Investigating the Effect of Implementing the Lean Six Sigma on Organizational Performance Based on the Mediating Role of Strategic Knowledge Management with Structural Equation Modeling Approach

Investigando o efeito da implementação do *Lean Six Sigma* no desempenho organizacional com base no papel mediador da gestão estratégica do conhecimento com a abordagem de modelagem de equações estruturais

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RESUMO

O principal objetivo deste estudo foi investigar o efeito da implementação do *Lean Six Sigma* no desempenho organizacional com a gestão estratégica do conhecimento como variável mediadora em hospitais privados em Teerã-Irã. O método de pesquisa foi baseado no objetivo da pesquisa aplicada e, em termos de coleta e análise de dados, o método de correlação foi de pesquisa. A população estatística deste estudo foi de 51 hospitais particulares em Teerã. Foram utilizados questionários para coleta de dados. Utilizou-se a modelagem de equações estruturais para analisar os dados. Os resultados mostraram que a implementação do *Lean Six Sigma* não tem um efeito positivo e significativo no desempenho organizacional; no entanto, é eficaz na gestão estratégica do conhecimento. Por outro lado, a gestão estratégica do conhecimento tem um efeito positivo e significativo no desempenho organizacional. Além disso, a implementação do *Lean Six Sigma* tem um efeito positivo no desempenho organizacional por meio da variável mediadora da gestão estratégica do conhecimento. Os resultados da pesquisa podem ser usados para melhorar o desempenho organizacional de centros médicos e hospitais privados através da implementação do *Lean Six Sigma*.
Palavras-chave: *Lean Six Sigma*. Gerenciamento Estratégico de Conhecimento. Desempenho Organizacional. Modelagem de Equações Estruturais.

ABSTRACT

The main purpose of this study was to investigate the effect of implementing the lean six sigma on organizational performance with the strategic knowledge management as mediating variable in private hospitals in Tehran- Iran. The research method was based on purpose of applied research and in terms of data collection and the analysis method was survey-correlation. The statistical population of this study were 51 private hospitals in Tehran. Questionnaires were used for data collection. Structural equation modeling was used to analyze the data. The results showed that the implementation of the lean six sigma does not have a positive and significant effect on organizational performance; however, it is effective on the strategic knowledge management. On the other hand, strategic knowledge management has a positive and significant effect on organizational performance. Moreover, the implementation of the lean six sigma has a positive effect on the organizational performance through the mediating variable of strategic knowledge management. The research findings can be used to improve the Organizational Performance of Medical centers and private hospitals through the implementation of Lean Six Sigma.
Keywords: Lean Six Sigma, Strategic Knowledge Management, Organizational Performance, Structural Equation Modeling.

