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Investigating Strategies for Dealing with Barriers of Implementing a Knowledge Management System

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Abstract: *Knowledge management has not only been considered for cost efficiency and management effectiveness in problem solving, decision making, innovation, and other elements needed to maintain and develop competitive advantage, but also is designed mainly for organizations to acquire, classify, maintain, and disseminate, list knowledge and expertise forming part of organizational memory in an irregular unstructured way. To survive in today's more complex and uncertain business environment, organizations are forced to implement knowledge management in order to gain competitive advantage; however, due to the high failure rate of knowledge management projects, they are needed to assess their current situation through reliable and scientific approaches and to adopt and implement the appropriate strategies for the project to succeed. Considering the above mentioned conditions, failure to identify and eliminate the barriers before and during the implementation of KM project faces organizations a range of challenges and complexities leading to a failure of the KM project, so that the organization not becomes able to benefit from the implementation of a KM project in spite of devoting a lot of time and resources.*

Keywords: *Knowledge Management, Defense Industries` Organization, Knowledge Management System Implementation, System Dynamics*

INTRODUCTION

Statement of Problem

It is obvious that knowledge plays a significant role in today's global complex environment. The industry will be guided by organizations which are able to accumulate, distribute and manage the information in an effective way. KM is primarily concerned with organizations that operate based on the knowledge; organizations experience an increasingly turbulent business environment more recently. Therefore, organizations are needed to implement knowledge management in order to gain competitive advantage and should be able to assess their current situation and adopt the appropriate strategies to implement the project. While shifting to a learning and knowledge-based organization, the Defense Industries` Organization (DIO) needs to pay special attention to the production, recording, maintenance, and exploitation of the acquired knowledge. As a result, it is essential for the organization to establish an integrated knowledge management system at all levels, particularly for operational units. The Arms Industry Group has received much attention as one of the main groups of the organization. The current study sought to assess the successful implementation of knowledge management system using a range of indicators. They included development and implementation of knowledge management systems, compilation and scientific publications per capita (article and book), share of inventions registered among other organizational units compared to the number of subsets of the industrial group. Based on the assessments, all these indicators were below the average organizational level, which have been the

concerns of the organization based on the size of the group and the importance of its missions. According to The 20-Year Vision Plan document (Horizon, 1404), the development and promotion of knowledge-based organizations are one of the critical areas involved in science and technology. In addition, the Defense Industries` Organization (DIO) has paid special attention to the implementation of an integrated knowledge management system to become a knowledge-based organization at all levels of the organization, especially its operational units. Therefore, identifying key success factors and barriers toward implementing a knowledge management system, planning to improve the strengths and reducing the barriers have been the issues that have raised concerns for the organization under study. This study sought to identify barriers prior to the implementation of a knowledge management project within the organization using the dynamic systems and analyzed the relationship between the barriers for determining their significance and weight to have a better attitude and understanding of the existing situation and finally implemented appropriate solutions to remove relevant obstacles.

