

Evaluating Factors Influencing Knowledge Management Effectiveness: A Conceptual Framework for Knowledge-Based Service Organizations

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ABSTRACT

Culture, infrastructure, organizational structure, and leadership are critical factors influencing the implementation of knowledge management processes in knowledge-based service organizations, thereby impacting the overall effectiveness of knowledge management. This research aims to introduce a comprehensive model that elucidates the interrelated factors affecting knowledge management processes in these organizations. Through an extensive review of existing literature, the authors developed a conceptual model that highlights these dynamics and their implications for practice. The model was rigorously tested and validated using a questionnaire distributed among various knowledge-based service companies in knowledge-based service companies, with 10 companies selected as the sample. A sample of 10 companies was selected for data collection, with data analyzed through Structural Equation Modeling using LISREL software. The research was conducted during a six-month period. The findings reveal that organizational culture, infrastructure, structure, and leadership enhance knowledge management capabilities significantly and influence knowledge management processes positively. Furthermore, these processes are shown to significantly improve the effectiveness of knowledge management, leading to enhanced communication, collaboration, and overall performance within service organizations, which ultimately fostered a more innovative and responsive organizational environment.

KEYWORDS

Culture, Effectiveness of Knowledge Management, Infrastructure, Knowledge Management Processes, Leadership, Organizational Structure.

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Introduction

Knowledge management is a crucial intangible asset for organizations and institutions, involving processes such as creation, acquisition, storage, transfer, sharing, and applying knowledge. However, despite its importance, there are significant gaps in understanding the specific dynamics of these processes. This research focuses specifically on the methods of knowledge creation, storage, transfer, and application.

Effective use of knowledge through knowledge management enhances an organization's competitive advantage (Welch, & Smith, 2023). The necessity of this research arises from the fact that nearly 84% of knowledge management programs have failed, highlighting the complexities involved in their implementation (Conallin et.al, 2018). This challenge is particularly severe in knowledge-based service organizations, which inherently rely on the creation and transfer of knowledge but often struggle with limited resources for service delivery.

Given these challenges, it is essential to ensure that operational processes in knowledge-based service organizations deliver maximum value despite the existence of resource constraints. Therefore, this research aims to develop a core framework of knowledge management tailored to these organizations while evaluating a conceptual model for assessing the factors influencing the effectiveness of knowledge management.

This study examines the impact of knowledge management capabilities—namely culture, infrastructure, leadership, and organizational structure—on knowledge management processes. Additionally, it investigates how these processes affect the knowledge management effectiveness. Moreover, it evaluates the indirect impact of knowledge management capabilities on overall effectiveness, a topic which remains underexplored in existing literature.

In terms of culture, the evaluation focuses on aspects such as cultural alignment with goals, sharing and learning, trust and collaboration, and innovation. For infrastructure, factors like the history of knowledge management implementation, encouragement of human resources, and technology appropriateness are assessed. The effectiveness of knowledge management, particularly regarding improved collaboration, communication, and performance, is also critically analyzed.

Literature Review

Knowledge Management

A recent definition of knowledge management is provided by Alavi and Leidner (2022,1), who describe it as "a systematic approach to managing an organization's knowledge assets, involving the processes of creating, sharing, and utilizing knowledge to enhance organizational effectiveness and competitiveness". The American Productivity and Quality Center defines knowledge management as a set of emerging strategies and approaches for creating, maintaining, and utilizing knowledge assets (including people

and information) that allow knowledge to flow from individuals at the right time, enabling them to leverage these assets to create greater value for the institution and organization. Generally, the factors contributing to knowledge management can be categorized into four layers of leadership, culture, structure, and information technology infrastructure (Munro et.al, 2017).

