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# Identifying and prioritizing critical success factors for the knowledge production Case Study: A Defense Organization

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**ABSTRACT**

To succeed in knowledge production, there are several key factors that vary under a variety of conditions, such as organizational culture, organization size, organization's mission, and motivational approaches. Ignoring and negligence about the factors affecting knowledge production is likely to prevent an organization from trying to achieve its full benefits. Knowledge production provides the ground for increasing the productivity of human resources and creating a competitive advantage. Nowadays, societies can move on the path of development that equip their human resources with knowledge and skills by creating the grounds for creativity and innovation. The purpose of this study was to identify and prioritize the critical factors of success of knowledge production in a defense organization using the DEMATEL method. The type of applied research and the research method are mixed and due to the discovery of the most important critical factors for the success of knowledge production, it has an exploratory nature. The results showed that 16 factors in three dimensions of organizational, individual and environmental have a significant effect on the success of knowledge production in the studied organization.

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## Introduction

One of the concerns of those in charge of knowledge management in any organization is "identifying the success factors of knowledge production and management". There is no single prescription for this issue that can be used in all organizations, and it varies from one organization to another according to various factors such as organizational culture, the size of the organization, the mission of the organization, and motivational approaches. These factors can also be different in different organizations and industries. For example, the success factors of knowledge management in a project-based organization in the oil and gas industry are not necessarily the same as those of a defense organization.

Many factors can affect the success of organizational knowledge management. Technological and organizational infrastructures, organizational culture, the support of senior managers of the organization, creating conditions for the protection of people's intellectual property, etc. are among these factors. Knowledge management practices in some organizations have failed, because in these organizations, knowledge management is a transient thing and is considered in a short period of time. The purpose of knowledge production and management is to support the achievement of business goals, and the allocation of knowledge and participation in it well requires encouragement and recognition at the level of employees and information needs assessment at the level of organizational people and the macro level of the organization, and it is considered the most important measure to be aware of knowledge-based functions in the organization. Maintaining strategic commitment and cultural cohesion leads to the inference of knowledge-based performances that are vital for the success of the organization's managers.

## Statement of the problem

Nowadays, the physical and tangible assets of organizations such as money, buildings, and equipment are no longer considered as competitive advantages, but the knowledge of human resources and intellectual capital play a decisive role in increasing their competitiveness (Seftari[1], 2020). This has led to significant changes in the field of management science in a way that it is referred to as knowledge management. For the success of an organization, knowledge as an asset must be exchangeable between humans and have the ability to grow (Zain[2], 2020). The most important goal of using knowledge management in organizations is to quickly adapt to the changes in the surrounding environment in order to innovate, be more productive, and profitable, so knowledge management refers to the process of how, create, disseminate, and apply knowledge in the organization (Farisi[3], 2018). Nowadays, due to the rapid production and development of knowledge and the increase in environmental uncertainty, the implementation of knowledge management is very important, on the other hand, the high cost of implementing knowledge management has made success in this field a major concern for researchers and managers (Edman[4], 2017). The importance of knowledge production in modern disciplines is due to its significant impact on the promotion of the value of organizations and institutions and the economy in general, because it leads to a competitive advantage These organs add and contribute to decision-making, balanced with minimal errors, and knowledge management to create an environment that fosters creativity and innovation through knowledge sharing and networking with experts and deepening it. Despite the numerous knowledge generation projects in different institutions around the world, there is a significant difference in the success of such projects, according to which between 40% of

[1] Septari
[2] Zain
[3] Farisi
[4] Othman

knowledge management initiatives are in faces, but these studies do not justify clear evidence of such a high percentage of failures (Zain et al5., 2020). Different cultures are different. Organizations need to be aware of the factors that influence the success of a knowledge management initiative. Key success factors are the critical points of management planning and action that are essential to achieving effectiveness. These activities need to be nurtured if they already exist, and they must otherwise be created. In short, knowledge generation and creation is a key process in transforming personalized learning is about organizational ability. Knowledge in the organization is created in two distinct cycles, individual and group. Despite the fact that two cycles create two different types of knowledge and are often used differently, they are related. Personal knowledge, when used in the organizational context, creates new knowledge that can be called organizational knowledge (Hojjatpour, 2021).

Defense organizations operate in highly competitive conditions, and the result of this competition shows its effect in possible wars. The turbulent environment and environmental uncertainties also cause the production of knowledge to be considered as an endless process that includes the creation of new ideas, the recognition of new patterns, the combination of rules separates from each other, and the creation of new processes. Therefore, the purpose of this study is to identify and prioritize the critical factors of the success of knowledge production in a defense organization, and the research answers the question that what are the critical factors of the success of knowledge production in the organization under study?

### Necessity of research:

By ignoring the factors affecting the production of knowledge, they will witness the following problems:
1. Hard access to critical and key knowledge for decision-making
2. Relying on existing and incomplete knowledge
3. Lack of Recruitment of New Scholars
4. Helping to properly implement the process of management and knowledge production
5. Time-consuming decision-making and decision-making process

### An overview of the research:

In the present study, the critical factors of success of knowledge production from three domains of environmental, individual, and organizational have been thoroughly investigated. As far as research and investigation has been done, it seems that other researchers have not paid attention to these three areas to date, so the present study is new and has an innovative aspect. However, there may be similar facts that have been hidden from the researcher's view.

## Research goal:

**Main Purpose:**

- Identifying and prioritizing the critical factors for the success of knowledge production.