Background of the Study

In general, several studies have been conducted on the knowledge management in Iran; however, they have been only interested in analyzing barriers to successful knowledge management implementation and did not prioritize them, and mainly focused on mentioning and counting the main obstacles, as well as arranging them in the order of importance without using a systematic and structured approach. Most of these studies primarily focused on identifying key success factors. Other studies focused on other components including organizational structure, individual and technology. For example, in a study conducted by Valamohammadi (2010), it was found that components such as information technology, rewarding, motivation and benchmarking the excellence models have been among the main success factors, which are less important than other research factors. In another study, Wang (2009) suggested that little research has been undertaken on the development of tools and techniques to measure and assess the success of the KM system, especially from the perspective of knowledge generation. Despite the growing interest in knowledge management system, there is a limited number of models and frameworks that address the success of the knowledge management system, especially those obtained from empirical studies. D. Singh and R. Kant (2008) identified and prioritized Knowledge management barriers and found that levels of barriers are critical for understanding the successful implementation of knowledge management and lack of senior management commitment has been listed as the main barrier for KM implementation based on its driving power and dependence power using the interpretive structural modeling (ISM) methodology. Rynhardt (2008) also showed that managers should be able to facilitate a more open and informal channels of communication with their employees and identified two major kinds of knowledge management barriers: individual-related barriers: culture, time, tacit knowledge, trust, value identification, language and preferred sharing; organization -related barriers: strategy development, rewarding, resource allocation, senior management support, organizational structure, number of employees, organizational culture, unidirectional or one-way knowledge management, competition and leadership power. S. Zyngier (2002) reported that there are a multitude of factors that have a negative impact on the implementation of knowledge management in organizations that are known as barriers to KM barriers, which may result from internal or external barriers. Internal barriers tend to arise from the culture and organizational structure, and external barriers are often outside the immediate control of the organization. According to Wang (2009), to have a successful knowledge-driven organization, organizations should incorporate cultural characteristics needed to implement knowledge management in the organization and the knowledge can be effectively created and shared in the organization if it is supported by the organizational culture. He also maintained that organizational culture can be used as a powerful leverage to strengthen organizational behavior since weak organizational culture may stop people making an effort to maintain their personal strength and efficiency, as well as to share and disseminate their knowledge.

Methodology

The statistical population of the study included managers and experts of Parsian Technology Group working in Defense Industries Organization (N = 34). Questionnaires, library resources and interviews were used to collect the required data. The information included in the questionnaire was provided by analyzing the questionnaires of other foreign and domestic researchers regarding the indicators of knowledge management. The questionnaire items were designed based on the 5-point Likert scale ranging from strongly agree; agree; neither agree nor disagree; disagree; strongly disagree. Therefore, the qualitative and nonparametric information was interpreted using the quantitative and numerical values, and were the basis for calculating the criteria. The Likert scale was used to determine the importance of each variable. It should be noted that a total of 32 questionnaires were distributed among the experts and specialists. The questionnaire classified the main factors into five groups of organizational culture, organizational structure, human resources, technology and socio-political factors. Three experts specialized in this area confirmed and analyzed the organization's current situation. The significance of the factors was identified using Friedman test and represented through dynamic correlation analysis and dependency factors. Next, the elements and main criteria as well as the relevant sub-criteria were identified and their interrelationships were explored. These data were then analyzed using SPSS, version 24, software and the type of relationship between the criteria was determined using Delphi method and dynamic systems.

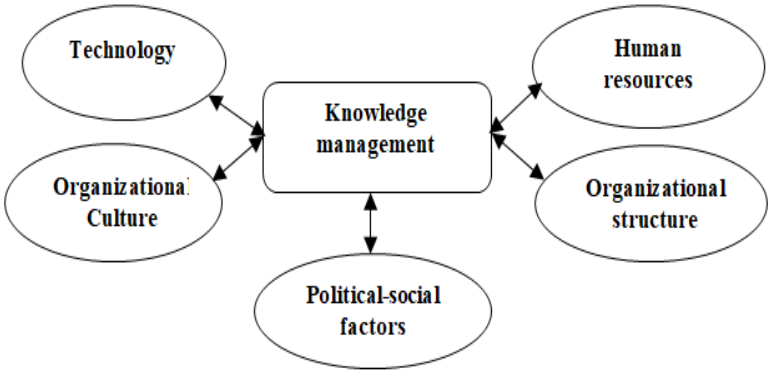

Figure 1. Proposed Conceptual Model

Having gathered the experts' opinions using the correlation test, the consistency of accumulated responses have been analyzed. Then, the consistency rates of the paired-comparison consensus were calculated to be smaller than the acceptable level (0.1) and reliable. The relationships were illustrated in Figure 2:

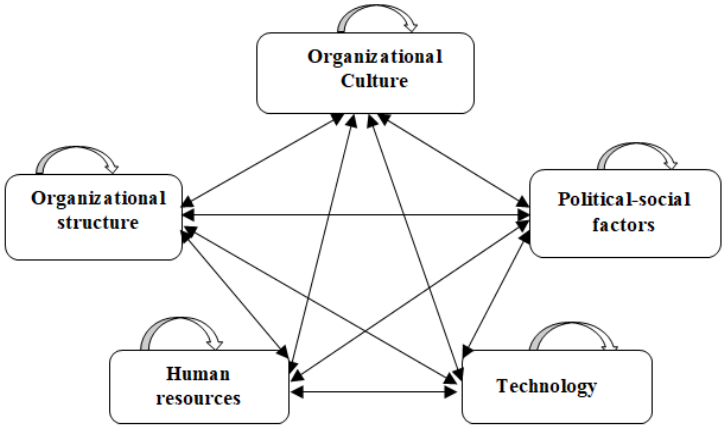

Figure 2. Relations between the main factors

The weights of the criteria and sub-criteria were determined using the identified relationships and they were finally prioritized. This can help us to present a more realistic picture of the subject under study.

Results and findings

In order to analyze the data normality, the null assumption was tested at the 5% error level based on the normal distribution of the data. Therefore, the data showed the normal distribution if the test statistic was greater than or equal to 0.05. The following statistical assumptions were formulated for the normality analysis.

H0: All variables are not normally distributed.

H1: All variables are normally distributed

Table 1. Normality test of research variables

Description	Cultural factors	Technology	Human Factors	Political-social factors	Implementation of knowledge management
Number of sample members	34.00	34.00	34.00	34.00	34.00
mean	2.98	2.40	2.77	2.74	3.01
Standard deviation	0.90	0.93	0.94	0.72	0.80
Positive values	0.14	0.21	0.14	0.17	0.17
Negative values	0.13-	0.12-	0.11-	0.11-	0.08-
Z Kolmogorov-Smirnov	0.82	1.23	0.78	1.01	0.96
Significance level	0.52	0.10	0.57	0.26	0.31
result	normal	normal	normal	normal	normal

According to Table 1, since the significance value of all variables was higher than 05, it can be concluded that all variables of the study were not normally distributed, and the parametric test including correlation coefficient and regression could be used to test the research hypotheses.

Table 2. Descriptive statistics of research questions

Component	Description	Number	Mean	Standard deviation	Deviation from the mean
Implementation of knowledge management	Q30	34.00	3.06	0.95	0.16
	Q29	34.00	3.15	1.10	0.19
	Q28	34.00	2.94	1.04	0.18
	Q27	34.00	3.03	0.90	0.16
	Q26	34.00	2.85	1.13	0.19
Political-social factors	Q25	34.00	3.15	0.99	0.17
	Q24	34.00	2.44	1.02	0.18
	Q23	34.00	2.50	0.90	0.15
	Q22	34.00	2.56	1.13	0.19
	Q21	34.00	3.06	0.89	0.15
Human Factors	Q20	34.00	3.44	1.13	0.19
	Q19	34.00	3.06	1.10	0.19
	Q18	34.00	2.62	1.23	0.21
	Q17	34.00	2.56	0.82	0.14
	Q16	34.00	2.18	1.29	0.22

Technology	Q15	34.00	1.88	1.01	0.17
	Q14	34.00	2.71	1.47	0.25
	Q13	34.00	2.50	0.99	0.17
	Q12	34.00	2.38	1.04	0.18
	Q11	34.00	2.53	1.35	0.23
Organizational Culture	Q5	34.00	3.32	1.07	0.18
	Q4	34.00	3.00	1.23	0.21
	Q3	34.00	3.24	1.21	0.21
	Q2	34.00	2.74	1.19	0.20
	Q1	34.00	2.62	0.89	0.15

As shown in the table above, the highest mean belonged to the item 20 of human factors (skill, expertise, and experiences) and the lowest belonged to the item 15 (technology).