Researchers have proposed various frameworks related to knowledge management processes. Hisig's model consists of four processes: Create, Store, Share, and Apply which are explained below:

- Create: This refers to the ability to learn and communicate. Developing this capability is crucial for sharing the existing knowledge and experiences, establishing connections between ideas, and building cross-disciplinary relationships.
- Store: This is the second essential element of knowledge management which provides an organized capability for quick retrieval of information, access to information for other employees, and effective knowledge sharing. In this system, necessary knowledge should be easily stored for everyone's use.
- Share: This process fosters a collective spirit where individuals feel connected as collaborators pursuing common goals and are interdependent in their activities
- Apply: The fourth process begins with the idea that creating more knowledge is possible through the practical application of new knowledge. This element completes the central process of unified knowledge management (Edward, 2011). This model comprises four key processes (Create, Store, Share, and Apply) that facilitate effective knowledge management. However, this model does not adequately consider the cultural and environmental factors that may influence the effectiveness of these processes. Additionally, the model may be insufficient for complex and dynamic organizations, as it does not address the specific needs of different organizations.

Becman proposed an eight-stage model for knowledge management processes:

1. Identification: Determining internal competencies, strategic sources, and the scope of knowledge.
2. Capture: Formalizing existing knowledge.
3. Selection: Determining the relevance, value, and accuracy of knowledge, and resolving incompatible knowledge.
4. Storage: Introducing a unified memory in the knowledge repository with various knowledge patterns.
5. Distribution: Automatically distributing knowledge to users based on interest and work, and facilitating knowledge sharing among real groups.
6. Application: Retrieving and using knowledge in decision-making, problem-solving, automating, and supporting work, job assistance, and training.

7. Creation: Discovering new knowledge through research, experimentation, and creative thinking.
8. Commercialization: Selling and trading, developing, and marketing new knowledge of products and services (Kwon, 2004). The eight-stage model by Becman comprehensively covers the stages of knowledge management and emphasizes the identification and storage of knowledge. Nevertheless, this model could place greater emphasis on the distribution and application of knowledge. There is also less focus on inter-organizational interactions and addressing customer needs.

The effectiveness of knowledge management in an organization leads to improved collaboration, enhanced communication, and better performance.

In this research study, the framework proposed by Downs (2013) serves as the basis for performance assessment, and the proposed model is evaluated in knowledge-based service organizations (Li, & Xiong, 2021). Our research aims to address these weaknesses by designing a new model that includes the following elements:

- *Attention to Cultural Factors*: By examining the organizational culture and its specific needs, we aim to design processes that are more aligned with the real conditions of organizations.
- *Integration of New Technologies*: Utilizing new technologies such as artificial intelligence and machine learning can enhance the processes of knowledge storage and sharing.
- *Facilitating Collaborative Environments*: By creating shared workspaces and effective communication tools, we can promote collaboration among employees and different departments.

Providing Knowledge-Based Services

A recent definition of knowledge-based services can be found in the work of Ghasemi and Zare (2023,2), who describe them as "services that leverage specialized knowledge to create value for clients, emphasizing collaboration and innovation in fields such as consulting, legal services, and IT solutions".

Knowledge-based services are those that heavily rely on specialized knowledge and are provided for the processes of other businesses. Therefore, companies operating in the service sector can be divided into two categories:

1. Companies that provide services using scientific and technological knowledge (such as research and development services, engineering services, computer services, etc.).
2. Companies that offer traditional professional services (such as legal services, accounting, and management consulting)

Knowledge-based companies and institutions are private or cooperative entities established to synergize the development of a knowledge-based economy, achieve

scientific and economic goals (including the expansion and application of inventions and innovations), and commercialize knowledge and wealth. They focus on research and development (including the design and production of goods and services) in high-tech areas with significant added value, especially in software production (Regulation of the Law on Support for Knowledge-Based Companies, 1391).

According to the OECD definition, those educated human groups in scientific, research, and investigative centers who have been able to learn theoretical sciences and scientific theories and convert the acquired knowledge into income-generating and value-producing activities are recognized as knowledge-based companies (González-Illescas & Zaragoza-Sáez 2023). Harvard Business Review points out that a common feature of knowledge-based business services is the provision of services that are a joint product of collaboration between the customer and the service provider. This has a profound impact on the quality of services provided and increases the customer satisfaction.

With proper management of this feature, knowledge-based service providers can improve their operational efficiency and create a sustainable competitive advantage (Lin et al., 2023).