[5] Zain

**Subsidiary Objectives:**

- Identifying the Critical Factors for the Success of Knowledge Production in the Organizational Field
- Identifying the Critical Factors for the Success of Knowledge Production in the Environmental Field
- Identifying the critical factors for the success of knowledge production in the individual field
- Prioritizing the Critical Factors of Knowledge Production Success in Three Dimensions of Organizational, Environmental and Individual

## Research Hypothesis:

Due to the exploratory nature of the research, no hypothesis has been presented.

## Research questions:

1. What are the critical factors affecting the success of knowledge production in the defense organization under study?

2. What are the critical factors affecting the success of knowledge production in the organizational field?

3. What are the critical factors affecting the success of knowledge production in the environmental field?

4. What are the critical factors affecting the success of knowledge production in the individual domain?

5. What are the factors affecting the success of knowledge production in three areas (organizational, environmental, and individual)?

## Research Methods:

The present study is based on a descriptive-analytical method and is applied in terms of purpose. The purpose of this study is to identify the critical factors of success of knowledge production using the DEMATEL method. In the present study, the DEMATEL method will be used to identify the critical factors of the success of knowledge production. In order to categorize the data and also collect data, three factors (organizational, environmental, and individual) are considered. In this study, using the DEMATEL method, the factors affecting the production of knowledge in a defense organization are extracted and by distributing a questionnaire among its managers, the data are summarized and finally the most important causes are identified by using the DEMATEL method and interviews with experts. The stages of the present study are as follows:

1- Studying the foundations of research and valid domestic and foreign articles and using the library method.
2- Identifying the critical factors for the success of knowledge production and developing and distributing questionnaires to confirm them.
3- Using the DEMATEL method in order to rank and identify the most important factors.

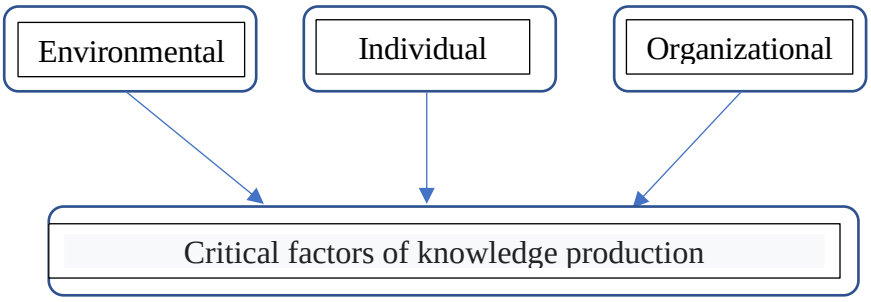


**Figure (1) the research model is inspired by:**
**Farisi[6] et al., (2021)**

## Statistical population and statistical sample

In the present study, the sample size corresponds to the statistical population and the whole count method has been used. The statistical population includes 13 experts in the study organization.

**Table (1) statistical population**

| Age | Years of Service | Grade | sex |
|---|---|---|---|
| 35 to 45 years – 8 people | 5 to 10 years – 2 people | Bachelor's Degree 3 | 2Woman |
| 45 to 55 years – 4 people | 10 to 15 years – 7 people | M.Sc. 6 people | 11 Men |
| Over 55 years – 1 person | Over 15 years – 4 people | Ph.D. 4 people | 13 people |

## Data Collection Method and Tool

In the present study, using the method of library studies and questionnaires, the results and findings related to the critical factors of success of knowledge production will be collected and examined and presented in the following table:

**Table (2) Extracted Factors**

| Source | Sub-Factors | Main factors | Row |
|---|---|---|---|
| Hosseini et al . (2017) | Appropriate organizational culture | | 1 |
| (Rajaei, 2017)/ (Ziauddini, 2011) | Having a network of experts | | 2 |
| Vaezi et al . (2009) | Having a proper organizational structure | | 3 |
| Zayn[7] et al., (2020) | Process reengineering | | 4 |
| Interviews with Experts/(Ziauddini, 2011) | Having a proper knowledge storage system | | 5 |
| Interviews with experts | Conquest of Knowledge | | 6 |
| Interviews with Experts/ Zayn et al., (2020) | Having Knowledge Identification Methods | | 7 |

[6] Farisi
[7] Zain

| Source | Sub-Factors | Main factors | Row |
|---|---|---|---|
| Interviews with experts | Knowledge Audit | Organizational Factors | 8 |
| Interviews with experts | Appropriate Rules and Regulations of the Organization | | 9 |
| Hosseini et al . (2017) | Managers' support and commitment | | 10 |
| Zayn et al., (2020) | High development of information technology | | 11 |
| Rajaei, (2017) | Having the right knowledge transfer channel | | 12 |
| Zayn et al., (2020) | Consider rewards for knowledge production | | 13 |
| Zayn et al. (2020)/ Farisi et al. (2018) | The right strategy and policies of the organization | | 14 |
| Farisi et al. (2018) | Employee turnover rate | | 15 |
| Interviews with experts | Data Updates and Retention | | 16 |
| Ziauddin (2011) | Encouraging interaction with others | | 17 |
| Hosseini et al . (2017) | Staff Training | | 18 |
| Interviews with experts | Strengthening information systems | | 19 |
| Interviews with experts | Transparency in Knowledge Production | | 20 |
| Interviews with Experts/ Farisi et al., (2021) | Having a knowledge-producing personality | Individual factors | 21 |
| Interviews with experts | Having individual innovations in knowledge production | | 22 |
| Farisi et al., (2021) | Trust in the people in the organization | | 23 |
| Ziauddin (2011) | Having high literacy in information technology | | 24 |
| Farisi8 et al., (2021) | Having a person's schedule and instructions | | 25 |
| Interviews with Experts/ Farisi9 et al., (2021) | Updating personal literacy in the field of work | | 26 |
| Septari10 et al. (2020) | Participation in Knowledge Production | | 27 |
| Interviews with experts | Technological Advancements | Environmental factors | 28 |
| Interviews with experts | Existenceof training programs outside the organization | | 29 |
| Shirazi (2021)<br><br>Tangsamy et al. (2018) | Competition in the market | | 30 |

