



An Investigation into Development and the Implementation of Knowledge Management in Iranian Government-Affiliated Research Centers

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Abstract

Purpose: This study aims to explore the development and implementation of knowledge management (KM) in Iranian government-affiliated research centers. The primary focus is on identifying key factors, challenges, and opportunities in adopting effective KM practices, with the goal of proposing strategic frameworks and practical recommendations to optimize KM processes in these organizations.

Method: A qualitative research design was employed, utilizing a population of scientific articles on KM in Iranian research centers. Through purposive sampling, 55 articles were selected for analysis. The primary tool used was a "Document Review Checklist". Data were analyzed using a systematic content analysis method, which facilitated the identification of recurring themes and patterns related to KM implementation.

Findings: The study identified six global themes critical to KM implementation: Maturity, Knowledge-Based Decision Making, Structural

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Flexibility, Knowledge-Centricity, Socialization, and Localization of Cloud Computing. While managers and experts recognized the value of KM and demonstrated a willingness to establish relevant systems, significant barriers - such as limited IT infrastructure, insufficient incentives, cultural resistance, and a lack of comprehensive policies hindered effective implementation.

The findings also highlighted the importance of fostering a knowledge-sharing culture, providing continuous training, and leveraging advanced technologies like Artificial Intelligence and localized cloud computing to enhance KM processes, data accessibility, and collaboration.

Conclusion: The study concluded that nurturing an organizational culture that encourages knowledge sharing, providing adequate training and incentives, and adopting advanced technologies are essential for successful KM implementation. Additionally, leveraging international models and applying continuous improvement strategies can significantly enhance research capacities and elevate organizational performance. Addressing cultural, structural, and technological barriers is crucial for unlocking the full potential of KM in Iranian government-affiliated research centers, ultimately improving decision-making, innovation, and international collaboration.

Keywords: Knowledge Management, Research Centers, Information Technology Infrastructure, Organizational Culture, Challenges in Development

Introduction

Knowledge management (KM) is a strategic approach that enables organizations to effectively collect, store, share, and utilize knowledge. In today's information-driven era, knowledge is a critical asset for organizational survival and competitiveness (Leonardo & Treem, 2012). KM enhances productivity, innovation, and decision-making by treating knowledge as intellectual capital, which allows organizations to address challenges and improve processes (Abdi & Safaei, 2014). It also fosters organizational learning, improves internal communication, and reduces redundant work, enabling organizations to adapt to environmental and technological changes (Yao et al., 2007).

Research centers, particularly those affiliated with government organizations, play a vital role in generating and sharing knowledge, thereby contributing to scientific, social, and economic progress. Effective KM in these centers ensures that knowledge is accessible and usable, which enhances research quality and policy development (Kasim, 2008; Cahyaningsih et al., 2017). However, the rapid pace of knowledge production and the complexity of managing it pose significant challenges, necessitating robust KM systems (Kotnour, 2000).

In Iran, the adoption of KM in government organizations lags behind the private sector due to bureaucratic structures, cultural resistance, and inadequate IT infrastructure (Teece, 1998; Cahyaningsih et al., 2017). While some government organizations have initiated KM efforts, a comprehensive national strategy is needed to address these barriers and fully harness the potential of KM. KM involves creating, storing, transferring, and utilizing knowledge to improve decision-making and organizational performance (Hosseini khah, 2008; Rakhshani & Gheibi, 2015). Despite its benefits, the implementation of KM in Iranian research centers faces challenges such as cultural resistance, lack of incentives, and insufficient IT infrastructure, hindering knowledge sharing and innovation.

This study addresses the gap in understanding the unique challenges and opportunities for KM implementation in Iranian government-affiliated research centers. By exploring cultural, structural, and technological barriers, it aims to propose strategic frameworks and practical recommendations to optimize KM practices, enhance research quality, and improve organizational effectiveness.

Literature Review

Knowledge management as a strategic area in organizations has attracted the attention of many researchers in Iran and the world. This attention is due to the extensive effects of knowledge management on

improving organizational performance, innovation, and competitive advantage. In this regard, numerous studies have been conducted to identify factors affecting knowledge management.

Lak et al. (2016) investigated the factors affecting the selection of knowledge management strategies within the police force. Their findings highlighted the importance of organizational structure, processes, and culture in this domain. Similarly, Dezhgar and Vishkai (2017) explored the relationship between knowledge management and organizational performance through human resource practices, confirming the positive influence of these practices on performance enhancement.

In another study, Dehghani et al. (2019) developed a comprehensive model outlining the factors that impact the effectiveness of knowledge management. Their research demonstrated that human factors, infrastructure, and knowledge strategies play pivotal roles in the successful implementation of knowledge management. Nejati and Chahardoli (2020) emphasized the critical role of information technology in advancing knowledge management, based on their examination of the knowledge management strategy employed within the Ministry of Industry, Mines, and Trade in Yazd Province.

Rafoa (2019) presented a knowledge management model for the Dana Insurance Organization, identifying and analyzing influential factors in the process. His study revealed that causal conditions and strategic approaches are key determinants of effective knowledge management in insurance organizations. Yavari and Heydarnejad (2022) identified the essential components of knowledge management in a study focused on urban planning, underscoring the role of information technology in enhancing information literacy.

Nuridin et al. (2018) examined the knowledge management model within Syrian banking institutions and highlighted the importance of integrating knowledge with Islamic values in these banks. Similarly, Ghasemi and Volmohammadi (2018) developed a tool to measure the implementation of knowledge management in the Iranian oil industry, identifying critical success factors for this sector.