Types of economic activities defined as knowledge-based services include:

- High-tech knowledge-based services: programming, consulting, and doing computer-related activities, scientific research, information services, etc.
- Knowledge-driven market services: advertising and market research, legal and consulting activities, etc.
- Knowledge-driven financial services: financial services, insurance, etc.
- Other services: publishing, education, etc. (Eurostat, 2014).

Knowledge Management Capabilities

Knowledge management capability is the ability to create and apply knowledge through the combination and integration of various activities and resources in knowledge management, aimed at impacting competitive advantage, knowledge management effectiveness, and organizational effectiveness (Chuang, 2004). In this research study, organizational culture, infrastructure, leadership, and organizational structure are considered as influential factors in knowledge management capability.

- **Organizational Culture:** Refers to the organizational climate and working conditions of employees that affect the knowledge management. If the culture is not ready for changes in knowledge management, the implementation of knowledge management programs will fail. An appropriate and effective organizational culture for knowledge management includes criteria such as a shared vision, expertise, and attitudes (Rai, 2011).
- **Organizational Infrastructure:** A systematic framework that provides a strategic basis for guiding and forecasting the organization (Dixon & Lucas, 2013).
- **Organizational Structure:** Refers to the formal and informal operational and

directive structure within organizations. Additionally, it includes methods, processes, incentive policies, and job design (Naseri Najafabadi et al., 2013).

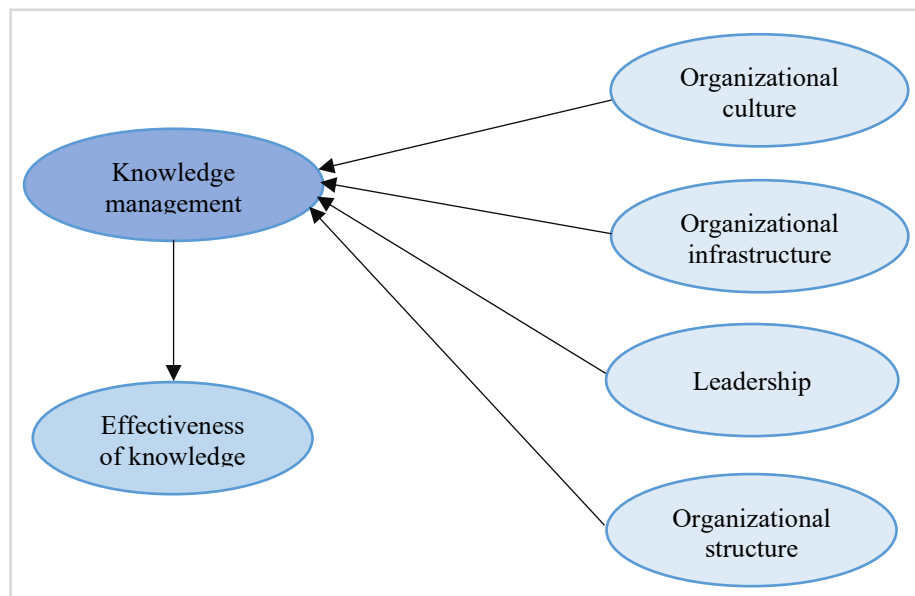
- Organizational Leadership: The leadership style is defined by a set of attitudes, traits, and skills of managers that are shaped based on a value system, trust in employees, leadership tendencies, and a sense of security in ambiguous situations (Rowold, 2009).

Conceptual Model

The theoretical framework of a conceptual model is based on the theoretical relationships among a number of factors that have been identified as significant concerning the research issues. This theoretical framework logically flows from the examination of research backgrounds to the domain of the problem.

Considering the provided definitions and theoretical backgrounds, the researchers have proposed the following conceptual models regarding how knowledge management capabilities influence knowledge management processes and their outcomes:

Figure 1.
The Theoretical Framework of the Research



(Source: Researcher's Findings)

Main and Sub-Hypotheses of the Research Study

- H1: Organizational culture has a direct, positive, and significant effect on knowledge management processes.
- H2: Organizational infrastructure has a direct, positive, and significant effect on knowledge management processes.
- H3: Leadership has a direct, positive, and significant effect on knowledge management processes.

