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The influence of knowledge management on innovation and organizational performance

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ABSTRACT

This study examines how the knowledge management processes of knowledge creation, integration, implementation, and sharing affect innovation and organizational performance. The study also examines the mediating role of innovation in the relationship between these knowledge management processes and organizational performance. Although the literature recognizes the importance of knowledge management, analyses have not considered the role of each of these knowledge management processes in addition to their collective impact on performance. This study addresses this research gap by empirically examining the relationships among these variables using partial least squares structural equation modeling (PLS-SEM). Questionnaire data were collected from 528 professionals across Romania. SPSS was used to produce and analyze descriptive statistics, and SmartPLS was employed to conduct PLS-SEM. Knowledge creation and sharing significantly influenced innovation, whereas knowledge implementation did not. Innovation was observed to be a key link between knowledge management and organizational performance. These findings have substantial implications for both knowledge management theory and practice. Specifically, the findings underscore the need to emphasize knowledge creation and sharing to foster innovation and secure a competitive advantage. This study enriches the theoretical literature by validating an integrated model using PLS-SEM. It also provides actionable recommendations for managers seeking to improve organizational performance through innovation.

Introduction

Given current economic, social, technological, and environmental pressures, securing a competitive advantage is a challenge. Different strategies have been developed to achieve this goal, with knowledge-based strategies offering companies a way to achieve sustainable performance. Knowledge is created in a dynamic process through social interactions among individuals and between individuals and organizations (Somoza et al., 2011). Companies that use knowledge as a strategic asset can cope with the challenges they encounter. Researchers and practitioners have reported the vital role of knowledge in achieving superior individual and organizational performance (Wu & Lin, 2009). In the era of the knowledge-based economy, resources, skills, and competencies are vital for companies that seek not only to survive but also to secure a competitive advantage in this dynamic environment (Wang & Wang, 2012).

Drucker (1993) predicted that knowledge would replace equipment, capital, materials, and labor to become the most important factor in achieving a competitive advantage, denoting employees who work with knowledge as *knowledge workers*. Knowledge is an intangible asset of organizations, which need it to perform. Hence, knowledge must be well managed (Bouzaabia et al., 2013). Given the importance of knowledge for future individual and organizational performance, both academicians and practitioners have sought to understand the processes of identifying, capturing, creating, sharing, implementing, and using knowledge (Kogut & Zander, 1996; Nonaka, 2005; Saura et al., 2021; Uden & Ting, 2023).

Knowledge has become the basis of competition. Tacit knowledge is especially important in this regard because it offers a source of competitive advantage thanks to the fact that it is unique, imperfectly mobile, imitable, and non-substitutable (Zack, 1999). The act of processing knowledge does not ensure a competitive advantage (Zack, 2002). It only grants firms such an advantage if well managed. Therefore, if companies want to grow, they must manage their knowledge efficiently.

Despite the varied approaches to studying knowledge management

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in previous studies, notable gaps remain in the literature. Research on the interactions among the various processes involved in knowledge management (creation, integration, implementation, and sharing) is limited. Most studies have focused on one or two of these processes, neglecting the question of how they collectively influence innovation and organizational performance (Scuotto et al., 2024). This omission creates a gap in the overall understanding of how knowledge management stimulates innovation and improves organizational outcomes. The role of innovation as a mediator between knowledge management and organizational performance has also been underexplored. Although this mediating role is vital to organizational success, few studies have explored it within an integrated model (Tortorella et al., 2024). Therefore, it is unclear how knowledge management can indirectly influence organizational performance through innovation, creating a void in the literature.

This study examines how the knowledge management processes of creation, integration, implementation, and sharing together affect innovation and organizational performance. The study addresses two gaps in the literature. First, it examines the interaction between these processes in shaping innovation and organizational performance. Second, it tests the hypothesis that innovation mediates the relationship between knowledge management and organizational performance. The study thus underscores the vital role of innovation in transforming knowledge into competitive advantage.