Andriani et al. (2019) proposed a knowledge management strategy model for Indonesian fashion companies, emphasizing the transformation of tacit knowledge into explicit knowledge as a key element. Igusi and Obeki (2019), in their study of the Nigerian banking industry, identified information technology and organizational culture as fundamental factors influencing knowledge management.

Benabdellah et al. (2021) developed an ontology-based knowledge management model for green product development, demonstrating the importance of knowledge design in the creation of environmentally

friendly products. Drank and Hewitt (2022) utilized ERP simulations to illustrate how knowledge management can enhance employee training and development.

Kim & Park (2022) examined factors influencing knowledge sharing intention among 126 records management specialists. Key findings revealed that managerial support positively impacted tacit knowledge sharing, while the evaluation/compensation system had a negative effect. Interestingly, job stress positively influenced both tacit and explicit knowledge sharing intention.

Hapsari (2023) examines the role of knowledge management (KM) in Jakarta's Jakpreneur Program, a successful MSME empowerment initiative under the Dinas PPUMKM. Focusing on how KM can help MSMEs overcome knowledge-based growth barriers, the research uses a qualitative approach, including interviews and focus group discussions with MSME owners, managers, mentors, and facilitators. The study aims to identify knowledge gaps across people, processes, technology, and governance, and to analyze KM practices within the Dinas PPUMKM. Ultimately, the goal is to provide recommendations for improving KM strategies and frameworks to enhance MSME competitiveness and inform policymakers, practitioners, and researchers.

Ambarwati et al. (2023) investigated the impact of employee competence on managing import tax revenue receivables, with knowledge management as a moderator. Data was collected via questionnaires from treasury and financial statement officials at the Indonesian Directorate General of Customs and Excise between March and July 2022. Results showed both employee competence and knowledge management positively influence the management of import tax revenue receivables. However, knowledge management did not moderate (strengthen) the positive relationship between employee competence and the management of those receivables.

Finally, Sonmez et al. (2024) found that organizational innovation and knowledge management strategies have a positive impact on service quality and product innovation within IT companies.

A review of the literature on knowledge management reveals that an extensive body of research has been conducted across various fields. However, the analysis of these studies indicates that, despite significant advancements and the availability of diverse resources, limited attention has been specifically directed toward the development and implementation of knowledge management in research centers. Moreover, the few existing studies in this area often suffer from fundamental limitations and fail to comprehensively address the unique needs of research centers. Given these gaps, the present study seeks to

explore the dimensions of knowledge management development and implementation in research centers affiliated with government organizations in Iran. The aim is to provide insights and recommendations to enhance the performance and effectiveness of these centers, which play a critical role in knowledge production and dissemination.

Method

The current study employed a qualitative research approach, with the primary objective of identifying the dimensions of knowledge management development and establishment in research centers affiliated with government organizations in Iran. This methodology utilized a mixed-methods approach, combining the analysis of previous studies with the extraction of relevant categories. The selection of this approach was justified by its capacity to provide a comprehensive and in-depth analysis of complex phenomena.

Corpus of the Study: The corpus of the study comprised 556 scientific and research articles pertaining to knowledge management and its development. The intended articles were selected based on purposive sampling procedure from reputable scientific databases, including Noormags, Magiran, Google Scholar, and Web of Science.

Data Collection Instruments: The primary data collection tool utilized in this study involved a comprehensive review of documents and an analysis of previous qualitative studies. Data related to knowledge management were collected and analyzed from reliable articles and sources, ensuring the accuracy and validity of the findings.

Data Analysis Method: The collected data were subjected to a thorough analysis and categorization, integrating different findings to provide a comprehensive overview of key categories related to knowledge management in research centers. This qualitative research approach was employed to synthesize and combine findings from multiple qualitative studies, thereby creating new and more comprehensive perspectives on the topic. By collecting and analyzing existing data from other studies, the researcher aimed to generate new insights by identifying common themes and key differences between the findings.

According to Fangfield and Connett (2010), this approach involved combining findings from different studies to arrive at a new interpretation of phenomena. Similarly, Sandelowski and Barroso (2007) regarded it as a method that integrated separate elements to

provide a coherent whole and a more comprehensive interpretation of the topic. The use of this approach enabled the researcher to develop a deeper understanding of the research phenomenon, facilitating the identification of patterns, themes, and relationships that may not have been immediately apparent through other research methods.

The study was conducted by employing a qualitative content analysis approach, which allowed for the examination of the data in a systematic and rigorous manner. The data were coded and categorized using a thematic analysis approach, which enabled the identification of key themes and patterns in the data. The findings of the study were then interpreted and discussed in the context of the existing literature on knowledge management, providing a comprehensive understanding of the research phenomenon.

Data Collection Procedure: The research process involved a systematic and rigorous approach to identify, analyze, and synthesize the existing literature on knowledge management in research centers affiliated with government organizations in Iran. The following stages were undertaken:

- Formulation of Research Questions: This initial stage entailed the precise definition of research questions, which were informed by the main questions such as what, who, when, and how. These questions served as the foundation for analyzing and synthesizing the studies.

- Systematic Literature Review: A comprehensive search of all articles and sources related to the research topic was conducted, utilizing keywords and authoritative articles to identify relevant sources.