H4: Organizational structure has a direct, positive, and significant effect on knowledge management processes.

H5: Knowledge management processes have a direct and significant effect on the effectiveness of knowledge management.

Methodology

This research aims to determine the causal relationships among organizational culture, organizational infrastructure, leadership, organizational structure, knowledge management processes, and the outcomes of knowledge management, namely the effectiveness of knowledge management, within the framework of the conceptual model. The research is applied-quantitative in terms of purpose and descriptive and correlational in terms of data collection method, specifically based on Structural Equation Modeling. The study is conducted within the context of education industry, which provides knowledge-based services.

In the analytical model of the study, organizational culture, organizational infrastructure, leadership, and organizational structure, which are referred to as knowledge management capabilities, are considered as independent variables. Knowledge management processes are the mediating variables, and the effectiveness of knowledge management is the dependent variable.

The main tool for data collection is a questionnaire. Accordingly, for the variables under study, 34, 20, 6, 4, 19, and 8 questions have been designed for organizational culture, organizational infrastructure, organizational leadership, organizational structure, knowledge management processes, and the effectiveness of knowledge management, respectively, using a 5-point Likert scale. In this study, to assess the knowledge management practices in knowledge-based service organizations, particularly within the education industry, we used a questionnaire designed and implemented by Downes (2014)

To assess the validity of the research instrument, feedback was obtained from three experts in the field of digital and social innovation. These experts, with both academic and practical experience in the field, reviewed the questions and research instruments thoroughly and provided their feedback. Based on their suggestions and input, necessary adjustments were made to improve the quality and accuracy of the instrument, ensuring that the questionnaire has acceptable content validity.

To measure the reliability of the instrument, a pilot sample consisting of 30 questionnaires was pre-tested, and then the reliability coefficient was calculated using Cronbach's alpha test based on the data obtained from the questionnaire, which is presented in Table 1 for organizational culture, organizational infrastructure, organizational leadership, organizational structure, knowledge management processes, and the effectiveness of knowledge management.

Table 1.
Reliability of the Questionnaire

Variable name	Number of questions	Reliable number
Organizational culture	34	90 percent
Organizational infrastructure	20	80.6 percent
Organizational leadership	6	76.3 percent
Organizational structure	4	81 percent
Knowledge management processes	19	86.2 percent
Effectiveness of knowledge management	8	78.5 percent

(Source: Researcher's Findings)

Since the result of Cronbach's alpha test for all variables and the entire questionnaire is greater than 0.7, it can be said that the questionnaire has an appropriate level of reliability.

Before testing the hypotheses and the conceptual models of the study, it is necessary to ensure the validity of the measurement models for the exogenous variables (culture, infrastructure, leadership, and organizational structure) and the endogenous variables (knowledge management processes and the effectiveness of knowledge management). To do so, first-order and second-order confirmatory factor analysis methods have been used.

This method is one of the oldest statistical methods used to examine the relationships between latent variables and observed variables, and it represents the measurement model (Salehi et al., 2012).

The results of the second-order confirmatory factor analysis for the exogenous and endogenous variables (Table 2) indicated that appropriate measurement models have been selected and all numbers and parameters of the model are significant. The fit indices of the measurement models, as described in Table 2, indicate the appropriateness of these models.

Table 2.
The Results of the Measurement Model of the Research Variables

Measurement model	The scumbags (independent, intermediary, dependent)	Chi-square value	degree of freedom(df)	Chi-square ratio to degrees of freedom	Amount RMSEA
Independent variable measurement model	culture	930	517	1/8	0.07
	Infrastructure	192	155	1/23	0/04
	leadership	15	9	1/66	0.06
	Organizational structure	4/3	2	2/15	0/08
Mediating variable measurement model	Knowledge management processes	240	146	1.64	0.065
Dependent variable measurement model	Effectiveness of knowledge management	335	171	1.95	0.07

(Source: Researcher's Findings)

Findings

As can be inferred from Table 3, most variables have an appropriate distribution and pattern.

