypotheses

In order to test the research hypotheses, structural equation modeling will be used. Figure 8 shows the overall standardized coefficient of the research model.

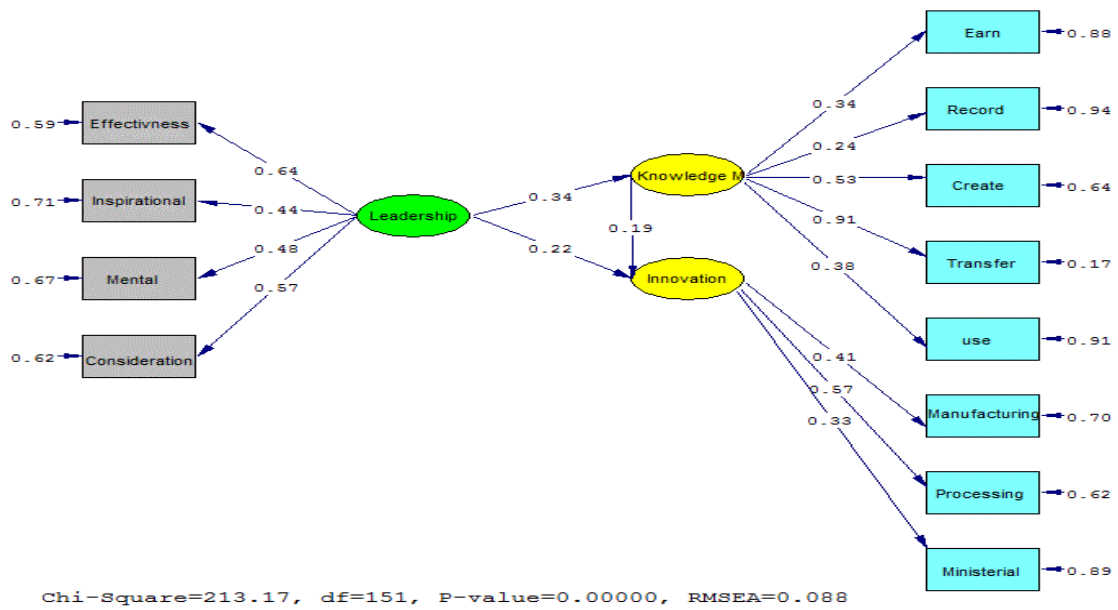


Figure 8. Standardized coefficient of the research model

Figure 9 shows the significance of the coefficients and parameters obtained from the measurement model of evaluating the impact of transformational leadership style and knowledge management processes on organizational innovation.

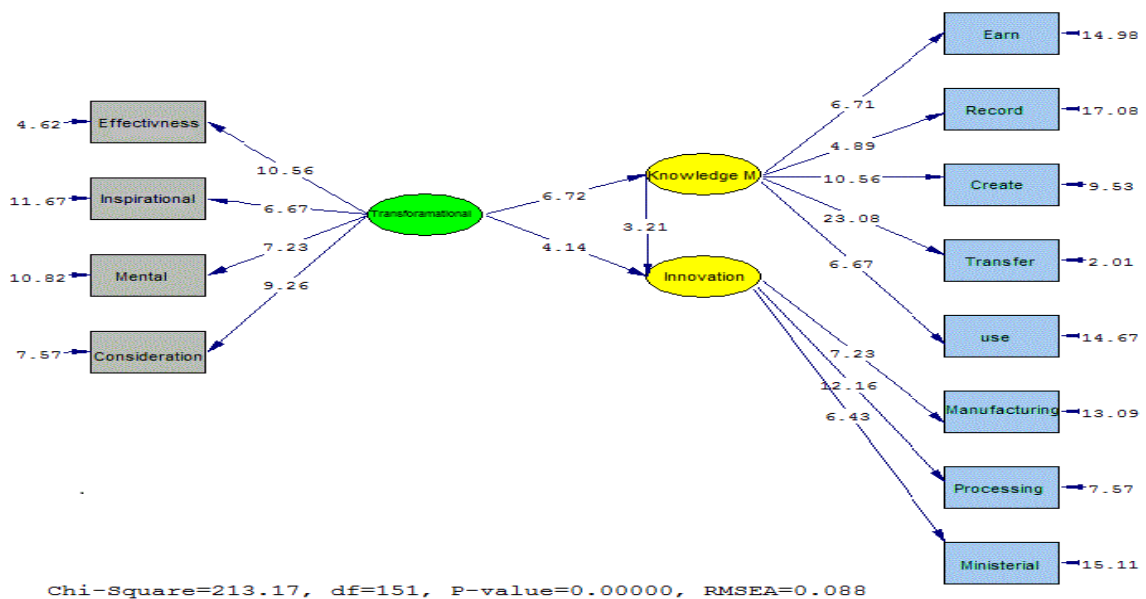


Figure 9. The significance coefficient of the research model

Based on the presented results, the research hypotheses are tested. Regarding the first hypothesis, the path coefficient of transformational leadership on knowledge management is 0.34, with the student's t-test of 6.72. Since the value of student's t-test is greater than 1.96, it can be said with 95% of confidence that transformational leadership has a significant positive impact on knowledge management. Regarding the second

hypothesis, the path coefficient of transformational leadership on organizational leadership is 0.22, with the student's t-test 4.14. As the value of student's t-test is greater than 1.96, it can be said with 95% of confidence that transformational leadership has a significant positive impact on organizational innovation. With regard to the third hypothesis, the path coefficient of knowledge management on organizational innovation is 0.19, with the student's t-test of 3.21. Since the value of student's t-test is greater than 1.96, it can be said with 95% of confidence that knowledge management has a significant positive impact on organizational innovation. Table 9 shows the general fit indices of the research model.