- Selection of Appropriate Texts: The selected articles were evaluated and refined based on quality criteria and relevance to the research questions. Articles that employed qualitative or quantitative methods to examine the topic were prioritized (Erwin et al., 2011).

- Extraction and Analysis of Findings: The qualitative findings were grouped into distinct categories and themes, and analyzed to identify the primary themes and create a novel interpretation pattern (Sandelowski and Barroso, 2007).

- Quality Control of Findings: To ensure the accuracy and validity of the analysis, the quality of the articles was assessed using validated tools, such as the CASP method.

- Synthesis of Findings: The findings from diverse articles were integrated into a coherent whole, yielding a new theoretical model or framework.

-Articles and research published in the field in question between 1370 and 1402 AH and 2000 to 2024 AD.

This methodology enabled the creation of a more comprehensive and in-depth understanding of the phenomena, enhanced evidence-based decision-making, and generated new knowledge. The approach was particularly useful in addressing research gaps and providing a more nuanced analysis of complex phenomena (Erwin et al., 2011; Zimmer, 2006). The research process was designed to be systematic, rigorous, and transparent, ensuring that the findings were reliable, valid, and generalizable. By following this methodology, the study aimed to contribute to the existing body of knowledge on knowledge management in research centers and provide a foundation for future research in this area.

In this study, a purposive sampling approach was employed, wherein specific criteria were established for selecting research articles. These criteria were developed by researchers and experts in the field, with the aim of capturing all relevant findings related to the research topic. The inclusion criteria consisted of selecting articles and research studies that had been conducted within the intended field, utilized appropriate qualitative or quantitative methods, and provided sufficient information pertinent to the research objectives. Furthermore, these articles were required to have undergone rigorous peer review by expert referees.

Conversely, the exclusion criteria encompassed articles that failed to provide sufficient information, were redundant with identical objectives, or exhibited low scientific quality. Subsequently, the articles were evaluated based on 10 quality criteria using the CASP method, and articles that achieved a satisfactory score were selected as valid. The scoring conditions for the articles, based on the evaluation of the reviewed articles, are presented in the below:

- 50-41: Excellent (E)
- 31-40: Very Good (VG)
- 21-30: Good (G)
- 11-20: Average (F)
- 0-10: Poor (P)

Finally, articles with a score exceeding 31 were deemed acceptable, whereas articles with a score below 31 were excluded from the study.

Findings

During this stage, the researcher eliminated a number of articles at each review stage, which were not further reviewed in the process. The

review and selection process employed in this study is succinctly summarized in Figure 1 (De Ridder et al., 2018).

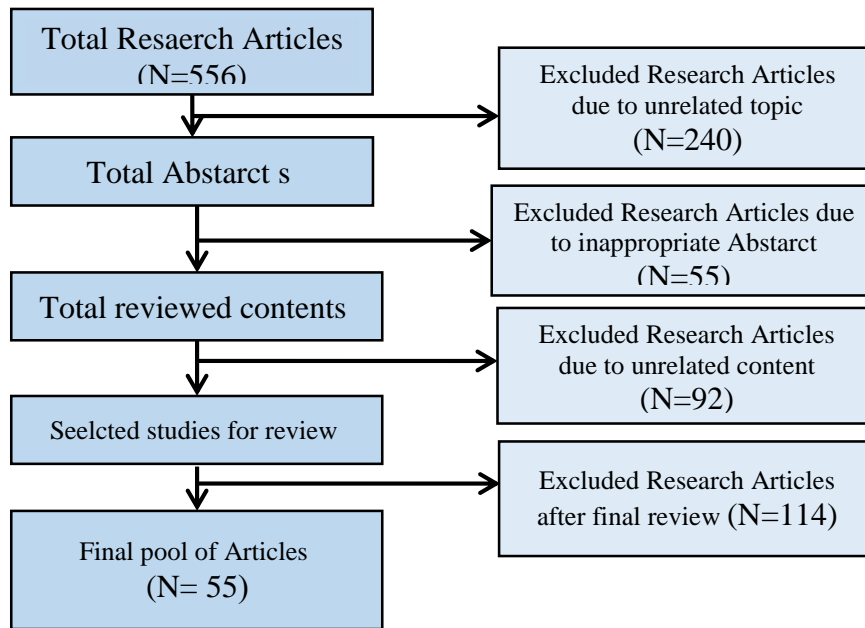


Figure 1. Reviewing and Selection Procedure

In this phase of the research, a total of 556 studies were identified and underwent a multi-stage review process to filter out irrelevant studies and select those that were relevant to the research questions. The process began with an examination of the study titles, which led to the exclusion of 240 studies. Next, a review of the abstracts resulted in the elimination of an additional 55 studies, leaving 261 studies for further evaluation. The content of these remaining studies was then carefully analyzed, resulting in the exclusion of another 93 studies, which left 169 studies for consideration. Finally, the methodological quality of these studies was assessed using the CASP tool to ensure that only high-quality studies were included in the analysis.

The table 1 presents a selection of recent academic papers on knowledge management, research methodologies, and organizational effectiveness. Each entry includes the authors, title, and key themes explored in the research. These studies highlight various aspects of knowledge transfer, strategic management, and institutional development.