The novelty of this study lies in its thorough examination of how knowledge creation, integration, implementation, and sharing collectively influence innovation and organizational performance in Romania's unique regional context. Although the specialized literature has recognized the importance of knowledge management, most studies have explored these processes in isolation or within a limited geographical framework. This study methodologically and practically contributes by employing partial least squares structural equation modeling (PLS-SEM) to assess the mediating role of innovation in the relationship between knowledge management and organizational performance. The findings offer valuable insights for managers in emerging economies such as Romania, indicating that a strategic emphasis on knowledge creation and sharing can improve innovation. This study contributes to the fields of knowledge management and innovation management, enhancing current understanding in several ways.

1. Integrating four knowledge management processes in the analysis offers an innovative approach. This approach addresses the limitations of previous research, which has focused on knowledge creation, integration, implementation, and sharing separately. This study examines the interaction of these processes, highlighting their combined impact on innovation and organizational performance (Davenport & Prusak, 1998; Nonaka & Toyama, 2003). This perspective not only allows for the optimization of knowledge use but also provides a deep understanding of the interdependent relationships among these knowledge management processes. The study thus contributes to knowledge management theory (Alavi & Leidner, 2001; King, 2009).
2. The study shows that innovation is the key to translating knowledge into organizational performance. Although studies have emphasized the importance of innovation, research has shown that it mediates the relationship between knowledge management and organizational outcomes (Crossan & Apaydin, 2010; Damanpour, 1991). Innovation not only facilitates the application of knowledge but also enhances its impact on performance. Gaining a deeper understanding of this mechanism can equip organizations with effective strategies to maximize the impact of knowledge on performance (Garud & Nayyar, 1994).
3. This study uses a robust PLS-SEM method to examine complex relationships between latent variables. This method provides a detailed understanding of the impact of knowledge management processes on innovation and performance. The study thus contributes methodologically to the literature in the field (Chin, 1998; Hair et al., 2011).
4. The study offers practical recommendations for managers looking to improve innovation and organizational performance. The findings highlight the need to prioritize knowledge creation and sharing to foster innovation. Managers can use these findings to develop policies and practices that support collaboration and continuous innovation in their organizations to enhance strategic effectiveness (Grant, 1996; Zack, 1999).

The study is structured as follows. Section 2 presents a review of the literature in this field. The research hypotheses and conceptual model are also proposed. Section 3 presents the method, states the study objectives, and describes the data, sample, and respondents. Section 4 presents the results. Section 5 discusses these results. Section 6 outlines the conclusions, implications, limitations, and future research directions, as well as highlighting the importance of this study.

Literature review, research hypotheses, and conceptual model

The ongoing analysis of the relationship between knowledge management, innovation, and performance reflects its nature as a continuously evolving process (Darroch, 2005). In contrast, the effects of knowledge management on innovation and performance have scarcely been analyzed (Choi et al., 2008). Some studies have tested the link between these variables (Tseng, 2008), although there is a research gap in the analysis of knowledge management.

The rise of digital technologies and the concept of Industry 4.0 have made knowledge management essential for organizations to cope with emergent challenges (De Bem Machado et al., 2022). Digital transformation not only affects knowledge management processes but also boosts organizations' ability to innovate and enhance performance (Gómez-Marín et al., 2022). These new directions suggest that the effective implementation of knowledge management in the context of technological change can accelerate innovation within organizations and improve their competitiveness.

Knowledge management and innovation

Knowledge creation and innovation

Knowledge creation lays the foundation for innovation. It is based on four processes: socialization, externalization, combination, and internalization, referred to collectively as the SECI model (Chen et al., 2024). According to Nonaka, organizational knowledge creation is based on two dimensions. The first reflects the idea that only individuals create knowledge. The second relates to the interaction between explicit and tacit knowledge. Tacit knowledge accounts for 85 % of total knowledge. It is any information or skills that employees derive from experience (Summerscales, 2024). Tacit knowledge is informal (Collins, 2010) and resides in the minds of employees. It is based on routines, experiences, relationships, teamwork, understandings, or intuitions (Johannessen, 2022). In contrast, explicit knowledge accounts for 15 % of total knowledge. It is formal and is found in documents, databases, rules, disks, videos, or methodologies. Companies must retain their tacit and explicit knowledge (McElroy, 2003). Another important dichotomy in this area of study is the idea that knowledge can be soft or hard (technical). Technical knowledge is considered a key factor in the innovation of organizations (Zhu et al., 2024).