Table3.
Descriptive and Inferential Statistics

Variables and their components	average	Observed t-value	degree of freedom	status
Organizational culture	28/3	2	149	suitable
Culture assessment	2.87	1.87	149	inappropriate
Communication to achieve goals	20/3	3.5	149	suitable
Share and learn	98/2	92/1	147	inappropriate
Trust, cooperation and respect	2/3	1.98	147	suitable
Innovation and initiatives	2.88	1.68	149	inappropriate
Organizational infrastructure	98/2	1.88	149	inappropriate
Experience in knowledge management	96/2	1.78	148	inappropriate
Encouraging human resources and knowledge management	97/2	94/1	149	inappropriate
Performance evaluation	14/3	2.12	149	suitable
Suitability of technology	95/2	1.55	149	inappropriate
Learning and technology support	23/3	2.01	149	suitable
Knowledge sharing potential	13/3	3.5	149	suitable
Organizational leadership	3.4	2.03	149	suitable
Organizational structure	04/3	1.95	148	inappropriate
Knowledge management processes	97/2	1.04	147	inappropriate
Creation	98/2	1.88	149	inappropriate
Storage	96/2	1.55	149	inappropriate
transmission	14/3	3.3	149	suitable
Application	08/3	1.65	149	inappropriate
Effectiveness of knowledge management	97/2	1.55	146	inappropriate
Improve cooperation	3.19	2.9	149	suitable
Improve communication	14/3	1.99	149	suitable
Improve performance	3.11	1.98	148	suitable

(Source: Researcher's Findings)

As shown in Table 4, the relationship between knowledge management capabilities, namely culture, infrastructure, leadership, and organizational structure (exogenous variables), and the variables of knowledge management processes and the effectiveness of knowledge management (endogenous variables) is significant at the 0.01 level.

The highest significant correlation is observed between the effectiveness of knowledge management and infrastructure at 0.7, while the lowest significant correlation is between leadership and infrastructure at 0.41. From the correlation analysis among the endogenous variables, it can be concluded that any improvement in the critical success factors and knowledge management processes leads to an improvement in the effectiveness of knowledge management, and consequently enhances collaboration, communication, and performance.

Table 4.
Correlation Analysis between Research Variables

Correlation between exogenous and endogenous variables	culture	Infrastructure	leadership	Structure	Knowledge management processes	Effectiveness of knowledge management
Culture	1	0	0	0	0	0
Infrastructure	0.59	1	0	0	0	0
leadership	0.65	0.41	1	0	0	0
Structure	0.57	0.51	0.59	1	0	0
Knowledge management processes	0.68	0.48	0.61	0.48	1	0
Effectiveness of knowledge management	0.59	0.7	0.68	0.47	0.64	1

(Source: Researcher's Findings)

Standard Estimation Model

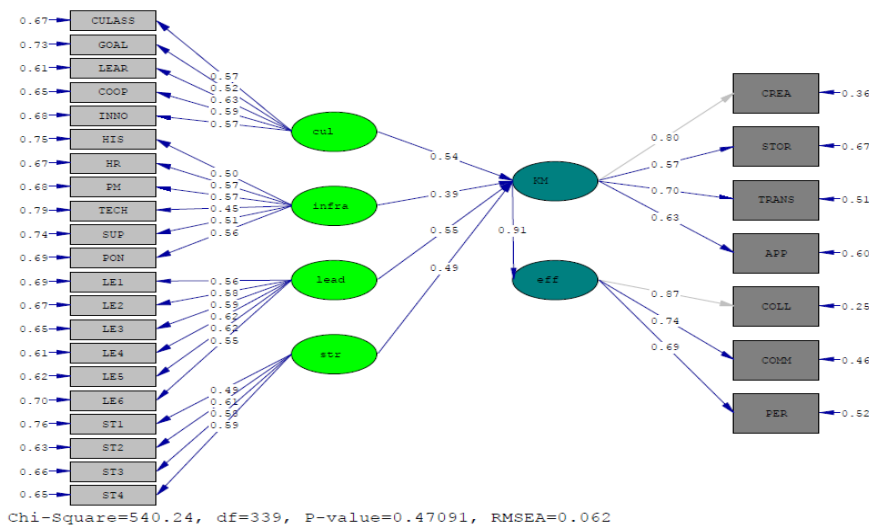
The fit indices indicate an appropriate fit for the model. The ratio of chi-square to degrees of freedom (1.59) is less than the permissible value of 3, and the RMSEA value (0.062) is less than 0.08.