8 Farisi

9 Farisi

10 Septari

| Source | Sub-Factors | Main factors | Row |
|---|---|---|---|
| Interviews with experts | Government Monetary and Fiscal Policies | | 31 |
| Interviews with experts | Changes in working practices | | 32 |
| Ziauddin (2011) | Inflation Rate | | 33 |

DEMATEL Questionnaire is a standard tool used to gather experts' views on the relationship between a set of criteria. In fact, this tool is a square matrix that shows the extent to which criteria and decision-making indicators are related.

In the present study, the DEMATEL method has been used to analyze and identify the interrelationships between factors, which mostly relies on qualitative evaluations and experts' knowledge. Due to the special nature of this method, which is based on the analysis of interactions and evaluations based on the knowledge and experience of experts, the use of reliability and validity criteria that are usually used in quantitative questionnaires has not been considered. Purpose of Use DEMATEL is the analysis of relationships between different factors, in which the validity of the content is ensured through consultation with experts and the use of their expertise to determine and analyze the factors. As a result, the lack of reliability and validity in this method not only does not indicate the importance of these concepts, but also indicates a different approach and specific application of DEMATEL in analyzing the relationship between factors in this research.

## Risk number calculation (rpn):

In the present study, the distribution of a questionnaire is used to identify the factors and the DEMATEL method is used to rank the data. DEMATEL technique is one of the decision-making methods that is based on pairwise comparisons. DEMATEL technique can be used to identify and investigate the relationship between criteria, cause and effect relationships, and to create a map of network relationships. In this study, to identify the relationship between the research variables, the soft MATLAB software was used.

## Identifying the Factors Affecting the Success of Knowledge Production

In order to identify the critical factors of the success of knowledge production with3 questions, the respondents were asked to determine the importance of each of the three mentioned items. To determine the importance of the indicators, experts should use one of the numbers 4, 3, 2, 1 and 5. The table below determines the importance of each item along with the average and standard deviation of each one.

**Table (3) Summary of the results of the questionnaire for determining the indicators**

| Presence or absence in the list of final indicators | Critical Limit | Exam Statistics | Standard deviation | Average | Factors | Row |
|---|---|---|---|---|---|---|
| yes | 1.645 | 9.390 | 1.080 | 3.880 | Appropriate organizational culture | 1 |
| yes | 1.645 | 6.988 | 1.166 | 3.707 | Having a network of experts | 2 |

| Presence or absence in the list of final indicators | Critical Limit | Exam Statistics | Standard deviation | Average | Factors | Row |
|---|---|---|---|---|---|---|
| yes | 1.645 | 9.478 | 1.089 | 3.934 | Having a proper organizational structure | 3 |
| yes | 1.645 | 10.285 | 0.944 | 3.842 | Process reengineering | 4 |
| yes | 1.645 | -5.315 | 1.158 | 2.466 | Having a proper knowledge storage system | 5 |
| yes | 1.645 | -7.969 | 1.164 | 2.195 | Conquest of Knowledge | 6 |
| yes | 1.645 | -5.150 | 1.140 | 2.293 | Having Knowledge Identification Methods | 7 |
| yes | 1.645 | -8.634 | 0.964 | 2.278 | Knowledge Audit | 8 |
| yes | 1.645 | 5.442 | 1.115 | 3.049 | Appropriate Rules and Regulations of the Organization | 9 |
| yes | 1.645 | 3.132 | 1.191 | 3.323 | Managers' support and commitment | 10 |
| yes | 1.645 | -5.279 | 1.156 | 2.271 | High development of information technology | 11 |
| yes | 1.645 | 2.485 | 1.256 | 3.271 | Having the right knowledge transfer channel | 12 |
| yes | 1.645 | -3.925 | 1.281 | 2.564 | Consider rewards for knowledge production | 13 |
| yes | 1.645 | 2.871 | 1.238 | 3.308 | The right strategy and policies of the organization | 14 |
| no | 1.645 | -1.427 | 1.214 | 2.639 | Employee turnover rate | 15 |
| yes | 1.645 | 4.708 | 1.220 | 3.500 | Data Updates and Retention | 16 |
| no | 1.645 | -1.201 | 1.165 | 2.677 | Encouraging interaction with others | 17 |
| yes | 1.645 | -7.856 | 1.104 | 2.248 | Staff Training | 18 |
| yes | 1.645 | -7.750 | 1.063 | 2.286 | Strengthening information systems | 19 |
| no | 1.645 | -1.641 | 1.213 | 2.406 | Transparency in Knowledge Production | 20 |