A knowledge-centered culture and social interactions within organizations play an essential role in stimulating innovation. Fierro Moreno et al. (2013) stressed that, by creating an organizational culture oriented toward knowledge and collaboration, knowledge management mediates innovation, facilitating the exchange of ideas and the creation of solutions. Other studies indicate that the processes of knowledge creation and sharing are critical for the success of organizations in a globally competitive environment (De Bem Machado et al., 2022).

According to knowledge management studies (Braunerhjelm et al., 2010) the creation process is significant in the market context and the laboratory. However, the outcomes of the creation process are subject to pressures from different barriers and so may not reach their full potential or may not be fully transformed into social and economic knowledge (Braunerhjelm et al., 2010). These barriers, known as *knowledge filters* (Audretsch et al., 2020), may be internal or external (Hadjimanolis, 2003). Internal barriers arise inside the organization in the form of skills, mindset, competencies, resources, and organizational culture. External barriers lie outside the organization's control and appear in the external environment in the form of human resources specialization, the education system, and financial measures (Sandberg & Aarikka-Stenroos, 2014). However, studies have shown that companies that face innovation barriers are more likely to develop eco-innovations (Dmytrenko et al., 2024).

Tian et al. (2024) discovered a strong positive relationship between innovation-based performance and inter-organization knowledge search. PLS-SEM-based studies have found that knowledge creation, especially in its tacit form, affects innovation by creating a network capability orientation (Dong et al., 2023) and new products and services to increase organizational performance (Zia et al., 2023).

PLS-SEM-based analyses have also shown that the impact of tacit knowledge sharing on employee innovation is crucial in developing service recovery performance (Alzyoud et al., 2024). Studies using a PLS-SEM approach have likewise shown that knowledge creation predicts corporate transparency and financial performance (Abueed & Aga, 2019). Hence, the following research hypothesis is proposed:

H1: Knowledge creation has a positive effect on the innovation process.

Knowledge integration and innovation

Knowledge and innovation are important for organizational competitiveness. Companies look for knowledge not only internally but also externally, through collaboration, partnerships, joint ventures, and strategic alliances, which offer new expertise and add value. They also seek knowledge externally through relationships with stakeholders such as suppliers, customers, and competitors (Audretsch et al., 2020), research institutes and universities (Scandura, 2016), and science parks, which can support innovation and new business idea discovery.

This strategy based on seeking external knowledge has become important, especially in key areas (Howells, 2006). Its efficiency depends on breadth, which refers to the number of different sources used for searching, and depth, which refers to the scope for extrapolation of searching (Laursen & Salter, 2006). The mix between the two ways of searching for knowledge is important for stimulating innovation. Numerous studies have indicated that knowledge co-creation using internal and external processes based on collaboration with external partners offers the opportunity to develop new products and services. Scholars have also reported that knowledge collaboration is one of the main challenges for organizations (Audretsch et al., 2020).

Knowledge integration improves innovation and performance by supporting multiplicity, creativity, and productivity (Krupskaya, 2025), as well as digital innovation based on information technology (IT) competencies and capabilities (Sherani et al., 2024). The processes of knowledge integration and performance depend on the integration of digital technologies in supply chain processes. The new opportunities that arise then offer a competitive advantage to organizations to protect against economic volatility, global pandemics, and regional conflicts (Hashem & Aboelmaged, 2024).