Correlation coefficient of independent variables

The table below shows the bidirectional relationships among the variables using the Pearson correlation coefficient:

Table 3. Correlation coefficient of independent research variables

Description	Organizational Culture	Technology	Human Factors	Political Factors
Organizational Culture	1.00	0.68	0.52	0.57
Organizational Structure	0.80	0.70	0.74	0.71
Technology	0.68	1.00	0.77	0.71
Human Factors	0.52	0.77	1.00	0.88
Political Factors	0.57	0.71	0.88	1.00

According to the above table, there was a direct relationship between the organizational culture and organizational structure (0.08), and culture and technology (0.68). Other information regarding the bidirectional relationships among the independent variables has been given in the table above.

Inferential statistics

Due to the consistency of all the assumptions of the present study, a technical statistical method called Pearson Correlation Coefficient has been utilized to test the hypotheses.

Testing hypotheses

Having presented the research hypotheses and using Pearson correlation coefficient and regression, it was intended to test the research assumptions and analyze the results.

1. Organizational culture has a positive impact on the successful implementation of a knowledge management system in an industrial organization.
2. Technology has a positive impact on the successful implementation of a knowledge management system in an industrial organization.
3. Human factors have a positive impact on the successful implementation of a knowledge management system in an industrial organization.
4. Socio-political factors have a positive impact on the successful implementation of a knowledge management system in an industrial organization.

Table 4. Summary of the first hypothesis model

Summary of the model				
Description	Correlation coefficient	Coefficient of determination	Adjusted coefficient of determination	Deviation from estimate
The impact of organizational culture on the successful implementation of knowledge management system	0.537	.288	0.266	0.68

Table 5. Testing the first hypothesis

Coefficients					
	Non-standard coefficients		standard coefficients		Significance
The impact of organizational culture on the successful implementation of knowledge management system	Beta coefficient	standard deviation	Beta coefficient	t-value	
	0.48	0.13	0.54	3.60	0.00

According to Table 4, the correlation coefficient between the organizational culture variables and the successful implementation of the knowledge management system was 0.537, suggesting a direct relationship between the two variables (0.537). In addition, the adjusted coefficient of determination for the organizational culture was calculated 0.266, indicating that organizational culture had an impact (26%) on the successful implementation of the knowledge management system. As shown in Table 5, since the significance level was less than 0.5, it can be concluded that there was a significant and direct relationship between the organizational culture and the successful implementation of knowledge management system, suggesting that the probability of successful implementation of knowledge management system could be increased if the organization could take some steps to implement the technologies related to knowledge management creation within the organization.

Table 6. Summary of the third hypothesis model

Summary of the model				
Description	Correlation coefficient	Coefficient of determination	Adjusted coefficient of determination	Deviation from estimate
The impact of technology on the successful implementation of knowledge management system	0.486	0.24	0.21	0.71

Table 7. Testing the third hypothesis

Coefficients					
	Non-standard coefficients		standard coefficients		Significance level
The impact of technology on the successful implementation of knowledge management system	Beta coefficient	Standard deviation	Beta coefficient	t-value	
	0.42	0.13	0.49	3.15	0.00

As shown in Table 6, the value of correlation coefficient between the technology variables and the successful implementation of the knowledge management system was 0.486, suggesting a direct relationship between the two variables (0.486). In addition, the adjusted coefficient of determination for the organizational structure was calculated 0.21, indicating that organizational structure had an impact (21%) on the successful implementation of the knowledge management system. As shown in Table 7, since the significance level was less than 0.5, it can be concluded that there was a significant and direct relationship between the technology and the successful implementation of knowledge management system, suggesting that the probability of successful implementation of knowledge management system would be increased if the organization could

take some steps to implement the technologies related to knowledge management creation within the organization.