| Presence or absence in the list of final indicators | Critical Limit | Exam Statistics | Standard deviation | Average | Factors | Row |
|---|---|---|---|---|---|---|
| yes | 1.645 | 5.076 | 1.281 | 3.564 | Having a knowledge-producing personality | 21 |
| yes | 1.645 | -5.626 | 1.159 | 2.331 | Having individual innovations in knowledge production | 22 |
| yes | 1.645 | 10.550 | 0.962 | 3.880 | Trust in the people in the organization | 23 |
| yes | 1.645 | -5.760 | 1.117 | 2.248 | Having high literacy in information technology | 24 |
| yes | 1.645 | 5.853 | 1.156 | 3.586 | Having a person's schedule and instructions | 25 |
| yes | 1.645 | -5.130 | 1.075 | 2.429 | Updating personal literacy in the field of work | 26 |
| yes | 1.645 | 6.363 | 1.145 | 3.632 | Participation in Knowledge Production | 27 |
| yes | 1.645 | -5.420 | 1.157 | 2.556 | Technological Advancements | 28 |
| yes | 1.645 | 3.444 | 1.234 | 3.368 | Existence of training programs outside the organization | 29 |
| yes | 1.645 | -6.680 | 1.103 | 2.361 | Competition | 30 |
| yes | 1.645 | -6.656 | 1.159 | 2.331 | Government Monetary and Fiscal Policies | 31 |
| yes | 1.645 | 5.550 | 0.962 | 3.880 | Changes in Work and Employment Practices | 32 |
| yes | 1.645 | -7.760 | 1.117 | 2.248 | Inflation Rate | 33 |

As it is clear in the table, after calculating the mean and standard deviation of the answers and holding a one-sample t-test out of the 33 studied indicators, only 30 items remained in the list of factors affecting the success of knowledge production. The table shows the identification of the factors affecting the success of knowledge production. Experts were also asked to comment on the accuracy of the 30 proposed indicators in the form of the study. After careful investigations, these indicators were confirmed by them in the desired format.

**Table (4) Factors Affecting the Success of Knowledge Production**

| Index | Sub-Factors | Agent |
|---|---|---|
| S1 | Appropriate organizational culture | Organizational Factors |
| S2 | Having a network of experts | |
| S3 | Having a proper organizational structure | |
| S4 | Process reengineering | |
| S5 | Having a proper knowledge storage system | |
| S6 | Conquest of Knowledge | |
| S7 | Having Knowledge Identification Methods | |
| S8 | Knowledge Audit | |
| S9 | Appropriate Rules and Regulations of the Organization | |
| S10 | Managers' support and commitment | |
| S11 | High development of information technology | |
| S12 | Having the right knowledge transfer channel | |
| S13 | Consider rewards for knowledge production | |
| S14 | The right strategy and policies of the organization | |
| S15 | Data Updates and Retention | |
| S16 | Staff Training | |
| S17 | Strengthening information systems | |
| F1 | Having a knowledge-producing personality | Individual factors |
| F2 | Having individual innovations in knowledge production | |
| F3 | Trust in the people in the organization | |
| F4 | Having high literacy in information technology | |
| F5 | Having a person's schedule and instructions | |
| F6 | Updating personal literacy in the field of work | |
| F7 | Participation in Knowledge Production | |
| M1 | Technological Advancements | Environmental factors |
| M2 | Existence of training programs outside the organization | |
| M3 | Competition | |
| M4 | Government Monetary and Fiscal Policies | |
| M5 | Changes in  Work and Employment Practices | |
| M6 | Inflation Rate | |

**Determining the Cause and Effect Network of the Problem Using DEMATEL Method**

Step 1: Preparing the Direct Relationship Matrix

In this part of the research, in order to measure the relationships between factors with the help of experts' opinions, we need a four-level comparative scale. These four scales, which are used to describe the extent of the relationships of factors over each other, are, respectively:

**Table (5) Verbal Expressions Used in Research**

| Row | Verbal Phrase |
|---|---|
| 1 | ineffective |
| 2 | Low impact |
| 3 | High impact |
| 4 | Quite effective |

Since in the previous section, the number of factors was obtained as 17, 7, and 6, respectively, so we will have a square matrix of pairwise comparisons with the number of rows and columns of 17, 7, and 6. In addition, since the members of the decision group are 13 people, we will add up the results of different people's comments together and make an average of

them. The following table shows the effect of factors affecting success The production of knowledge reflects on each other. Due to the limitations of part of the table.

**Table (6) The Impact of Factors Affecting the Success of Knowledge Production**

A) Organizational Factor

| Agent | S1 | S2 | S3 | S4 | S5 | S6 | S7 | S8 | S9 | S10 | S11 | S12 | S13 | S14 | S15 | S16 | S17 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| S1 | 0.000 | 2.125 | 0.500 | 2.000 | 2.500 | 0.000 | 0.000 | 1.500 | 2.500 | 0.000 | 0.000 | 0.000 | 0.000 | 2.000 | 0.000 | 0.000 | 0.000 |
| S2 | 2.125 | 0.000 | 1.000 | 2.000 | 2.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| S3 | 1.500 | 2.500 | 0.000 | 2.000 | 0.000 | 1.500 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 2.000 | 2.000 | 0.000 | 0.000 |
| S4 | 0.000 | 0.000 | 2.000 | 0.000 | 2.000 | 2.250 | 0.000 | 0.000 | 0.000 | 1.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.500 | 0.500 | 0.000 |
| S5 | 1.000 | 1.000 | 0.000 | 2.000 | 0.000 | 2.000 | 0.000 | 2.000 | 1.750 | 0.000 | 0.000 | 0.125 | 2.625 | 0.000 | 0.000 | 0.500 | 0.000 |