Table 1. Reviewing A Number of Article Information

Code	Author(s)	Title	Keywords
S23	Minna et al. (2024)	Reflexive use of methods: a framework for navigating different types of knowledge and power in transformative research	Defining ambitious and flexible goals, systemic approach and collective participation, accountability of managers, localization of knowledge extraction technologies, integrated response to changes.
S54	Barra et al. (2024)	Research and knowledge transfer performance in Colombian universities	Knowledge base design, team awareness, creating the need for teamwork, indirect supervision of teams, attention to employees' knowledge needs, process orientation, integration in utilizing human resource capacities, documentation of knowledge, documentation of unsuccessful knowledge, satisfaction assessment.
S41	Ayinaddis (2024)	Unpacking Antecedents of Knowledge Management Success: A Key to Firm Performance in the Banking Sector	Presence of trained and specialized human resources, delegation of authority and employee empowerment, enhancement of employee competencies, revision of regulations, teamwork, participatory leadership.
S38	Abdallah et al. (2024)	Knowledge Management and Risk Control in the University Environment: Biotechnology Center of Sfax-Tunisia	Identifying organizational characteristics, risk identification, identification of indigenous knowledge, defining ambitious and flexible goals, drafting outsourcing regulations, eliminating cumbersome regulations, goal orientation, providing a clear organizational image, long-term vision, moderation, developing and communicating a strategic vision, identifying threats and opportunities.
S42	Durst et al. (2024)	A systematic literature review on knowledge management in SMEs:	Responsibility, knowledge infrastructure, goal orientation, organizational learning, incentives and motivation systems, coordinated

		current trends and future directions	organizational structuring, integrated response to changes, inter-organizational balance.
S12	Ghorbankhani et al. (2023)	Intrinsic and strategic complementarity of research and knowledge transfer activities as determinants of knowledge transfer management: evidence from public research organisations	Educational needs assessment, continuous training, promoting a culture of knowledge acquisition, team-building training, attention to employees' knowledge needs, process orientation, integration in utilizing human resource capacities, data sensitivity in research centers, encryption, confidentiality and trust, fostering research centers with supervision, prudent decision-making.
S13	Alexander (2023)	The Interplay of Knowledge, Strategies, and the Interest in the Development of Expertise within Professions	Utilization of organizational authority, attention to employees' knowledge needs, process orientation, integration in utilizing human resource capacities, knowledge extraction, diversity in educational productions, leveraging internal capacities for software development.
S15	Pinto et al. (2023)	Sources of knowledge in the firm: a review on influential, internal and contextual factors in innovation dynamics	Adoption of new technologies, organizational knowledge structure, adoption of smart technology, artificial intelligence utilization, cloud computing, knowledge base, equipping with modern hardware and software, localization of knowledge extraction technologies, internal transformation for change, strong determination, readiness for knowledge advancement, firm managerial willpower, moderation and stability, adherence to discipline.

S16	Benner et al. (2024)	Will the Center Hold? What Research Centers Do to Universities and to Societal Challenges	Creating a foundation for idea generation in research centers, positioning knowledge within research centers, developing knowledge preservation regulations, establishing a knowledge base.
S18	Sell et al. (2023)	Developing, implementing, and monitoring tailored strategies for integrated knowledge translation in five sub- Saharan African countries	Goal orientation, providing a clear organizational image, long-term vision, moderation, developing and communicating a strategic vision, decentralization, outsourcing, quick feedback provision, optimization of organizational positions, organizational flexibility, knowledge extraction, diversity in educational productions, leveraging internal capacities for software development, strong interview teams for extracting tacit knowledge, existence of an accurate reporting system.

To improve the quality of the results, the remaining articles were methodologically evaluated against ten criteria using the CASP tool, which included clarity of objectives, appropriateness of the research method, data collection methods, ethical considerations, and accuracy of the analysis. Out of the total 556 articles, 501 were excluded for failing to meet these criteria, resulting in a final selection of 55 articles for analysis. The extracted codes were reviewed by two researchers, and statistical analyses conducted with SPSS software revealed a kappa index of less than 0.05, indicating that the extracted codes were interdependent and challenging the assumption of their independence. Therefore, the tool used for code extraction showed adequate reliability. The researcher sought to identify common themes across the various studies, a process referred to as a “thematic review.” After these themes were identified, they were categorized, and similar themes were grouped into related categories. These classifications were then developed into explanations, patterns, theories, or hypotheses. Ultimately, all factors extracted from the studies were treated as identifiers, and similar concepts were organized into explanatory categories to pinpoint the main and sub-themes of the research.

Table 2. Identification of Common Themes in Studies Examining Organizational Maturity

Basic Themes	Organizing Theme	Frequency	Global Theme
Knowledge-centricity, learning enthusiasm, Responsibility for acquiring awareness, Invalidation of traditional beliefs, Detection of organizational vulnerabilities	Awareness Raising	27	Maturity
Internal transformation for change, Strong determination, Readiness to enhance knowledge, Robust managerial commitment, Moderation, and sustainability.	Organizational Will	42	
Formulating regulations to secure internal and external organizational funding, defining ambitious yet flexible objectives, establishing regulations for outsourcing, Eliminating cumbersome regulations	Policymaking	3	

Knowledge-centricity and enthusiasm for learning are considered key factors in organizational improvement. Responsibility for acquiring awareness also plays a crucial role in fostering motivation and progress within the organization. On the other hand, breaking traditional beliefs and identifying blind spots in organizational processes have been proposed as essential steps towards enhancing awareness and transparency. Given the high frequency of this theme (27 instances), it can be concluded that awareness-raising is one of the prominent and fundamental topics in research related to organizational growth. Internal organizational transformations require sustainable changes and strong determination. Research shows that the presence of strong will among managers and employees plays a significant role in driving change and readiness to enhance knowledge. The emphasis on moderation and sustainability in these changes suggests that researchers are seeking long-term and lasting changes. With the highest frequency (42 instances), organizational will is seen as one of the most important focal points in organizational studies.