Fourth hypothesis of research

Human factors have a positive impact on the successful implementation of a knowledge management system in an industrial organization. Moreover, indicators related to human factors included:

1. Understanding the value of knowledge assets by the organization
2. Freedom of employees to share their knowledge
3. Professional knowledge sharing by the employees
4. Encouraging employees to share in organizational knowledge creation
5. Encouraging employees to utilize organizational knowledge

Table 8. Summary of the third hypothesis model

Summary of the model				
Description	Correlation coefficient	Coefficient of determination	Adjusted coefficient of determination	Deviation from estimate
The impact of human factors on the successful implementation of knowledge management system	0.77	0.59	0.58	0.52

Table 9. Analysis of the third hypothesis

Coefficients					
	Non-standard coefficients		standard coefficients		Significance level
The impact of human factors on the successful implementation of knowledge management system	Beta coefficient	standard deviation	Beta coefficient	t-value	
	0.85	0.13	0.77	6.76	0.00

According to Table 8, the value of correlation coefficient between the human factors variables and the successful implementation of the knowledge management system was 0.77, suggesting a direct relationship between the two variables (0.77). In addition, the adjusted coefficient of determination for the organizational structure was calculated 0.58, indicating that organizational structure had an impact (58%) on the successful implementation of the knowledge management system. As shown in Table 9, since the significance level was less than 0.5, it can be concluded that there was a significant and direct relationship between the human factors and the successful implementation of knowledge management system, suggesting that the probability of successful implementation of knowledge management system would be increased if the engaged human resource within the organization was more willing to implement the knowledge management.

Table 10. Summary of the fourth hypothesis model

Summary of the model				
Description	Correlation coefficient	Coefficient of determination	Adjusted coefficient of determination	Deviation from estimate
The impact of political-social factors on the successful implementation of knowledge management system	0.611	0.37	0.35	0.64

Table 11. Analysis of the fourth hypothesis

Coefficients					
	Non-standard coefficients		standard coefficients		Significance level
The impact of political-social factors on the successful implementation of knowledge management system	Beta coefficient	standard deviation	Beta coefficient	t-value	
	0.52	0.12	0.61	4.37	0.00

According to Table 10, the value of correlation coefficient between the political-social factors variables and the successful implementation of the knowledge management system was 0.61, suggesting a direct relationship between the two variables (0.61). In addition, the adjusted coefficient of determination for the organizational structure was calculated 0.35, showing that political-social factors had an impact (35%) on the successful implementation of the knowledge management system. As shown in Table 11, since the significance level was less than 0.5, it can be concluded that there was a significant and direct relationship between the political-social factors and the successful implementation of knowledge management system, suggesting that the probability of successful implementation of knowledge management system would be increased if the organization was more willing to implement the knowledge management.

Friedman test

Friedman test was used to rank the significance of research variables. This test is a non-parametric alternative to the one-way ANOVA, in which k is assigned randomly to n blocks. According to the table, the respondents ranked human resource, cultural, structural, and political, social, and technological factors as the most important ones to implement the knowledge management, respectively.

Table 12. Friedman Test to rank factors affecting the implementation of knowledge management

Average raking	Component	ranking
3.57	Human factors	1
3.38	cultural factors	2
3.37	Structural factors	3
2.94	Political and social factors	4
2.24	Technological factors	5

Table 13. Significance level of Friedman test

Number	34
Chi-square statistics	12.68
Degrees of freedom	4
Significant level	0.001

Moreover, the following graph showed the ranking of factors affecting the successful implementation of knowledge management system:

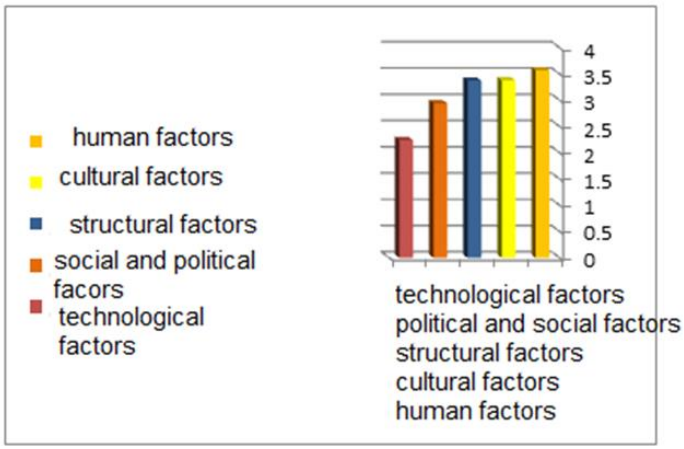

Chart 1. Ranking factors affecting the successful implementation of knowledge management system