B) Individual factor

| Agent | F1 | F2 | F3 | F4 | F5 | F6 | F7 |
|---|---|---|---|---|---|---|---|
| F1 | 0.000 | 0.000 | 2.000 | 2.000 | 1.500 | 0.000 | 0.000 |
| F2 | 2.000 | 0.000 | 2.000 | 2.000 | 2.000 | 1.500 | 0.000 |
| F3 | 1.000 | 2.000 | 0.000 | 2.000 | 1.500 | 1.500 | 0.000 |
| F4 | 0.000 | 0.000 | 0.000 | 0.000 | 2.000 | 0.000 | 2.000 |
| F5 | 0.000 | 0.000 | 0.000 | 1.500 | 0.000 | 0.000 | 2.500 |
| F6 | 1.500 | 2.000 | 2.000 | 2.000 | 2.000 | 0.000 | 0.000 |
| F7 | 0.000 | 1.000 | 0.000 | 0.000 | 1.500 | 0.000 | 0.000 |

C) Environmental factor

| Agent | M1 | M2 | M3 | M4 | M5 | M6 |
|---|---|---|---|---|---|---|
| M1 | 0.000 | 2.000 | 2.000 | 2.000 | 0.000 | 0.000 |
| M2 | 2.000 | 0.000 | 2.000 | 2.000 | 0.000 | 0.000 |
| M3 | 0.000 | 0.000 | 0.000 | 2.000 | 2.000 | 2.500 |
| M4 | 0.000 | 0.000 | 2.000 | 0.000 | 0.000 | 2.000 |
| M5 | 0.000 | 0.000 | 2.000 | 2.000 | 0.000 | 2.000 |
| M6 | 0.000 | 0.000 | 2.000 | 2.000 | 2.000 | 0.000 |

Step 2: Normalize the Direct Relationship Matrix

Through the following formulas, the matrix of direct relations can be converted to the normal matrix of direct relationships. Z

$$X = s.Z,$$

$$s = \min\{1/\max_{1\le i\le n}\sum_{j=1}^{n} z_{ij}\,,\ 1/\max_{1\le j\le n}\sum_{i=1}^{n} z_{ij}\}\,,\quad i,j = 1,2,\dots,n$$

That is, we calculate the maximum for all rows and columns and then use the above relationship. The result of the above calculations is shown in the table below. Here is an example of the normalized matrix of the organizational factor.

**Table (7) Normalized Organizational Agent Matrix**

| Agent | S1 | S2 | S3 | S4 | S5 | S6 | S7 | S8 | S9 | S10 | S11 | S12 | S13 | S14 | S15 | S16 | S17 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| S1 | 0.0000 | 0.0881 | 0.0207 | 0.0829 | 0.1036 | 0.0000 | 0.0000 | 0.0622 | 0.1036 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0829 | 0.0000 | 0.0000 | 0.0000 |
| S2 | 0.0881 | 0.0000 | 0.0415 | 0.0829 | 0.0829 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| S3 | 0.0622 | 0.1036 | 0.0000 | 0.0829 | 0.0000 | 0.0622 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0829 | 0.0829 | 0.0000 | 0.0000 |
| S4 | 0.0000 | 0.0000 | 0.0829 | 0.0829 | 0.0829 | 0.0933 | 0.0000 | 0.0000 | 0.0000 | 0.0415 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0207 | 0.0207 | 0.0000 |
| S5 | 0.0415 | 0.0415 | 0.0000 | 0.0829 | 0.0000 | 0.0829 | 0.0000 | 0.0829 | 0.0725 | 0.0000 | 0.0000 | 0.0052 | 0.1088 | 0.0000 | 0.0000 | 0.0207 | 0.0000 |

Step 3: Forming the General Relationship Matrix

The normalized matrix of the previous stage was named X, the general relationship matrix is calculated in the form of a relationship:

$$T = X(I - X)^{-1}$$

That is, first, we subtract the normalized matrix of the previous stage from the same matrix and reverse the result. The following table shows some of the results of the calculations of the research problem.$(\mathrm{I} - \mathrm{X})^{-1}$

**Table (8) Results of Research Problem Calculations$(I - X)^{-1}$**
**A) Organizational Factor**

| Agent | S1 | S2 | S3 | S4 | S5 | S6 | S7 | S8 | S9 | S10 | S11 | S12 | S13 | S14 | S15 | S16 | S17 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| S1 | 1.0497 | 0.1289 | 0.0699 | 0.1700 | 0.1500 | 0.0481 | 0.0032 | 0.0897 | 0.1271 | 0.0092 | 0.0029 | 0.0049 | 0.0190 | 0.1105 | 0.0377 | 0.0129 | 0.0174 |
| S2 | 0.1044 | 1.0250 | 0.0643 | 0.1311 | 0.1102 | 0.0292 | 0.0017 | 0.0183 | 0.0203 | 0.0070 | 0.0021 | 0.0033 | 0.0139 | 0.0200 | 0.0153 | 0.0091 | 0.0058 |
| S3 | 0.0893 | 0.1266 | 1.0452 | 0.1514 | 0.0350 | 0.0841 | 0.0040 | 0.0110 | 0.0127 | 0.0072 | 0.0020 | 0.0034 | 0.0060 | 0.1054 | 0.1045 | 0.0120 | 0.0270 |
| S4 | 0.0228 | 0.0257 | 0.1234 | 1.1514 | 0.1055 | 0.1278 | 0.0069 | 0.0157 | 0.0113 | 0.0510 | 0.0098 | 0.0109 | 0.0220 | 0.0295 | 0.0507 | 0.0430 | 0.0190 |
| S5 | 0.0765 | 0.0758 | 0.0557 | 0.1732 | 1.0468 | 0.1313 | 0.0078 | 0.1042 | 0.0925 | 0.0198 | 0.0119 | 0.0219 | 0.1226 | 0.0417 | 0.0414 | 0.0468 | 0.0194 |
| S6 | 0.0243 | 0.0257 | 0.1225 | 0.1418 | 0.0255 | 1.0255 | 0.0192 | 0.0142 | 0.0055 | 0.0085 | 0.0082 | 0.0134 | 0.0130 | 0.0419 | 0.0361 | 0.0909 | 0.0942 |