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1 INTRODUCTION

The importance of Six Sigma and its effects on organizational performance in various services and industries has been considered by many organizations in the last decade and knowledge management has been deemed as an influential factor in organizational performance by many organizations and managers. Managers in the field of quality are constantly concerned that controlling production conditions and reducing waste would cause the least dissatisfied customers (Youssouf, Rachid, & Ivon, 2014). Given the existing competitive market and the need to increase product quality at the lowest cost, six Sigma has become a very effective solution to increase the quality of processes in the organization (Parsana & Desai, 2016) and a solution to production problems and business processes (Smętkowska & Mrugalska, 2018), which would help to meet customer needs by combining organizational wisdom and statistical methods (Dubey, Gunasekaran, Childe, Fosso Wamba, & Papadopoulos, 2016). The lean six sigma is a business improvement method that enhances shareholder value by increasing the quality of production (Laureani & Antony, 2019). It helps the organization to achieve its goal by adding efficient processes (Vinodh & Swarnakar, 2015) and by eliminating flaws and reducing variance, it leads to business success (Antony, Forthun, Trakulsunti, Farrington, McFarlane, Brennan, & Dempsey, 2019). Six sigma is an effective way to speed up the quality of products and services (Bazrkar, Iranzadesh, Feghhi Farahmand, 2017). In fact, Six Sigma is a tool used to minimize process changes (Manville, Greatbanks, Krishnasamy, & Parker, 2012) to ensure the desired results with optimal improvements at the right time by focusing on the root causes of changes and defects (Desai & Prajapati, 2017). By reducing the rate of change and defects to 3.4 per million cases (Reosekar & Pohekar, 2014), it is able to have a positive impact on organizational performance (Sin, Zailani, Iranmanesh, & Ramayah, 2015). Six sigma allows the organization to achieve strategic goals and consequently increase organizational performance (Uluskan, Godfrey, & Joines, 2017). Organizational performance is defined as measuring an organization's output relative to that organization's expected output (Almatrooshi, Singh, & Farouk, 2016), which includes financial and non-financial indicators that have the ability to evaluate, to measure the achievement of the organization's goals (Singh, Darwish, & Potocnik, 2016). On the other hand, knowledge management enables the organization to identify the knowledge that exists in the organization and then use it to help the organization (Kianto, Vanhala, & Heilman, 2016). In fact, the capacities and tools that the knowledge management entails enable the organization to acquire, store, and use knowledge (Ferraris, Santoro, & Dezi, 2017) and provide a platform for the organization to offer new solutions and products while increasing the productivity of business processes and improving product quality for the organization's customers (Donate & de Pablo, 2015). Knowledge management acts as a tool of power for organizations and individuals and it is used to promote organizational goals to find, store, retrieve and adapt to the organization (Karamitri, Talias, & Bellali, 2017) and the lean six sigma plays a positive role in knowledge management activities (Corbett, 2011). The focus of knowledge management is on the optimal implementation of knowledge creation and collection processes in the organization, sharing that knowledge and using it to bring the organization to appropriate organizational performance (Al Ahbabi, Singh, Balasubramanian, & Gaur, 2019). Strategic knowledge management makes knowledge management a competitive advantage and enables the firms to create value from their knowledge assets (Archer-Brown & Kietzmann, 2018). In fact, strategic knowledge management is a distinct approach that allows people, systems and responses emerging in a chaotic environment manage and improve organizational performance (Sousa & Rocha, 2019). This study, considering the importance of strategic knowledge management in improving the situation and performance of the organization and considering the lean six sigma, aims to find out how the lean six sigma affects the organizational performance according to the mediating role of strategic knowledge management among the private hospitals in Iran. The use of lean six sigma methodologies in the healthcare sector has led to an increase in patient satisfaction, quality of care and patient safety (Trakulsunti & Antony, 2018). The six sigma approach is a good tool for reducing risk and cost in healthcare institutions (Tagge, Thirumoorthi, Lenart, Garberoglio, & Mitchell, 2017). The lean approach is a way to improve production and reduce waste (Sari, Rotter, Goodridge, Harrison, & Kinsman, 2017). On the other hand, knowledge management in healthcare institutions leads to improved service quality and cost reduction (Rezaei, Hosseinzadeh, & Dehghan, 2018).

Here, the variables related to lean six sigma, organizational performance and strategic knowledge management are examined.

2 BACKGROUND AND HYPOTHESIS DEVELOPMENT

2.1 Implementing the lean six sigma and organizational performance

Today, the use of lean six sigma methodologies is very useful for organizations operating in a competitive world (Bazrkar & Iranzadeh, 2017). Six Sigma method actually uses statistical methods to identify, reduce and eliminate deviations and changes and it is used to improve processes (Wang & Chen, 2010). This method improves performance in organized operations and increases customer satisfaction with the organization's products and services (Chakravorty, 2009). The lean six sigma was developed in 1990 with the combination of six Sigma and the principles of lean production (Vinodh, Kumar, & Vimal, 2014). Six sigma and lean six sigma are the same thing and end in the same situation. In fact, the initial result of six Sigma is a uniform output and the result of lean six sigma is a reduction in process time (Assarlind, Gremyr, & Bäckman, 2013) and after the approval of some companies, organizations active in the healthcare industry also used the lean six sigma. The lean six sigma in these organizations focuses on direct care delivery, executive support, and financial management (Laureani, Brady, & Antony, 2013). Performance management is used as a way to evaluate and manage employees' work and guide and evaluate their performance in the organization (Tweedie, Wild, Rhodes, & Martinov-Bennie, 2019). Performance management is an important aspect of organizational effectiveness through which the key work process is fulfilled (Gruman & Saks., 2011). In this regard, six Sigma is a method to solve problems related to performance in the organization (Parast, 2011). Organizational performance is the comparison of an organization's actual results or output with the its desired results (Tomal & Jones, 2015).

Shafer & Moeller (2012) conducted a study entitled The Effect of Six Sigma on Firm's Performance. The results showed that six sigma has a positive effect on performance. Alosani, Yusoff and Alansi (2018) in a study entitled "The Effect of Six Sigma on Organizational Performance with the Mediating Role of Innovation Culture" showed that organizational performance is affected by six Sigma. Alkunsol, Sharabati, AlSalhi, & El-Tamimi (2019) investigated the effect of six Sigma components on organizational performance in pharmaceutical companies in Jordan. The results of this study showed that except for additional processing and waiting time, all six sigma variables affect business performance.

According to Ahmed, Manaf and Islam (2018), in this study, with the components of continuous quality improvement, lean innovations, Six-Sigma innovations, patient safety, value-added activities, and group work the lean six sigma is implemented.

Accordingly, the first hypothesis of this research is defined as follows:

H1: Implementing lean six sigma has a positive and significant effect on organizational performance.