Table 9. Fit indices of the research model

Row	Fit indices	Expected values	Model's calculated model	Status
1	GFI	0.9 and higher	0.91	Acceptable
2	NFI	0.9 and higher	0.90	Acceptable
3	CFI	0.9 and higher	0.90	Acceptable
4	RMSEA	Lower than 0.1	0.088	Acceptable
5	Chi-square of the degree of freedom	Lower than 3	1.53	Acceptable
6	X2	In a large sample size is always significant		Acceptable

The value of RMSEA is equal to 0.088 that is lower than 0.1. Moreover, chi-square value of the degree of freedom is obtained 1.53 which is located between 1 and 3. The value of the indices of GFI, CFI, and NFI is also higher than 0.9. Thus, in general, fit indices show the appropriateness of the research estimated model. In order to test the mediating role of knowledge management, it is essential to determine the direct, indirect, and total impact of the variables. The results are given in table 10.

Table 10. The direct, indirect, and total impact of the variables

Variable name	Direct impact on knowledge management	Indirect impact on knowledge management	Total impact
Transformational leadership	0.34	-	0.34
Variable name	Direct impact on organizational innovation	Indirect impact on organizational innovation	Total impact (the sum of direct and indirect impact)
Transformational leadership	0.22	0.34 * 0.19	0.28
Knowledge management	0.19	-	0.19

According to the table 10, the total impact of transformational leadership is 0.34, that is, by changing a single unit of transformational leadership, 34% change will be observed in knowledge management. Likewise, the total impact of transformational leadership on organizational innovation is equal to 0.28, that is, by changing a single unit of transformational leadership, 28% change will be observed in organizational innovation. Additionally, knowledge management explains 19% of the changes of organizational innovation. Regarding the fourth hypothesis, given the direct impact of transformational leadership on organizational innovation which is equal to 0.22 and also the indirect impact of transformational leadership on organizational innovation that is equal to 0.06 and is carried through knowledge management, the obtained result shows that knowledge management influences the relationship between transformational leadership and organizational innovation; hence, the mediating role of knowledge management is confirmed.

Conclusion, Recommendations, and Limitations

Given the information era and today's competitive environment as well as efforts to meet the ever-changing needs of customers, it is essential to pay a special attention to the concepts of knowledge management and organizational innovation which happen in the light of transformational leadership; especially, in the medical sciences organizations which are concerned with public health. In this research, the impact of transformational leadership and knowledge management on organizational innovation was investigated. Based on the results of this research, transformational leadership style had a significant positive impact on knowledge management. Ghanbari and Abdi-zadeh (2016) also concluded that there is a significant relationship between transformational leadership and knowledge management. Timothy et al (2016) also suggest leaders in small business environments have an important role in organizational innovation. Furthermore, it was found out transformational leadership style has a significant positive impact on organizational innovation. Nemanich and Keller (2007) opine that the existence of transformational leadership will lead to the improvement of organizational innovation and the creation of competitive advantage. This finding is in line with the findings of Reza-zadeh and Azizi (2012), Politis and Harkiolakis (2008), Gumusluoglu and Ilsev (2009), and Gumusluoglu and et al (2012). Li et al (2015), in their research, concluded that transformational leadership has a positive impact on innovation at the group level, but a negative impact on innovation at the individual level. Vargas (2015) examines the impact of transactional and transformational leadership on innovation at the corporate level and believes that a flexible leadership style will be innovative and the best organizational facilitator. The results of this research also show that knowledge management influences organizational innovation. This result is in line with the findings of Johannessen (2008). Birasnav et al (2013) showed that transformational leadership has a direct impact on product and process innovation and that daily engagement of employees in knowledge management can positively influence organizational innovation. Li et al (2014) showed that the conditions of innovation, justice, and proper distribution in organizations lead to the proper and reasonable sharing of knowledge among employees. Another result of the current research is that knowledge management has a mediating role in the relationship between transformational leadership and organizational innovation. The findings of this research are in line with the findings of Birasnav et al

(2013). Suk Bong et al (2016) also concluded that transformational leadership has a positive impact on knowledge sharing and innovative behavior.

Based on the findings of this research, it is suggested that HR managers of University of Medical Sciences, through conducting studies on their employees, explore the ways to knowledge management and strive to implement transformational leadership for the further flourishing of their organization. Managers and employees should be informed and trained about the advantages and benefits of knowledge management. It is recommended that managers employ different levels of transformational leadership related operations which can lead to further flourishing of this type of leadership compared with traditional leadership. Human resource management should launch knowledge management department for the alignment of the knowledge of different level employees in line with organizational objectives.

Future researchers are recommended to investigate the mediating role of organizational culture in the relationship between transformational leadership and organizational innovation. Moreover, the relationship between knowledge management and the performance of service organizations can be examined in order to make an interaction between transformational and transactional leadership styles. Future researchers also can investigate the relationship of knowledge management processes with organizational intelligence and organizational innovation. Finally, the obstacles to the development of transformational leadership and organizational innovation can be identified in future researches.

Very few international researches have been conducted in this field which is one of the main limitations of this research. Lack of cooperation by some respondents to answer all questions of the questionnaire is another limitation. Another limitation is related to the low motivation of respondents in answering the questions of the questionnaire. Scattering of the schools of the University of Medical Sciences, the problem of access to all of them and non-return of all questionnaires are among other limitations of this research.

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