Research has studied how companies manage their alliance portfolio to speed up innovation, especially based on knowledge (Pan et al., 2024). The knowledge gained though external collaborations positively affects innovation (Huang et al., 2024). Scholars have also found that knowledge integration, capabilities, and innovation affect strategic orientation and organizational performance, leading to a competitive advantage (Sondhi et al., 2024). Hence, the next hypothesis is proposed:

H2: Knowledge integration has a positive effect on the innovation process.

Knowledge implementation and innovation

As a valuable intangible asset, knowledge helps organizations perform highly and achieve a competitive advantage (Teece et al., 1997). New knowledge and dynamic capabilities influence innovation and competitiveness (Garcia-Martinez et al., 2024). To acquire new knowledge, people can learn from their own experiences or from the experiences of others through observation, imitation, and interaction. They can then transfer these experiences to other colleagues through feedback, explanation, help, or advice (Kang & Kim, 2010). This exchange of knowledge develops new knowledge. Its implementation and use then builds new structures and routines (Kumar & Ganesh, 2009). For efficient knowledge management, organizations can use knowledge implementation, application, and storage to achieve superior performance (Almuayad et al., 2024). Knowledge management and human capital are vital in achieving innovation and high performance (Nguyen & Le, 2024).

To facilitate knowledge implementation, organizations can create a knowledge tracing model or maps for predictions (Park et al., 2024). They can also use geoscience knowledge graphs to determine knowledge density and data quality. Directories or knowledge maps within the organization can act as a solution for structuring and storing knowledge (Coakes, 2003). Using knowledge mapping, graphical representations, and complex ideas makes it possible to learn by integrating new and old knowledge. These tools can thus improve individual and organizational understanding or be used to diagnose misunderstandings (Geisler & Wickramasinghe, 2015; White, 2002), as well as creating a best-practices or lessons-learned knowledge repository. Based on this concept, organizations can designate a *chief knowledge officer* to raise employees' awareness of the importance of knowledge in securing individual and organizational innovation and superior performance.

By creating a knowledge directory, organizations will have more time for new ideas, take less time to find the right person with the right experience and competencies, and achieve better results. They will also improve activity efficiency and quality, while reducing the time required to solve issues, number of complaints from customers, time needed to find the right information, and time for development and learning (Liebowitz, 2000; Pandey, 2016).

Sustainable knowledge management is crucial for fostering innovation and long-term development in academic and research institutions (Gómez-Marín et al., 2022). By adopting sustainable practices in knowledge management, organizations can create an environment that is conducive to continuous innovation, ensuring greater adaptability to market changes and shifts in the academic environment.

For better implementation, employees can deepen their understanding based on feedback and discussion (Desouza, 2003). They can thus offer quicker responses to meet the needs of the environment and reduce the costs of problem solving (Sher & Lee, 2004). A PLS-SEM-based study of the banking system showed the positive impact of knowledge implementation, use, and storage on bank performance (Almuayad et al., 2024). Innovation performance indicates effectiveness, and an organization's performance translates into tangible outcomes such as new product, process, or service development or new or improved offerings. Supervisor-employee relations, alongside better implementation through learning processes based on acquiring new knowledge and efficient communication practices, have been found to lead to innovation and superior performance (Chen, 2024). Hence, the following hypothesis is proposed:

H3: Knowledge implementation has a positive effect on the innovation process.

Knowledge sharing and innovation

Efficiency depends on the quality of knowledge sharing between employees, work teams, departments, or organizations (Alavi & Leidner, 2001). Knowledge sharing contributes to learning (Funasaki et al., 2024), the development of capabilities, and innovation, which is vital for organizational performance (Kogut & Zander, 1996). It is important

to develop a sharing environment based on the principle that *sharing knowledge is power* (Liebowitz, 2000; Talbot, 2024), with this knowledge sharing proving critical for performance (Anbar et al., 2024).