One of the critical pillars of policymaking in organizations is the formulation of appropriate regulations to attract internal and external funding and the elimination of cumbersome regulations. These studies also emphasize the necessity of setting long-term and flexible goals so that organizations can effectively adapt to environmental changes. Policymaking, with a frequency of 31 instances, has been identified as

a vital theme in the field of organizational management. The Global Themes of "maturity" indicates that many studies focus on the process of growth and development in organizations. Organizational maturity encompasses the improvement of awareness, strengthening of internal will, and the formulation of efficient policies, all of which contribute to the formation of a dynamic and successful organization. These themes together represent the path that organizations take to reach maturity, from increasing knowledge to sustainable changes and appropriate regulations.

Table 3. Identification of Common Themes in Studies Examining Knowledge-Based Decision Making

Basic Themes	Organizing Themes	Frequency	Global Themes
Goal-orientation, Providing a transparent organizational image, Long-term vision, Moderation, Vision formulation and communication, Identification of threats and opportunities.	Future-orientation	52	Knowledge-based decision making
Rapid responsiveness, Increased accountability, Systemic approach and public participation, holding managers accountable, Systematizing complaint handling, Developing a suitable monitoring and evaluation system.	Accountability	30	
Proper and optimal use of human resources, Existence of trained and specialized human resources, Delegation of authority and employee empowerment, Enhancing employee competencies, Appropriate and scientific organization, Knowledge-based human resource management.	Human resource development	34	
Motivating employees, reward and encouragement system, prioritizing group interests over individual and factional interests, encouraging individuals committed to knowledge management, financial rewards	Motivational culture	28	

and job promotions, satisfaction of trainers and managers with knowledge management programs			
Acceptance of new technology, Acceptance of smart technology, Use of artificial intelligence, Equipping with modern hardware and software, Localization of knowledge extraction technologies.	Technology-Centricity	25	

One of the most important factors in organizational success is having a clear and long-term vision. Research clearly demonstrates that future-orientation and planning for future pathways play a key role in organizational stability and advancement. Understanding the surrounding environment, analyzing threats and opportunities, and formulating appropriate strategies to address external challenges are among the necessary actions in the future-orientation process. With the highest frequency (52 instances), this theme has been considered one of the main axes in the studies.

Research indicates that rapid and effective responsiveness to the needs of customers and stakeholders is among the key factors in organizational success. Accountability at all organizational levels also plays an important role in this regard, especially when there is a need for quick and accurate responses to issues and complaints. For performance improvement, responsiveness processes must be systematic, and complaint handling must be structured and effective to increase customer trust and satisfaction.

Research emphasizes the importance of human resource development. Human resources are considered the main engine of organizational growth and productivity. Knowledge-based human resource management is considered one of the key factors in organizational success. Appropriate and scientific organization of human resources is also a factor that can contribute to improving organizational performance and productivity.

Employee motivation through creating a culture of cooperation, rewards, and incentives has been identified as an effective factor in improving organizational performance. Studies show that creating an environment where group interests are prioritized over individual and factional interests can strengthen motivation among employees and lead to improved team spirit.

Acceptance of new technologies and their use for improving organizational performance is one of the most important themes

considered in studies. In particular, the use of artificial intelligence as a powerful tool can help optimize processes and strategic decision-making. Technology focus allows organizations to maintain their innovation and competitiveness.

The Global Themes of Knowledge-Based Decision-Making underscores the pivotal role of informed judgment, predicated on robust knowledge and information, in achieving organizational success. The utilization of knowledge and information within the decision-making process not only facilitates strategic foresight but also exerts a significant influence on enhancing accountability, fostering human capital development, and cultivating employee motivation. Knowledge-based decision-making maintains a direct and integral link to all subordinate themes. This interconnectedness stems from the inherent reliance of each theme on the rigorous analysis of empirical data and pertinent information. Such analysis empowers organizations to formulate and execute strategic, efficacious decisions that drive positive outcomes.

Table 4. Identification of Common Themes in Studies Examining Structural Flexibility

Basic Themes	Organizing Theme	Frequency	Global Themes
Decentralization, Outsourcing, providing rapid feedback, Optimizing the number of organizational positions, Organizational flexibility.	Reducing complexity	15	Structural flexibility
Availability of consultants, Presence and accessibility of communication consultants, Facilitating communication, Internal and external communication.	Effective communication	13	
Innovation focus, Use of creative techniques, promoting creativity and innovation, Laying the foundation for generating suitable ideas within research centers.	Creativity-orientations	15	
Harmonious organizational structuring, integrated response to changes, inter-organizational balance,	Coordination	15	

capacity coordination, integrated transformational leadership			
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Moreover, access to consultants and the establishment of appropriate communication channels have been recommended as strategies for enhancing organizational communication. Innovation and creativity, particularly in today's competitive environment, are key factors in organizational success. Studies suggest that creating a conducive environment for fostering creativity and supporting new ideas can drive organizations toward innovation and transformation. Encouraging idea generation and providing the necessary conditions for implementing these ideas are among the recommended strategies in creativity-oriented studies.