Figure 2 shows the structural model of the research in the standard estimation state. In this model, culture has a positive and significant effect on knowledge management processes (0.54). Infrastructure also has a positive and significant effect on knowledge management processes (0.36) and effectiveness (0.25).

Organizational leadership has a positive and significant effect on knowledge management processes (0.39). The fourth factor, organizational structure, also has a positive and significant effect on knowledge management processes (0.55).

The knowledge management processes have a positive and significant effect on the effectiveness of knowledge management (0.91).

Figure 2.
The Structural Model of the Research in Standard Estimation Mode

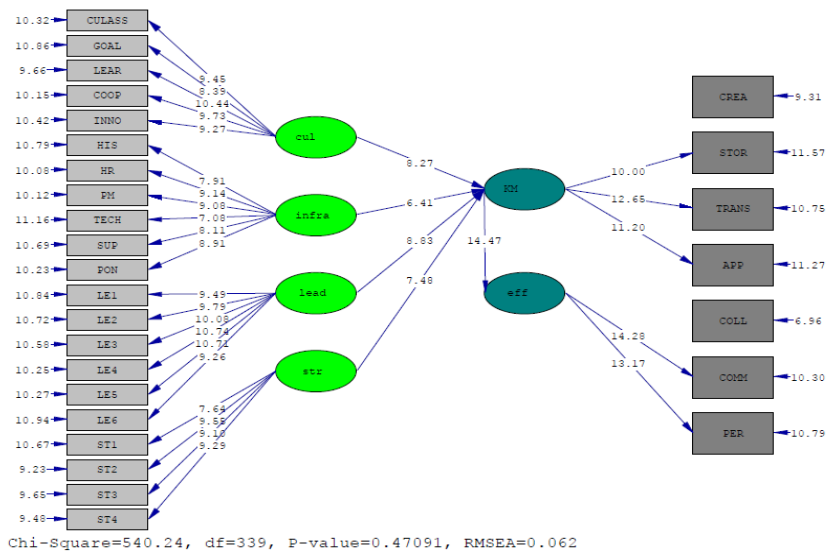


(Source: Researcher's Findings)

Model of Significant Values

As shown in Figure 3, organizational culture, organizational infrastructure, organizational leadership, and organizational structure have a positive and significant effect on knowledge management processes, and knowledge management processes also have a positive and significant effect on the effectiveness of knowledge management. Therefore, all research hypotheses are confirmed.

Figure 3.
Structural Model of the Research in terms of Significant Values



(Source: Researcher's Findings)

Table 5.
Summary of the Results of Structural Model of the Research

Relationships	Path coefficient	
	Direct impact on knowledge management processes	Indirect effect on the effectiveness of knowledge management
Culture	0.54	0.49
Infrastructure	0.39	0.35
Leadership	0.55	0.5
Structure	0.49	0.44

(Source: Researcher's Findings)

Table 5 presents the path coefficients that summarize the results of the structural model of this research, focusing on the relationships between knowledge management capabilities (culture, infrastructure, leadership, and structure) and their impacts on knowledge management processes and effectiveness.

Culture: The path coefficients for culture for the direct impact on knowledge management processes and for the indirect effect on the effectiveness of knowledge management are 0.54 and 0.49, respectively. This suggests that a strong organizational culture significantly enhances knowledge management processes' efficiency and

contributes to overall effectiveness. The high coefficients indicate that fostering a supportive culture is crucial for successful knowledge management.

Infrastructure: With a path coefficient of 0.39 for direct impact and 0.35 for indirect effect, infrastructure plays a significant role in facilitating knowledge management processes. While the values are slightly lower than those for culture, they still demonstrate the importance of having a robust infrastructure in place to support knowledge management initiatives. This includes technological resources and support systems that enable effective knowledge sharing and application.