After that, we multiply the normalized matrix by the resulting matrix shown in the table above. The table below shows the matrix of general relationships.

**Table (9) General Organizational Factor Relations Matrix**

| Agent | S1 | S2 | S3 | S4 | S5 | S6 | S7 | S8 | S9 | S10 | S11 | S12 | S13 | S14 | S15 | S16 | S17 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| S1 | 0.0497 | 0.1289 | 0.0699 | 0.1700 | 0.1500 | 0.0481 | 0.0032 | 0.0897 | 0.1271 | 0.0092 | 0.0029 | 0.0049 | 0.0190 | 0.1105 | 0.0377 | 0.0129 | 0.0174 |
| S2 | 0.1044 | 0.0250 | 0.0643 | 0.1311 | 0.1102 | 0.0292 | 0.0017 | 0.0183 | 0.0203 | 0.0070 | 0.0021 | 0.0033 | 0.0139 | 0.0200 | 0.0153 | 0.0091 | 0.0058 |
| S3 | 0.0893 | 0.1266 | 0.0452 | 0.1514 | 0.0350 | 0.0841 | 0.0040 | 0.0110 | 0.0127 | 0.0072 | 0.0020 | 0.0034 | 0.0060 | 0.1054 | 0.1045 | 0.0120 | 0.0270 |
| S4 | 0.0228 | 0.0257 | 0.1234 | 0.1514 | 0.1055 | 0.1278 | 0.0069 | 0.0157 | 0.0113 | 0.0510 | 0.0098 | 0.0109 | 0.0220 | 0.0295 | 0.0507 | 0.0430 | 0.0190 |
| S5 | 0.0765 | 0.0758 | 0.0557 | 0.1732 | 0.0468 | 0.1313 | 0.0078 | 0.1042 | 0.0925 | 0.0198 | 0.0119 | 0.0219 | 0.1226 | 0.0417 | 0.0414 | 0.0468 | 0.0194 |

Step 4: Prepare a causal diagram

The sum of the elements of the rows and columns of the T matrix are named as R and D vectors, respectively. Then, the value of the horizontal axis of the diagram which is called the "importance axis" and represents the degree of importance that the criterion has is calculated by adding the vectors R and D, (). The vertical axis of the graph called the "dependency axis" is also calculated by the relation ().D + RD − RWhen () is positive, the criterion belongs to the cause group and otherwise belongs to the effect group. Therefore, the causal graph can be obtained by plotting points with coordinates (). D − RD + R، D − R The table below shows the values of R, D, D, D+R, and D-R for the 30 mentioned factors.

**Table (10) Results of R, D, D+R, D-R and D-R calculations**

| Index Status | D-R | D+R | R | D | Sub-Factors |
|---|---|---|---|---|---|
| Cause | 0.0277 | 2.0746 | 1.0235 | 1.0511 | Appropriate organizational culture |
| Disabled | -0.4433 | 1.6054 | 1.0244 | 0.5810 | Having a network of experts |
| Disabled | -0.8742 | 2.5279 | 1.7010 | 0.8269 | Having a proper organizational structure |
| Disabled | -1.9729 | 3.6255 | 2.7992 | 0.8263 | Process reengineering |
| Cause | 0.0290 | 2.1502 | 1.0606 | 1.0896 | Having a proper knowledge storage system |
| Disabled | -0.3633 | 1.7839 | 1.0736 | 0.7103 | Conquest of Knowledge |
| Cause | 0.4209 | 1.2296 | 0.4043 | 0.8253 | Having Knowledge Identification Methods |
| Cause | 0.3654 | 1.7436 | 0.6891 | 1.0545 | Knowledge Audit |
| Cause | 0.7397 | 1.7381 | 0.4992 | 1.2389 | Appropriate Rules and Regulations of the Organization |
| Cause | 0.8478 | 1.8519 | 0.5021 | 1.3499 | Managers' support and commitment |
| Cause | 0.3240 | 1.2304 | 0.4532 | 0.7772 | High development of information technology |
| Cause | 0.7981 | 1.7770 | 0.4895 | 1.2875 | Having the right knowledge transfer channel |
| Cause | 0.4543 | 1.9717 | 0.7587 | 1.2130 | Consider rewards for knowledge production |
| Disabled | -0.5896 | 2.1197 | 1.3547 | 0.7651 | The right strategy and policies of the organization |
| Disabled | -0.9454 | 2.1159 | 1.5306 | 0.5853 | Data Updates and Retention |
| Cause | 1.2901 | 2.5444 | 0.6271 | 1.9173 | Staff Training |
| Disabled | -0.1084 | 1.4414 | 0.7749 | 0.6665 | Strengthening information systems |
| Cause | 0.3687 | 2.2831 | 0.9572 | 1.3259 | Having a knowledge-producing personality |
| Cause | 1.2500 | 3.5269 | 1.1384 | 2.3884 | Having individual innovations in knowledge production |
| Cause | 1.0458 | 4.4569 | 1.7056 | 2.7514 | Trust in the people in the organization |
| Disabled | -1.5843 | 2.8757 | 2.2300 | 0.6457 | Having high literacy in information technology |
| Disabled | -1.8533 | 3.1396 | 2.4965 | 0.6432 | Having a person's schedule and instructions |