2.2 Implementation of lean six sigma and strategic knowledge management

In six Sigma more attention is paid to the amount of errors in the processes and more improvement is achieved in processes in such a way that the errors are removed or reduced (Cheng & Chang, 2012). Six sigma is an organized method for advancing the strategic process, product development and new services that relies on statistical and scientific methods to reduce customer error (De Mast & Lokkerbol, 2012). As a management tool to increase efficiency, Six sigma a systematic approach (Azis & Osada, 2013). Today, this method is used as a comprehensive quality program that is able to manage the entire organization as a management approach (Brun, 2011). DMAIC method is one of the important methodologies of six Sigma, which includes the steps of definition, measurement, analysis, improvement and control (Caiado, Nascimento, Quelhas, Tortorella, & Rangel, 2018) and another important methodology of Six Sigma is the DMADV method, which is used for new products and processes. This method consists of five steps: definition, measurement, analysis, design and

approval (Murumkar, Teli, Jadhav, Dharmadhikari, & Nikam, 2018). Six Sigma and lean six sigma are two approaches to increase quality that are used in healthcare organizations (Mason, Nicolay, & Darzi, 2015). Lean six sigma increases organizational performance and customer satisfaction (Sin et al., 2015) and it is a method that increases the quality of products and services, eliminates value-added activities and processes and speeds up quality improvement effectively (Ferryanto, 2015). Six Sigma's importance and benefits are now clear to many companies, which is why so much investment has been made in this method (Krueger, Mellat Parast, & Adams, 2014). Knowledge management is a managerial process to achieve competitive advantages in the organization (Santoro, Vrontis, Thrassou, & Dezi, 2018). That is all the existing processes, strategies and procedures to use the intellectual and knowledge capacities within the organization are applied to achieve Value in the organization (Hemsley & Mason, 2013) and improve the organizational effectiveness as a regular operation. Using the knowledge of past decision experiences, it improves the current and future decisions of the organization (Dorasamy, Raman, & Kaliannan, 2013). These operations include the processes of recording, storing, sharing, and ultimately using knowledge, which helps to organize it for future use and retrieval by finding information effectively (Al-Emran, Mezhuyev, Kamaludin, & Shaalan, 2018). Accordingly, with the most valuable knowledge capabilities and processes, the strategic knowledge management seeks to create a competitive advantage for the company and it is focused on the strategic decision-making power of knowledge production, allocation, sharing, maintaining and using the company's basic knowledge (Cabrilo & Dahms, 2018). Rozo-Rojas, Díaz-Piraquive, Ordoñez-Díaz, and Jesús Muriel-Perera (2019) in a study entitled "Quality Assessment in Sterilization Processes at the Colombian Health Organization using Six Sigma Criteria" showed that knowledge management is influenced by six Sigma. Asif (2019) conducted a study entitled "Institutionalizing 6 Lean Sigma and Creating Knowledge" and the results indicate the positive role of 6 lean Sigma on knowledge creation. Gutierrez Gutierrez, Barrales-Molina and Tamayo-Torres (2016) conducted a study to investigate the relationship between six sigma and knowledge management and the results showed that six sigma implementation has a positive effect on knowledge management and organizational performance.

According to López-Nicolás & Meroño-Cerdán (2011), in this study, strategic knowledge is managed using the components of knowledge development in the hospital, knowledge acquisition through official documents and manuals, recording the results of projects and meetings, sharing knowledge through codified forms, acquiring personal knowledge through professionals and colleagues, getting advice from experts, sharing knowledge through informal conversations and meetings, and gaining knowledge by personal advise.

Accordingly, the second hypothesis of this research is defined as follows:

H2: Implementing Lean six sigma has a positive and significant effect on strategic knowledge management.

2.3 Strategic knowledge management and organizational performance

The ability to manage knowledge in the organization actually enables the organization over time to manage the knowledge base, configure it, and confirm the processes of knowledge discovery and maintenance as well as future uses in the internal and external environment of the organization (Martinez-conesa, Soto-Acosta, & Carayannis, 2017). Therefore, the goal of knowledge management is the effective and maximum use of organizational knowledge and individual or public knowledge of this knowledge (Chang & Lin, 2015). If knowledge management is implemented properly, it is able to create new opportunities and competitive advantages for customers and improve the performance of the organization (Huang, Quaddus, Rowe, & Lai, 2011). The main components of knowledge management include knowledge acquisition, knowledge creation, knowledge storage and knowledge sharing (Liu, 2011). Strategic knowledge management can define the organization's approach in such a way that the organization could coordinate all available resources of knowledge and ability with its strategy and achieve sustainable competitive advantage (Ferreira, Mueller, & Papa., 2018). It includes various skills and techniques, which align human resource capabilities with the organization's strategic goals (Marques, Leal, Marques, & Cardoso, 2016). Contrary to many people's beliefs, performance management is not a modern concept, and the New York City Council