Establishing organizational coordination and integration is essential for improving efficiency and productivity. Studies highlight the significance of transformational leadership, which can foster greater integration and ensure the necessary coordination within organizations. The presence of strong leadership with the ability to manage change and guide teams has been identified as a key factor in organizational success.

Global Themes – Structural Flexibility: This theme underscores the importance of developing a flexible and adaptive organizational structure that can respond effectively to environmental changes. Structural flexibility enables organizations to navigate both internal and external transformations more efficiently. This concept is interconnected with all other themes; for instance, complexity reduction enhances flexibility, effective communication facilitates better organizational coordination, and creativity orientation fosters innovative solutions for adapting to change.

Table 5. Identification of Common Themes in Studies Examining Knowledge-Centric Approaches

Basic Themes	Organizing Theme	Frequency	Global Themes
Extraction of knowledge Diversity in educational offerings Utilization of internal resources for software development Formation of effective interview teams to elicit tacit knowledge	Knowledge Management	18	

Presence of a comprehensive reporting system			Knowledge-Centricity
Creating a supportive atmosphere for knowledge exchange Narratives incorporating diverse or seasoned content Recognizing contributors of knowledge Establishing trust in the sharing of knowledge Implementing job rotation strategies	Knowledge Sharing	22	
Knowledge documentation practices Suboptimal knowledge documentation Narratives for knowledge sharing Reliable reporting systems Design of knowledge bases	Documentation Practices	31	
Assessment of educational needs Provision of ongoing training Cultivating a culture of learning Training focused on team-building	Training-Centric	24	

Knowledge is regarded as one of the most valuable assets of organizations. Studies indicate that the extraction and utilization of knowledge, particularly tacit knowledge, are vital for organizational success. One effective strategy in this regard is the formation of strong teams to leverage internal capacities and develop organizational software. With a frequency of 18 occurrences, this theme has been identified as a primary focus in various studies. Establishing a culture of knowledge sharing within organizations is of significant importance. Research shows that to create a safe and trusting environment for knowledge sharing, organizations must foster an atmosphere where employees feel appreciated and motivated to share their knowledge. Encouragement and recognition of these individuals are among the strategies that contribute to the development of a knowledge-sharing culture. Structured and written documentation of knowledge is a key method for preserving and transferring knowledge within

organizations. This process enables both tacit and explicit knowledge to be made accessible to other members of the organization. The use of accurate reporting systems is also highlighted as one of the critical recommendations in documentation practices. With the highest frequency (31 occurrences), this theme is recognized as one of the most important focal points in knowledge management studies. Continuous training and educational needs assessment are other emphasized topics in the research. Promoting a culture of learning and enhancing employee knowledge through team-building training and skill development are recognized as effective strategies for improving organizational performance. Training-centric approaches not only contribute to knowledge enhancement but also foster increased motivation and efficiency among employees.

The Global Themes—knowledge-centricity—reflects the importance of transforming organizations into knowledge-driven entities. Knowledge-centricity is interconnected with all other themes, as the extraction, sharing, documentation, and training of knowledge are essential for establishing a knowledge-centric organization. In other words, to achieve an organization that recognizes knowledge as one of its most important assets, it is necessary to continuously and harmoniously focus on these four pillars. Training-centric approaches further assist in elevating knowledge and skills within the organization, thereby reinforcing the commitment to knowledge-centricity.

Table 6. Identifying common themes in studies examining sociopathy

Basic Themes	Organizing Theme	Frequency	Global Themes
Utilization of teamwork capacities, encouragement of team problem-solving, identification of skilled and creative individuals for team formation, self-managed teams, indirect supervision of teams	Team Orientation	44	Socialization
Efforts to address the needs of service recipients, striving for service recipient satisfaction, appropriate response systems to feedback	Responsiveness	25	
Use of organizational authority, empowerment of research centers with oversight, prudent	Participatory Management	45	

decision-making, attention to employee knowledge needs, process-centric approach, coherence in utilizing human resources			
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Research clearly indicates that teamwork and the formation of self-managed teams are key factors in organizational success. Employees' ability to collaborate, especially when creative individuals come together in teams, can lead to innovation and improved organizational performance. The identification and engagement of creative individuals within teams are also crucial elements of team orientation. This theme, with a frequency of 44 occurrences, is recognized as a primary focus in research, emphasizing the importance of collaboration and collective thinking within organizations. Addressing customer needs and accepting their criticisms are among the factors contributing to organizational success. Studies show that customer satisfaction is directly related to an organization's ability to be responsive to feedback and improve its performance. Establishing appropriate systems for addressing and managing feedback can enhance relationships with customers and strengthen trust in the organization. This approach is recognized as one of the critical strategies for organizational success. In studies, employee participation in the decision-making process is highlighted as an important factor in organizational success. This management style not only boosts employee morale but also provides them with the opportunity to contribute to their own knowledge growth and development. Participatory management emphasizes a process-centric approach; this means that organizations achieve their goals by focusing on continuous improvement of work processes and optimal use of their resources.

The Global Themes—socialization—indicates that organizations must engage effectively with their community and stakeholders to achieve success in a broader environment. Socialization is closely linked with other themes such as team orientation, responsiveness, and participatory management. Team orientation fosters a sense of belonging among employees, responsiveness enhances customer relations and constructive interactions, while participatory management increases employee involvement and collaboration in organizational decision-making. This comprehensive approach guides organizations toward sustainable success.