| Index Status | D-R | D+R | R | D | Sub-Factors |
|---|---|---|---|---|---|
| Cause | 1.7080 | 3.1612 | 0.7266 | 2.4346 | Updating personal literacy in the field of work |
| Disabled | -0.9348 | 2.1054 | 1.5201 | 0.5853 | Participation in Knowledge Production |
| Disabled | -0.5698 | 2.2876 | 1.4287 | 0.8589 | Technological Advancements |
| Disabled | -0.4296 | 2.5529 | 1.4913 | 1.0616 | Existence of training programs outside the organization |
| Cause | 0.9590 | 3.4156 | 1.2283 | 2.1873 | Competition |
| Cause | 1.0176 | 3.2460 | 1.1142 | 2.1318 | Government Monetary and Fiscal Policies |
| Disabled | -0.6112 | 2.1279 | 1.3695 | 0.7583 | Changes in Work and Employment Practices |
| Disabled | -0.3660 | 2.4792 | 1.4226 | 1.0566 | Inflation Rate |

The diagram below shows the graphical schema of the 30 mentioned indicators by each factor on the coordinates ($D + R$، $D - R$).

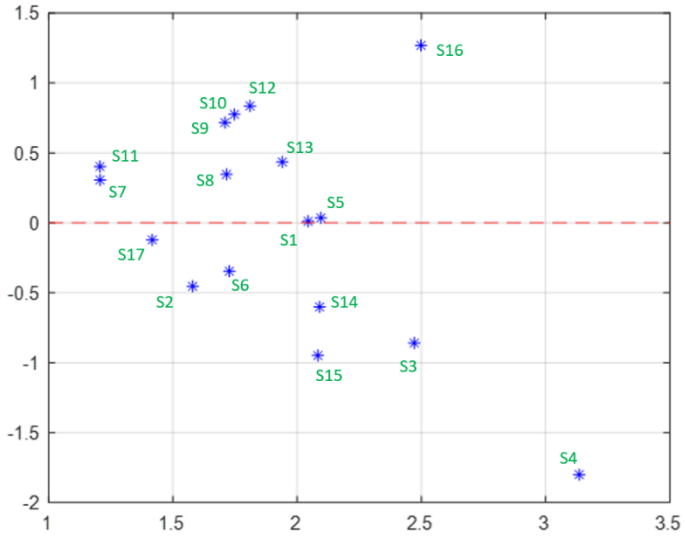


**Figure (2) Organizational Factors Chart**

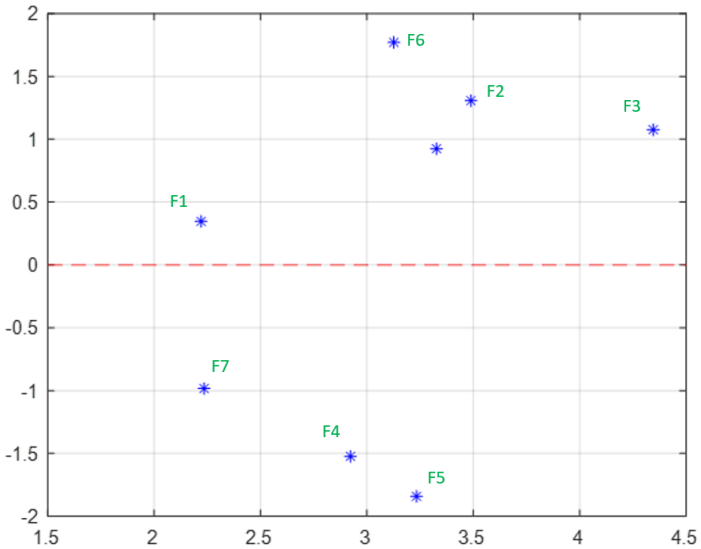


**Figure (3) Individual Factors Chart**

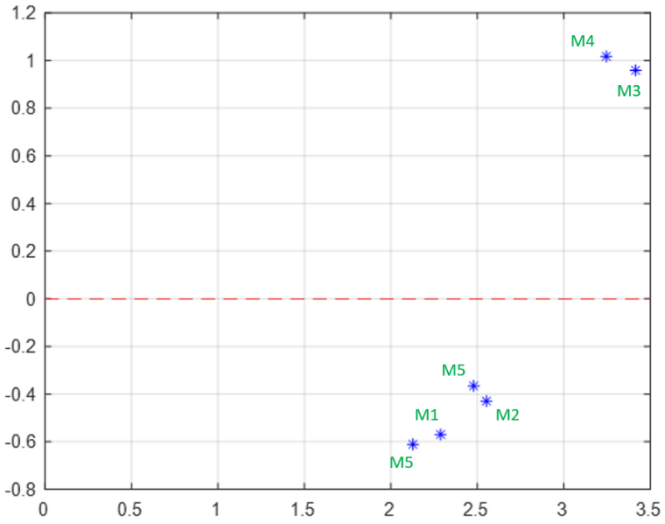


**Figure (4) Environmental Factors Chart**

## Prioritization of units to make corrective suggestions

The main challenge for organizations is to understand knowledge management and how to implement it to produce knowledge. Nowadays, the biggest aspiration of organizations is to define a proper knowledge management system and manage it in a successful way. Defense organizations, which play an important role in the development of the country at other economic, political, and social levels, as the custodians and driving engine of the country's defense and security, must appear as the leading organizations in designing and establishing an appropriate knowledge management system, which requires identifying key success factors and taking practical action based on these influential factors in different stages of designing and establishing a knowledge management system. In the present study, in order to identify DEMATEL method was used to prioritize the critical factors of knowledge production success in a defense organization, as a result of which 10 organizational factors, 4 individual factors, and 2 environmental factors were identified as key factors. According to the research background of Zain et al. (2020), Farisi et al. (2018), and Hosseini et al. (2017), four factors such as high development of information technology, managers' support and commitment, employee training, and organizational culture are among the important factors affecting knowledge management, which are consistent with the findings of this research. The most critical factors that are effective in knowledge production are as follows:

**Table (11) Ranking Organizational Factors**

| Rating | Organizational Factor | D+R | D-R | Index Status |
|---|---|---|---|---|
| 1 | Staff Training | 2.5444 | 1.2901 | Cause |
| 2 | Managers' support and commitment | 1.8519 | 0.8478 | Cause |
| 3 | Having the right knowledge transfer channel | 1.777 | 0.7981 | Cause |
| 4 | Appropriate Rules and Regulations of the Organization | 1.7381 | 0.7397 | Cause |
| 5 | Consider rewards for knowledge production | 1.9717 | 0.4543 | Cause |
| 6 | Having Knowledge Identification Methods | 1.2296 | 0.4209 | Cause |

| Rating | Organizational Factor | D+R | D-R | Index Status |
|---|---|---|---|---|
| 7 | Knowledge Audit | 1.7436 | 0.3654 | Cause |
| 8 | High development of information technology | 1.2304 | 0.324 | Cause |
| 9 | Having a proper knowledge storage system | 2.1502 | 0.029 | Cause |
| 10 | Appropriate organizational culture | 2.0746 | 0.0277 | Cause |