sought data analysis and forecasting in the early 1970s. However, the term "performance management" was not used until the 1970s (Fryer, Antony, & Ogden, 2009) and in the twentieth century the concept of organizational performance was created to help managers plan, implement and control changes and quality of operations (Markos, & Sridevi, 2010). Measuring organizational performance is essential to achieve organizational goals, and this is achieved by performance indicators. Therefore, determining these indicators, their relation to goals and their dependence on operations for each organization is very important (Popova & Sharpanskykh, 2010). Reducing the organization's costs, the profit of the organization, the amount of sales, the turnover, the turnover of the organization's assets and the turnover of the organization's shares are the most common performance indicators for this purpose (Choudhary, Akhtar, & Zaheer, 2013). On the other hand, the balanced scorecard method for evaluating performance is able to evaluate performance based on components beyond the financial criteria (Hu, Leopold-Wildburger, & Strohhecker, 2017). Iqbal, Latif, Marimon, Sahibzada and Hussain (2019) conducted a study entitled "From Knowledge Management to Organizational Performance" and their results showed that organizational performance is affected by knowledge management. Nisar, Prabhakar, & Strakova (2019) conducted a study entitled "The Benefits of Information in Mass Communication Websites, Knowledge Management, and Smart Organization" and the results showed that knowledge management affects organizational performance. Al Ahbabi et al. (2019) sought the relationship between knowledge management processes and organizational performance in the public sector and the results of this study showed that knowledge management processes have a positive and high impact on organizational performance.

According to Masha'deh et al. (2016), in this study, organizational performance is assessed by the components of customer satisfaction, cost management, organizational productivity, asset management, quality development, and organizational responsiveness.

Accordingly, the third hypothesis of this research is defined as follows:

H3: Strategic knowledge management has a positive and significant effect on organizational performance.

In this study, it is attempted to examine the mediating role of strategic knowledge management in the relationship between lean six sigma and organizational performance. Accordingly, the fourth hypothesis of the research is as follows:

H4: Implementing lean six sigma has a positive and significant impact on organizational performance through the mediating role of strategic knowledge management.

According to the variables studied and the proposed hypotheses, the conceptual model of the research is shown as follows.

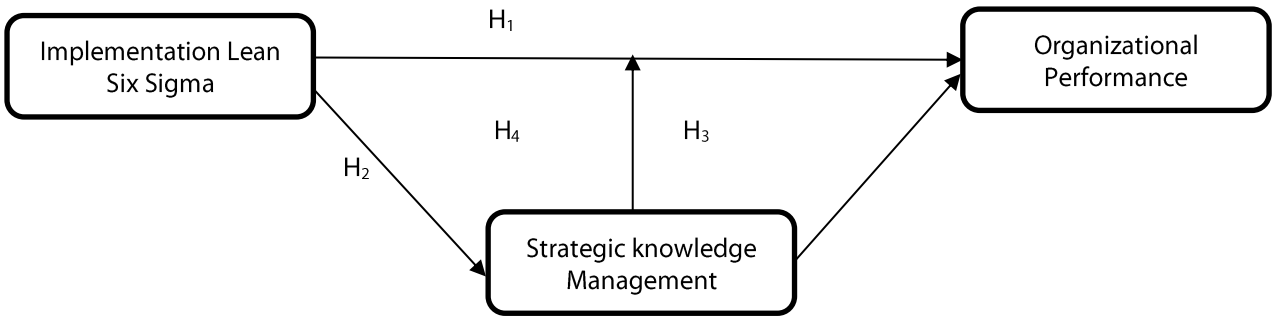

Figure 1. Conceptual Research Model
Source: Authors (2020).

3 RESEARCH METHODOLOGY

This research is applied in terms of purpose and is descriptive-survey in terms of data collection method. Library resources are used to collect information on theoretical foundations and thematic literature,

and field study and questionnaire are used to collect data. In the end, structural equations and the third version of Smart PLS software were used to measure and model the relationships between the variables.

As mentioned earlier, this study uses the method of partial least squares in structural equations to test the hypotheses. This method is the best tool for the studies in which the relationships between variables are complex, sample size is small and data distribution is abnormal (Tenenhaus, Amato, & Esposito Vinzi, 2004). Since the interactive effect of two variables with normal distribution is often skewed, it is better to use the PLS method to investigate the interactive effect that is not sensitive to normal distribution (Davari & Rezazadeh, 2013). Descriptive data are analyzed and the fitting of the model is examined in three parts of the fitting of the measurement models, fitting of structural models and overall model fitting.

The main tool for data collection in the present study is a questionnaire. To collect information in this study, a questionnaire containing 30 measures of five-point Likert scale was used. To measure the research variables, including implementing lean six sigma, which includes 16 measures in the questionnaire, the study of Ahmed et al. (2018) has been used. Eight items based on López-Nicolás & Meroño-Cerdán (2011) were used to measure the strategic knowledge management variable. Six items based on Masa'deh, Obeidat and Tarhini (2016) research studies were used to measure organizational performance variable.