Table 7. Identifying common themes in studies examining cloud computing localization

Basic Themes	Organizing Theme	Frequency	Global Themes
Communication policy, establishment of a shared platform, organizational coordination, regulation of data sharing in cloud platforms	Organizational Communication	25	Localization of Cloud Computing
Attention to data sensitivity in research centers, encryption, maintaining confidentiality and trust	Security and Trust	24	
Scalability, alignment with organizational needs, localization of cloud computing systems	Organizational Flexibility	25	
Technology adoption, measurement of system productivity, creation of a shared space for knowledge management, cost management, quality management, time management	Informational Optimization	49	

Effective communication within organizations is a key factor for success, particularly in the realm of data and information sharing. Studies indicate that coordination and the establishment of coherent information flows within an organization can enhance efficiency and productivity. The use of shared platforms for data sharing has been proposed as a practical solution to improve communication quality within organizations. This theme, with a frequency of 25 occurrences, is recognized as one of the main focal points in research. A critical aspect of data management is the protection of sensitive and confidential information. Research highlights the significant importance of data security within organizations and recommends the use of encryption methods to ensure this security. Additionally, trust-building mechanisms are considered part of the strategies to guarantee information security and gain stakeholder trust. Data security not only aids in protecting organizational information but also lays the foundation for reliable communications between the organization and its stakeholders. Studies show that the flexibility of cloud computing systems is vital for organizational success. These systems must possess scalability and adaptability to meet the changing and often complex needs of organizations. Localizing cloud systems according to the specific requirements of each organization and country is an important

factor in increasing organizational flexibility and adaptability to environmental and market changes. This enables organizations to manage changes effectively in dynamic environments. Optimizing resource utilization and data management are among the most important themes in research related to organizational management. Creating shared spaces for knowledge and information management is recognized as an effective strategy for enhancing productivity and increasing collaboration among organizational units. With a frequency of 49 occurrences, this theme is presented as the primary focus in the area of informational optimization. Better utilization of data can play a significant role in strategic decision-making and overall organizational performance.

The Global Themes—localization of cloud computing—indicates that adapting cloud technologies to the specific conditions and needs of each organization and country is recognized as one of the key strategies for success and productivity. Localization allows organizations to have more efficient and secure cloud systems tailored to their unique culture, regulations, and specific needs. This theme is directly related to other themes such as effective communication, data security, and informational optimization. For instance, localized cloud platforms can enhance communication, ensure greater security, and increase organizational productivity through better information management.

This section examined the quality of analysis in qualitative research. Credibility in qualitative studies refers to concepts such as trustworthiness and confirmability, and in this research, quality control was measured using the Kappa coefficient. The Kappa coefficient was employed to determine the level of agreement among codings and qualitative analyses, resulting in a value of 0.711, indicating an acceptable reliability of the research findings. Additionally, to ensure the quality of the study, both electronic and manual search methods were utilized, along with detailed explanations. Ultimately, the research indicators were categorized into six categories and 23 final codes. In this study, the Delphi technique was used to assess the consensus and agreement among experts regarding the designed framework and its components. To fuzzify the experts' views, triangular fuzzy numbers were utilized, collecting their perspectives on the importance of each indicator using a seven-point fuzzy scale. The use of fuzzy numbers is preferred over traditional methods due to their greater flexibility in accommodating human linguistic and subjective descriptions, especially in long-term predictions and real-world decision-making. The Delphi method was employed in this research to screen and validate the identified indicators in the initial phases of the study. Initially,

qualitative analyses identified 106 indicators relevant to the research topic. To ensure the significance of these indicators and select the final ones, insights from 43 experts were gathered in the first round of Delphi. This round involved specialists from the fields of research and knowledge management who were purposefully selected based on their research background, work experience, and adequate knowledge in strategic knowledge management. The experts' opinions regarding each indicator were collected using a five-point Likert scale. In this method, any item with an average score below 3 was eliminated. As a result of this process, 75 indicators that did not achieve the necessary average score were discarded. These indicators primarily pertained to areas such as interaction with other organizations, training programs, policies and incentives for employee participation, and infrastructure. In the second round of Delphi, after removing weaker indicators, the remaining 32 indicators were reassessed by experts. Again, a five-point Likert scale was used to rank the importance of each indicator. In this round as well, indicators with means and modes below 3 were removed, leading to the elimination of five additional indicators. The topics of these discarded indicators included knowledge storage and retrieval systems, capabilities for developing and implementing knowledge management, attention to the importance of knowledge management, knowledge dissemination meetings, and performance improvement. In the third and final round of Delphi, results obtained from previous rounds were sent to experts for final confirmation. At this stage, 27 remaining indicators were ultimately confirmed and considered as final indicators for further research.

To measure the level of agreement among experts throughout the Delphi process, Kendall's coefficient of concordance was utilized. This coefficient indicates whether experts used similar criteria in ranking the importance of indicators. Kendall's coefficient served as a criterion for deciding whether to stop or continue Delphi survey rounds. When Kendall's coefficient indicated strong consensus among panel members, the survey process was halted, and final indicators were confirmed. Table 8 presents the results of calculating the Kendall coefficient for the first and second rounds of the Delphi survey.

Table 8. Kendall's coefficient

	Kendall's coefficient
Third Round	0.56

The Kendall's coefficient of concordance has been calculated as 0.56, indicating a moderate level of agreement among experts, which is acceptable and suitable given the large number of participants. The most important topics mentioned in the first ten questions are as follows:

Role of Managers in Creating a Suitable Culture for Knowledge Management: Questions 1 and 9 explore the role of managers in promoting a culture of knowledge sharing and developing knowledge management programs.