Leadership: The leadership variable shows the highest path coefficients, with 0.55 for direct impact and 0.50 for the indirect effect on knowledge management effectiveness. This indicates that effective leadership is pivotal in both driving knowledge management processes and enhancing their overall effectiveness. Leaders play a critical role in creating an environment conducive to knowledge sharing and innovation, reinforcing their influence in organizational contexts.

Structure: The path coefficients for structure for direct impact and indirect effect are 0.49 and 0.44, respectively. This signifies that an appropriate organizational structure is essential for facilitating knowledge management processes. A well-defined structure allows for clearer communication and collaboration, which influences the effectiveness of knowledge management positively.

In summary, all four capabilities—culture, infrastructure, leadership, and structure—have significant direct impacts on knowledge management processes and also indirectly affect the overall effectiveness of knowledge management. The coefficients highlight the interconnectedness of these factors and underscore the importance of integrating them to optimize knowledge management practices within organizations.

Discussion and Conclusion

In recent decades, the increase in data volume within organizations and the necessity of making decisions based on the information extracted from this data have led to the emergence of a phenomenon known as knowledge management. Knowledge-based service organizations provide services to their customers based on the knowledge available within their organization. Therefore, knowledge management processes such as creation, storage, transfer, and application serve as vital arteries for gaining competitive advantage and ensuring the survival of such organizations. Knowledge management needs to be effective, and this effectiveness is created and accelerated through knowledge management capabilities. This research aimed at providing a conceptual framework for evaluating the factors influencing the effectiveness of knowledge management in knowledge-based service organizations. Accordingly, five hypotheses were tested, and the results of the hypothesis testing indicate that all hypotheses are confirmed, meaning that culture, infrastructure, structure, and organizational leadership have a positive and direct impact on knowledge management processes, and knowledge management

processes also have a positive and direct impact on the effectiveness of knowledge management in knowledge-based service organizations. Therefore, improving the status of knowledge management capabilities can also enhance its effectiveness.

As mentioned, the enabling factors of organizational structure and infrastructure are not in a suitable condition. Given that knowledge-based service organizations are moving towards knowledge structures, they need to be organic, flexible, and flat. Since the success of knowledge management depends on collaboration, teamwork, and interaction among individuals, these organizations must pay attention to this issue and focus on teamwork and collaboration while controlling dominance and authoritarianism. Regarding organizational infrastructure, it is essential to focus on human resource learning and using up-to-date and relevant technologies, to keep pace with rapid technological changes.

In terms of knowledge management capabilities, leadership and organizational culture in knowledge-based service organizations are in a suitable condition, while infrastructure and organizational structure are not. In an organizational culture, knowledge sharing and learning are not in a good state, even though they are the factors that have the most significant effect on organizational culture. Taking organizational culture into consideration, it is necessary to focus on learning, interaction, and knowledge sharing in knowledge-based service organizations, encouraging explicit and implicit knowledge sharing through seminars and workshops related to these topics.

In the area of knowledge management processes, the creation and storage of knowledge is not in a good state. To improve these processes, it is recommended to establish mechanisms and systems for documenting and recording individuals' knowledge and to encourage and support individuals through a reward and promotion system for generating and presenting new ideas.

One of the primary limitations of this study is its reliance on self-reported data, which may introduce biases and affect the accuracy of the findings. Additionally, the research focuses primarily on knowledge-based service organizations, which may limit the generalizability of the results to other sectors. Future research could explore comparative studies across various types of organizations to validate the framework developed in this study.

The final recommendation is to focus on the effectiveness of knowledge management and the improvement of collaboration, communication, and performance in organizational improvement programs. It is essential for organizational managers to support new and innovative ideas and to encourage the presentation of new opinions, collaboration, and teamwork. By creating internal communication networks, an organic structure, and interaction-based systems, communication and interaction among individuals within the organization can be enhanced. Future research should also examine the role of technology adoption in facilitating knowledge management processes and its impact on organizational effectiveness.

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