To ensure the content and face validity of the questionnaire, its initial edition was reviewed by experts and experts in this field, and according to their comments and suggestions, the necessary corrections were made to the items and it was used after their approval. Cronbach's alpha test was used to ensure the reliability of the questionnaire and the obtained values showed that the questionnaire had acceptable reliability. The results of this study are shown in Table 1. The statistical population of this study consists of managers of private hospitals in Iran. Due to the high volume of the statistical community and the need to use the statistical sample, the managers of private hospitals in Tehran are introduced as the sample size. According to 51 private hospitals in Tehran, the managers of the statistical sample size are 255 managers. To distribute the questionnaire among the statistical sample size, the managers of hospitals (n=255) are selected as a member of the statistical sample size, and finally 100 questionnaires with complete and valid answers were collected.

4 RESULTS

4.1 Checking the normality of data

Before implementing the structural equation modeling steps, the normality of data is examined with the Kolmogorov-Smirnov test and the results are displayed in Table 1.

Variable	Mean	SD	Level of significance
Lean six sigma	3.18	1.071	0.020
Strategic knowledge management	3.17	1.044	0.038
Organizational performance	3.37	1.067	0.018

Table 1. Checking the normality of the data
Source: Prepared by the authors (2020)

Since the significance level of the test of each of the studied variables is less than 0.05, it can be said with 95% confidence coefficient that not all the variables under study are normal. Given that, the data is abnormal and considering that, the use of Smart PLS software does not require the normal distribution and the possibility of solving models with fewer items as well as fewer samples compared to other software, it is recommended to use Smart pls software (Hair, Ringle & Sarstedt, 2011).

4.2 Description of demographic characteristics

Here, the demographic characteristics of the respondents are examined in terms of gender, education, and experience and the results are displayed in Table 2.

	Female	Male
Gender	36%	64%
Education		
Master's degree	30.555%	28.125%
PhD	69.444%	71.875%
Work experience		
Less than 5 years	13.88%	15.63%
Between 5 and 10 years	22.24%	34.37%
More than 10 years	63.88%	50%

Table 2. Demographic characteristics
Source: Research results (2020)

According to Table 2, a total of 64% of the respondents (100 people), equal to 64 subjects were male and 36%, or 36 subjects were female. 28.125% of men (n=18) had master's degrees and 71.875% (n=46) of them had PhD. On the other hand, 30,555% (n=11) of women had master's degrees and 69,444% (n=25) of them had PhD. 15.63% (n=10) of men had less than 5 years, 34.37% (n=22) had 5-10 years and 50% (n=32) had over ten years of experience. 1.88% (n=5) of women had less than 5 years, 22.24% (n=8) had 5-10 years and 63.88% had over ten years of experience. To fit the model, three parts of measuring models, structural equations and general model are used.

4.3 Fitting the measurement models:

To analyze the measurement model, 3 criteria of reliability, convergent validity and divergent validity are used. To measure the reliability of the model, the combined reliability and Cronbach's alpha are examined, which are shown in Tables 3 and 4.

	AVE	CR	Cronbach's Alpha	Factor Loading	Question
Implementation Lean Six Sigma	0.449	0.928	0.918	0.658 0.505 0.670 0.694 0.607 0.664 0.675 0.692 0.722 0.626 0.647 0.615 0.745 0.708 0.726 0.724	LSSE1 LSSE2 LSSE3 LSSI3 LSSLI1 LSSLI2 LSSLI3 LSSS1 LSSS2 LSSS3 LSST1 LSST2 LSST3 LSSV1 LSSV2 LSSV3
Strategic Knowledge Management	0.505	0.890	0.858	0.787 0.733 0.588 0.721 0.786 0.665 0.653 0.729	SKM1 SKM2 SKM3 SKM4 SKM5 SKM6 SKM7 SKM8
Organizational Performance	0.558	0.883	0.841	0.755 0.669 0.741 0.741 0.786 0.784	OP1 OP2 OP3 OP4 OP5 OP6

Table 3. Data validation specifications
Source: Search results (2020).

	Implementation Lean Six Sigma	Organizational Performance	Strategic Knowledge Management
Implementation Lean Six Sigma	0.640		
Organizational Performance	0.503	0.686	
Strategic Knowledge Management	0.631	0.602	0.660

Table 4. Structure correlation matrix and divergent validity analysis
Source: Search results (2020).