Necessary Capabilities for Knowledge Management: Questions 3 and 6 examine the presence of necessary capabilities for training and developing knowledge management programs within the research center.

Knowledge Sharing: Questions 4 and 10 investigate the willingness and trust of center members to share their knowledge with others.

Incentives and Facilitators: Questions 2 and 7 focus on the importance of creating internal incentives and the emphasis managers place on knowledge management as a facilitator for developing this process.

Access to Knowledge: Question 8 assesses the extent of access to experts and managers for exchanging knowledge and ideas.

In Figure 2, it can be observed that the key components of Knowledge Management (KM) are presented in a continuous and integrated structure. The sunburst chart highlights six core areas—Knowledge Creation and Generation, Knowledge Sharing and Dissemination, Knowledge Collection and Acquisition, Knowledge Utilization, Knowledge Storage and Retrieval, and Technical/Structural Support. Each of these main categories expands into relevant subcomponents such as managerial support, organizational culture, internal incentives, access to experts, IT infrastructure, and trust. Collectively, they form a comprehensive framework for the effective development, implementation, and sustainability of KM within an organization.



Figure 2. shows the thematic network

Conclusion

This study employs thematic network analysis to explore the development and implementation of knowledge management (KM) in Iranian government-affiliated research centers. The findings reveal six global themes—Maturity, Knowledge-Based Decision Making, Structural Flexibility, Knowledge-Centricity, Socialization, and Localization of Cloud Computing—that collectively provide a comprehensive framework for understanding KM in these organizations. These themes align with and expand upon existing literature while also addressing unique challenges specific to the Iranian context. For instance, the study emphasizes the critical role of leadership commitment and organizational culture in KM success,

which is consistent with findings from Kim & Park (2022), who highlighted that managerial support positively impacts tacit knowledge sharing. However, unlike Kim & Park, who found that job stress positively influences knowledge sharing, this study identifies cultural resistance as a significant barrier, suggesting that contextual factors play a crucial role in shaping KM outcomes. Similarly, the importance of IT infrastructure in KM is a recurring theme in both this study and prior research, such as Nurdin et al. (2018), who identified the lack of technological infrastructure as a barrier to KM in Syrian banking. This study further highlights the need for localized cloud computing and modern technologies like AI to optimize KM processes, aligning with international studies by Andriani et al. (2019) and Benabdellah et al. (2021). The localization of cloud computing, as introduced in this study, adds a novel dimension to the literature by emphasizing the adaptation of global technologies to local organizational and cultural needs.

The study's focus on continuous training, motivational incentives, and participatory management resonates with findings from Ambarwati et al. (2023), who found that employee competence and KM positively influence organizational outcomes. However, unlike Ambarwati et al., this study does not find that KM to moderate the relationship between employee competence and outcomes, suggesting that KM's role may vary across contexts. This divergence highlights the need for context-specific KM strategies tailored to organizational and cultural environments. Additionally, the emphasis on fostering a collaborative culture and international collaboration aligns with Hapsari (2023), who examined KM in Jakarta's Jak preneur Program. Both studies highlight the importance of knowledge sharing and stakeholder engagement in overcoming growth barriers and enhancing organizational competitiveness. However, while Hapsari focused on MSMEs, this study extends these findings to government-affiliated research centers, demonstrating the universal applicability of KM principles across different sectors.

While prior research often focuses on general organizational challenges, this study specifically identifies cultural resistance and bureaucratic structures as major barriers to KM implementation in Iranian research centers. This finding underscores the need for context-specific strategies to address these unique challenges, which are less emphasized in the broader KM literature. The six global themes identified in this study provide a more holistic framework for understanding KM implementation compared to prior research, which often focuses on isolated factors like managerial support or technology infrastructure. This framework integrates multiple dimensions, including structural flexibility, knowledge-centricity, and socialization,

offering a more nuanced understanding of KM in complex organizational settings. Furthermore, the study introduces the concept of localizing cloud computing to meet organizational and cultural needs, which is a novel contribution to the KM literature. This theme highlights the importance of adapting global technologies to local contexts, ensuring both efficiency and security, and addresses a gap in prior research that often overlooks the cultural and infrastructural challenges of technology adoption in developing countries.

The study's findings suggest several areas for future research and practical application. Future studies could compare the KM frameworks and challenges identified in this study with those in other countries or sectors to identify best practices and universal principles. Exploring the role of AI, machine learning, and other smart technologies in enhancing KM processes could provide valuable insights for organizations seeking to modernize their KM systems. Additionally, investigating the impact of financial and non-financial incentives on employee engagement and KM effectiveness could help organizations design more effective motivational strategies. In conclusion, this study builds on and extends prior research by providing a comprehensive framework for understanding KM implementation in Iranian government-affiliated research centers. While it confirms the importance of managerial support, technology infrastructure, and employee engagement, it also highlights unique challenges such as cultural resistance and bureaucratic structures. By addressing these barriers and leveraging localized technologies, organizations can unlock the full potential of KM to improve decision-making, innovation, and international collaboration. The findings offer valuable insights for policymakers, practitioners, and researchers aiming to enhance KM strategies in similar contexts. Future research should explore comparative analyses, the role of smart technologies, and the impact of financial incentives to further advance the field of KM.

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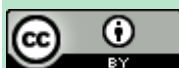
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