Results of the first hypothesis

According to this hypothesis, numerous studies have shown that culture is considered as the key factor in determining the effectiveness of knowledge sharing. Organizational culture not only determines the kind of knowledge management, but also the value of the knowledge in creating the competitive advantage of the organization. The results of this study revealed that there was a significant and direct relationship between an appropriate and supporting organizational culture in knowledge sharing and the implementation of knowledge management system. This suggested that strengthening the role of organizational culture in knowledge management may increase the successful implementation of knowledge management system implementation within the organization. In addition, it was found that cultural factors ranked the second most effective factor for successful implementation of knowledge management system.

Results of the second hypothesis

According to this hypothesis, in order to maximize the value of their knowledge, organizations need to utilize technology and develop an appropriate system to support the knowledge flow process for establishing the knowledge management system. The results of this study showed that there was a significant and direct relationship between an appropriate and supporting technology and the implementation of knowledge management system. This suggested that strengthening the role of technology in knowledge management may increase the successful implementation of knowledge management system implementation within the organization. In addition, it was found that technological factors ranked the fourth most effective factor for successful implementation of knowledge management system.

Results of the third hypothesis

According to this hypothesis, human resource is the most important asset of an organization. In order to successfully establish knowledge management, each organization must first require the human resources to believe in the knowledge management system**.** In addition, understanding the value of knowledge assets by the organization, freedom of employees to share their knowledge, professional knowledge sharing by the employees, encouraging employees to share in organizational knowledge creation, as well as encouraging employees to utilize organizational knowledge have been mentioned among the factors influencing the successful implementation of knowledge management system. The results of the current study showed a significant and direct relationship between a supporting human resource and the implementation of knowledge management system. Therefore, human resource factors ranked the first factor affecting the successful implementation of knowledge management system.

Results of the fourth hypothesis

According to this hypothesis, intra-organizational political factors can shorten the road to successful knowledge management. In addition to formal groups, all organizations have informal groups that play a significant role in achieving the organizational goals. Therefore, paying attention to political factors and the recognition of social groups within the organizations could be effective for implementing knowledge management system.

Final conclusion

All four proposed hypothesis of the study have been confirmed based on the results of our study, previous research and expert survey. It should be noted that considering the individual relationships between the independent and dependent variables, independent variables showed that all four factors had a direct impact on the barriers to the successful implementation of knowledge management. Besides, analyzing the current situation of the unit can help us to easily identify the areas that need further improvement and development.