Given that the index for Cronbach's alpha is at least 0.7 (Nunnally, 1978) and 0.6 is also appropriate according to other sources (Moss, Rousseau, Parent, St-Laurent, & Saintonge, 1998), Table 3 shows that these indicators are achievable. The appropriate index for composite reliability (CR) should be greater than 0.7 (Werts, Linn, & Jöreskog, 1974), which according to the composite reliability values in Table 2, this criterion has been observed by model structures. Suitable indicator for convergent validity (AVE) are the values higher than 0.5 (Fornell & Larcker, 1981) and according to Table 3, the obtained values indicate compliance with this criterion. Confirmation of convergent validity depends on the fact that the average variance extracted for each structure is greater than the common variance of that structure with other structures. In fact, the mean square variance extracted for each structure should be greater than the correlation between structures (Fornell & Lacker, 1981) that the values obtained in Table 4 confirm the divergent validity.

4.4 Structural fitting of the model

Here, the PLS or modeling structural equations is used to test the research hypotheses. In this method, R2, T-Value, P-Value and GOF tests from the third version of Smart PLS software are used and the VAF statistics and bootstrapping methods are applied to investigate the mediating role.

4.4.1. R2 test: To check the intensity of the relationships between the structures, the R2 test is used, which is only valid for the dependent variable, and the result of this test is shown in Figure 2.

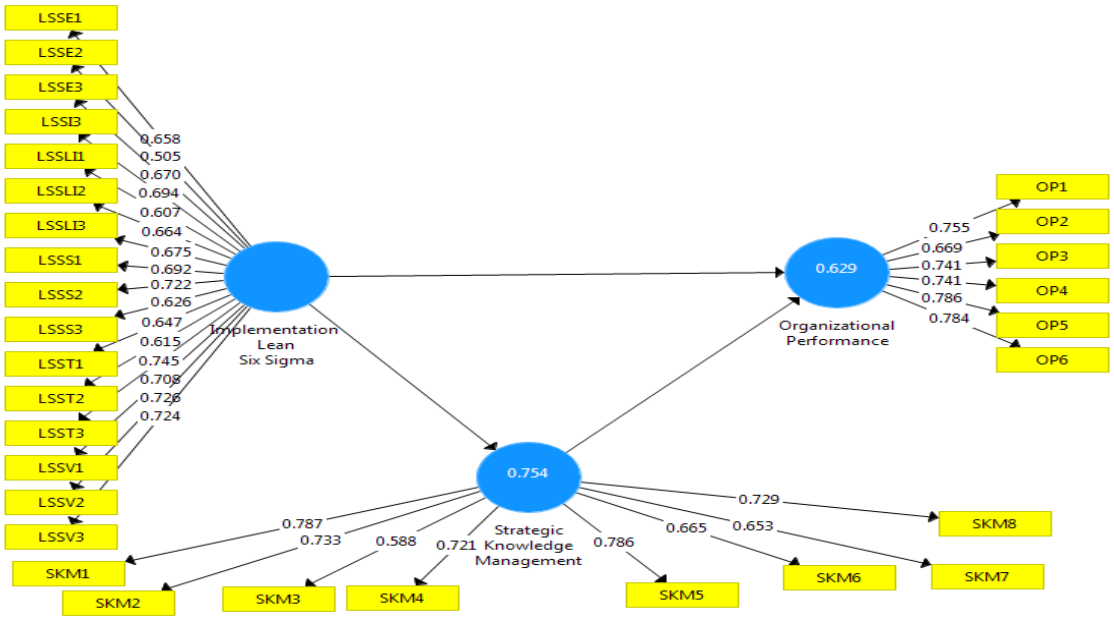

Figure 2. R2 test and model with factor loads and standard coefficients
Source: Prepared by the authors (2020).

The appropriate indicators for the R2 test are three values of 0.19, 0.33 and 0.67, which indicate that the index is poor, medium and strong (Chin, 2010). Therefore, according to Figure 2, the model at R2 level has an acceptable fit. On the other hand, considering the value of the appropriate index for factor loads, which is at least 0.4 (Hulland, 1999) and according to Figure 2, all coefficients of factor loads are higher than the specified index, which indicates the suitability of the model.

4.4.2. T-value & path coefficients test: The T-Value indicates the significance of the relationships between the variables and expresses the values of the coefficient of the relationship path between the variables and the results of this test are given in Figure 3.