The present study showed that ten organizational factors have an impact on knowledge production in a defense organization. These factors include employee training, managers' support and commitment, having appropriate knowledge transfer channels, appropriate rules and regulations of the organization, considering reward systems to encourage knowledge production, knowledge identification methods, knowledge auditing, information technology development, having appropriate knowledge storage systems, and the organizational culture is appropriate.

**Table (12) Ranking of individual factors**

| Rating | Individual Factor | D+R | D-R | Index Status |
|---|---|---|---|---|
| 1 | Updating personal literacy in the field of work | 3.1612 | 1.708 | Cause |
| 2 | Having individual innovations in knowledge production | 3.5269 | 1.25 | Cause |
| 3 | Trust in the people in the organization | 4.4569 | 1.0458 | Cause |
| 4 | Having a knowledge-producing personality | 2.2831 | 0.3687 | Cause |

In the present study, the studies showed that four individual factors affect the production of knowledge in the organization under study. Updating personal literacy in the field of work is the first important factor that provides a stronger foundation for knowledge production by increasing the level of knowledge and skills of employees.

**Table (13) Environmental Factors Ranking**

| Rating | Environmental factor | D+R | D-R | Index Status |
|---|---|---|---|---|
| 1 | Government Monetary and Fiscal Policies | 3.246 | 1.0176 | Cause |
| 2 | The level of competition in the environment | 3.4156 | 0.959 | Cause |

In the present study, two key environmental factors have been identified as the factors affecting the production of knowledge in the organization under study. First, the government's monetary and fiscal policies play a significant role in creating a suitable platform for investment in research and development of knowledge. Supportive policies and financial facilities can create more incentives for organizations to invest in innovation and exploitation of existing knowledge. Second, the level of competition It is also known as an important factor in the environment. High competition in the environment encourages organizations to take advantage of innovative strategies and optimal knowledge management. This leads to increased productivity and continuous improvement of processes and products.

## Practical Suggestions

1. To promote knowledge production in the organizational dimension, first, continuous training of employees should be a priority. Providing specialized training courses and individual and group skills development programs can increase the knowledge and capabilities of employees.

2. To improve knowledge production in the individual dimension, it is recommended to first hold regular and up-to-date training programs for employees so that their individual literacy in their field of work is constantly updated. Also, creating an environment that supports individual innovations can play an important role in increasing knowledge production.

3. To improve knowledge production in the environmental dimension, the government's monetary and fiscal policies can have a significant impact. It is suggested that governments provide the necessary incentives for investment in research and development by providing financial and credit facilities, reducing taxes, and creating support programs.

## Suggestions for future research:

- Providing solutions to attract the support of senior managers of the organization in order to produce knowledge
- Presenting a Model for Evaluating the Impact of Production on Organizational Performance with an Investigative Approach in Operations
- Investigating the Effects of Government Support Programs on Improving Knowledge Production Processes in the Organization

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