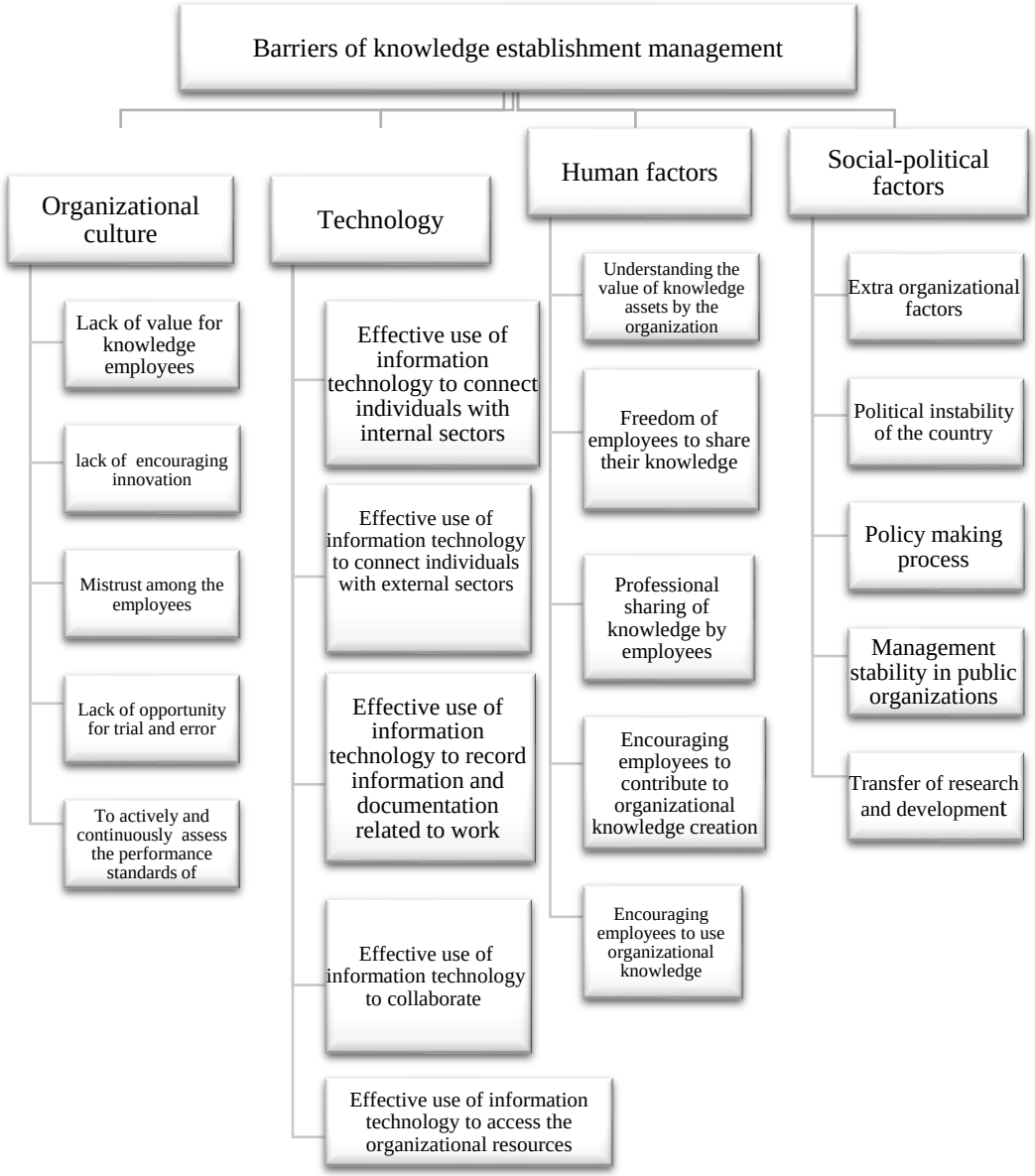

Figure 3: Indicators

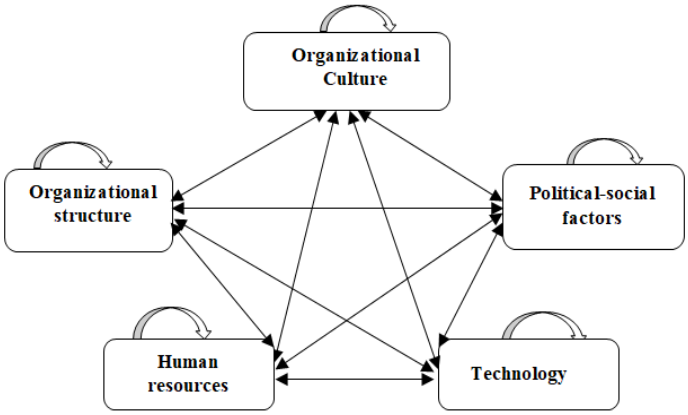

Figure 4: Final model.

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