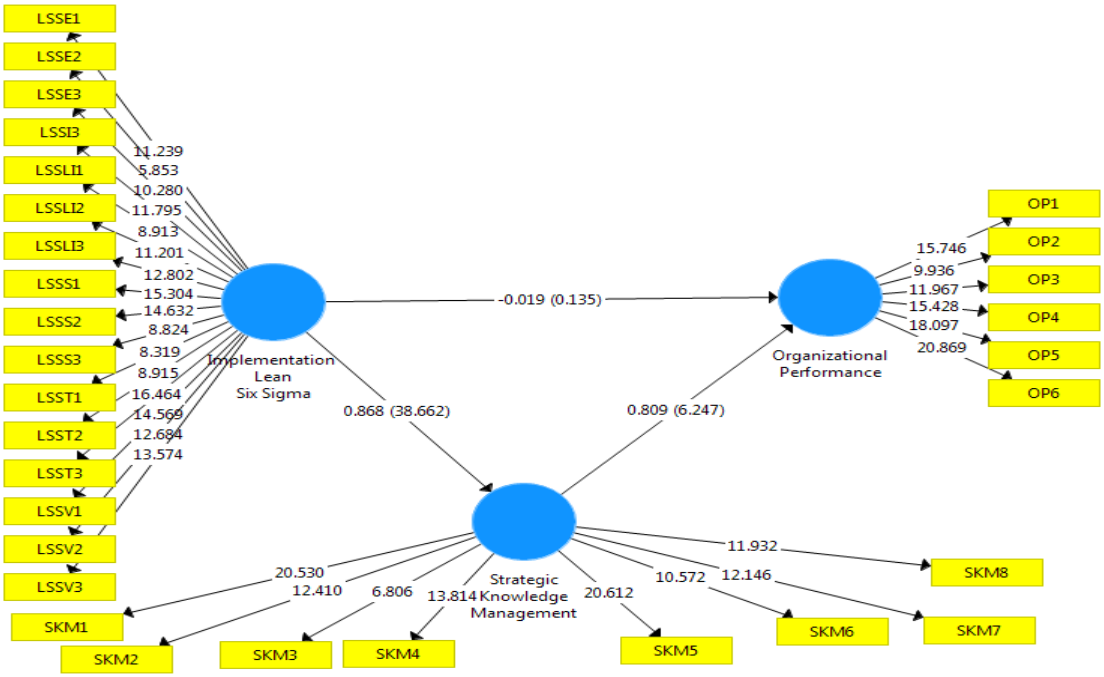

Figure 3. T-value & path coefficients test
Source: Prepared by the authors (2020)

The appropriate index for the T-Value test is greater than 1.96. If the value of T is greater than 1.96, it means a positive and significant relationship, and if it is between -1.96 and +1.96, it means that there is no significant relationship, and if it is less than -1.96. It means a negative but significant relationship. Also, values of path coefficients greater than +0.6 indicate a strong relationship between the two variables, values of path coefficients between 0.6 and 0.3 indicate a moderate relationship between the two variables and values less than 0.3 indicate a poor relationship between the two variables (Chin, 1998). Therefore, according to T-value and Figure 3, values, there is a positive and significant relationship between Implementation Lean Six Sigma/ Strategic Knowledge Management variables and Strategic Knowledge Management /Organizational Performance. However, there is no significant relationship between Implementation Lean Six Sigma and Organizational Performance variables. On the other hand, according to the values of path coefficients and Figure 3, there is a strong relationship between Implementation Lean Six Sigma/ Strategic Knowledge Management and Strategic Knowledge Management/ Organizational Performance variables; however, there is a poor relationship between Implementation Lean Six Sigma and Organizational Performance.

P-Value test: This test is for deciding on the rejection or acceptance of the hypotheses. The appropriate criterion for the P-Value test are values less than 0.05 (Kock, 2014). Therefore, P-Value results confirm the relationship between Lean Six Sigma/Strategic Knowledge Management (P-Value = 0.000) and Strategic Knowledge Management/ Organizational Performance (P-Value = 0.000). However, the P-Value results do not

confirm the relationship between Implementation Lean Six Sigma and Organizational Performance (P-Value = 0.893).

GOF test: To evaluate the overall fitting of the model, the fitness index is used, which was introduced by Tenenhaus et al (2004) and this index is obtained by multiplying the product of the mean of commonalities of the dependent structures multiplied by their mean R2. This index is examined through the values 0.01, 0.25 and 0.36 as poor, medium and strong values (Wetzels, Odekerken-Schröder, & Van Oppen, 2009). Therefore, according to the obtained value of 0.405 for this criterion, the model has a strong overall fitting.

VAF test and bootstrapping method: Due to the abnormality of the data, the use of bootstrapping method is recommended to evaluate indirect relationships and mediating role (Hayes, 2009) and VAF statistic is used to determine the severity of indirect effect through mediating variable the value of which is between 0 and 1. Its proximity to 1 indicates the strength of the mediating variable effect. This value measures the ratio of the indirect effect to the total effect and is obtained through Equation 1 (Doustdar, Mombini, & Goodarzi et al., 2016).

Eq.1) VAF = (a×b)/((a×b)+c)

Where, a is the value of the path coefficient between the independent and median variables, b is the value of the path coefficient between the mean and dependent variables, and c is the value of the path coefficient between the independent and dependent variables.

Eq.2) VAF = 3.072/3.864=0.795

A value of 0.795 for VAF indicates a partial mediation. On the other hand, after performing bootstrapping in Smart PLS 3 software with 500 samples, the results of Table 5 were obtained.

	Original Sample	Sample Mean	S.D	T- Value	P Value
ILSS →SKM →OP	0.703	0.693	0.105	6.714	0.000

Table 5. Bootstrapping method results for the mediating variable
Source: Prepared by the authors (2020)

Given the P-Value and T-Value of 0.000 and 6.714, the mediating role of strategic knowledge management in the relationship between the implementation of the lean six sigma and organizational performance is confirmed.

4.5 Testing Research Hypotheses

In this section, the results obtained for confirming or rejecting research hypotheses are provided in Table 6.

Hypothesis	Path	Path coefficient	t-value	P-value	Test result
Direct Effect					
H1	ILSS →OP	-0.019	0.135	0.893	Not supported
H2	ILSS →SKM	0.866	38.662	0.000	supported
H3	SKM →OP	0.809	6.247	0.000	supported
Mediator effect					
H4	ILSS →SKM →OP	0.702	6.714	0.000	supported

Table 6. Research Hypothesis Test
Source: Prepared by the authors (2020)

According to Table 6 and the amount of -Value between Implementation Lean Six Sigma and Organizational Performance, which is 0.135 and less than 1.96, it is concluded that that there is no significant

relationship between these two variables. According to Path Coefficients, which is -0.019 and this value is less than 0.3, it is concluded that that there is a poor relationship between these two variables. On the other hand, the P-Value between these two variables is 0.893 and is more than 0.05, so the P-Value is not validated and the H1 hypothesis is rejected. However, T-Value between Implementation Lean Six Sigma/ Strategic Knowledge Management variables and Strategic Knowledge Management/ Organizational Performance variables are 38.662 and 6.247, which are higher than 1.96, which means a positive and significant relationship between them. On the one hand, the Path Coefficients values between these variables are 0.868 and 0.809, which are more than 0.6, and this means a strong relationship between these variables. On the other hand, the P-Value between these variables are 0.000, which is less than 0.05, and this confirms the P-Value for these variables. Therefore, it is concluded that the H2 and H3 are confirmed. According to Table 5 and the value of 6.714 for T-Value, which is greater than 1.96 and the value of 0.000 for P-value which Less than 0.05, the implementation of the six lean segments through the mediating role of strategic management has a positive and significant effect on organizational performance, and the H4 hypothesis is confirmed.

5 DISCUSSION AND CONCLUSION

The results of this study show that the implementation of lean six sigma does not affect organizational performance (H1), which is contrary to the results of Shafer & Moeller (2012), Alosani et al. (2018) and Alkunsol et al. (2019). Therefore, it is suggested that hospital managers make appropriate and serious decisions to increase and improve the organizational performance along with the implementation of six lean sigma to evaluate and manage the work of employees and guide and evaluate their performance in the organization. On the other hand, the implementation of lean six sigma affects strategic knowledge management (H2), the results of which are consistent with Rozo-Rojas et al. (2019), Asif (2019) and Gutierrez Gutierrez et al. (2016). Therefore, it is suggested that hospital managers implement lean six sigma a to improve strategic knowledge management processes in the organization to create a competitive advantage and increase strategic power to help knowledge generation, knowledge allocation, knowledge sharing and knowledge retention. The results of this study also indicate that strategic knowledge management affects organizational performance (H3) that the results obtained for this hypothesis are in line with Iqbal et al. (2019), Nisar et al. (2019) and Al Ahbabi et al. Therefore, it is suggested that hospital managers use strategic knowledge management processes to improve organizational performance so that key work processes can be done better and more organizational goals are achieved. Finally, the results of this study showed that the implementation of lean six sigma affect organizational performance (H4) through the mediating variable of strategic knowledge management. Considering that, this research has been done in private hospitals in Tehran- Iran., different results may be obtained in other places and organizations. Researchers have always encountered limitations and challenges in their research, some of the limitations of the present study included the lack of awareness and knowledge of the research community (managers of private hospitals) of the concepts of six-sigma lean management, and as a result, some of them refused to complete the questionnaire. Another challenge was managers' lack of discernment of the differences between the Lean six sigma and other process improvement measures and they considered their process improvement programs as lean Six Sigma. Another limitation and challenge was the lack of familiarity of managers with strategic knowledge management concepts that reduced the accuracy of their responses.

Finally, suggestions for further research are provided:

- Using methods such as in-depth interviews with experts and Delphi method to strengthen and improve hypotheses
- Collecting data in all public and private health centers and optimizing the proposed model
- Investigating the effect of success factors on the implementation of lean six sigma an on different dimensions of organizational performance and strategic knowledge management
- Investigating the effect of the presence or absence of quality management approaches such as ISO on the proposed model

- Investigating risk factors and crises against implementing lean six sigma on the proposed model
- Investigating all organizational factors to have a better understanding of strategic knowledge management.

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