Even though knowledge sharing is crucial, the literature offers little insight into its importance and benefits (Lee & Choi, 2003). Knowledge sharing is difficult but beneficial. It is related to the reduction of production costs (Fan et al., 2024), faster project completion, higher performance by individuals and teams, and greater scope for capabilities and innovation (Hansen et al., 2005) through knowledge exchange and application (Wang & Noe, 2010). It is also related to superior firm performance in terms of sales growth and revenues from new products and services (Mesmer-Magnus & DeChurch, 2009), better decision making (Yuan et al., 2024), and more effective solutions for pressing problems in the workplace (Chen et al., 2018). However, studies have also indicated that knowledge sharing does not lead directly to superior performance but that performance may be improved by implementing these practices (Hsu, 2008).

Knowledge sharing is important for individual and organizational performance and may be achieved using internal collaborations such job rotations (Faegri et al., 2010), coaching, mentoring, apprenticeships, storytelling (Dej, 2024), teambuilding, and meetings (Morabito et al., 2017). It can also be achieved with external collaborations and transfers such as projects, virtual teams, strategic alliances (Baxamusa et al., 2024), joint ventures (Jiang et al., 2023), and know-how contracts (Prusak, 2009).

Innovation is important for companies because it lets them respond to changes in the market and secure a competitive advantage. From this point of view, Than et al. (2024) found that knowledge sharing in this environment mediates the relationship between knowledge-oriented leadership and innovation performance. Other studies have found a positive and direct relationship between knowledge sharing or diffusion and innovation (Jin et al., 2024; Wang & Wang, 2012; Chaudhuri et al., 2023). PLS-SEM-based studies have shown a strong correlation between knowledge sharing and organizational performance, generating value co-creation (Al-Omoush, 2024), providing new ideas, and helping organizations succeed in the long term (Olaleye et al., 2024). Politicians and managers should pay attention to this key process based on business associations, the absorptive capacity of new knowledge, and connectivity in the digital environment (Fuentes-Fernandez et al., 2024). Hence, the following hypothesis is proposed:

H4: Knowledge sharing has a positive effect on the innovation process.

Innovation and performance

In the era of Innovation 3.0, many organizations collaborate to boost innovation and create new knowledge and value (Yang, 2024). New knowledge and new technologies lead to the development of new products and new services. Innovation is about implementing ideas (Borghini, 2005). Learning and sharing with others what has been learned will improve business processes and performance, with benefits including greater creativity and product and service innovation (Darroch, 2005; Moffett et al., 2002), as well as more creative thoughts, ideas, and innovation (Borghini, 2005). Knowledge sharing, especially in its tacit form, enables the development of innovation, which can improve organizational performance (Holsapple & Jones, 2005; Wu & Lin, 2009) and competitiveness (Tseng, 2008). In turn, it increases financial and non-financial metrics (Sher & Lee, 2004), leads to the development of new services, and improves the ability to attract, train, develop, and retain employees.

Innovation is crucial for the growth of organizations. However, it is difficult to acquire, especially when resources are limited. A more diverse range of knowledge has a positive effect on innovation (Huang & Tu, 2024). Studies have shown that innovation contributes to sustainability and performance (Wilke & Pyka, 2024). Management innovation such as new processes, practices, and structures within an organization has a positive impact on innovation performance among employees, processes, and performance outcomes (Li et al., 2024). Performance depends on innovation diversity, product and service diversity (Wang & Yang, 2024), and workforce diversity (Croitoru et al., 2022). Hence, the following hypothesis is proposed:

H5: The innovation process has a positive effect on organizational performance.

Knowledge, innovation, and performance

Organizations must innovate to beat the competition (Purwati et al., 2021) and increase customer loyalty, sustainability, and performance (Alias et al., 2018). Studies have revealed a positive influence of knowledge on innovation (Sebaka et al., 2024). Innovation helps organizations identify new opportunities and develop new ideas (Chuang et al., 2014), create new products and services, devise new methods and strategies, and attract and retain employees and customers. Organizations that innovate will probably face many challenges and barriers throughout the innovation process (Sandberg & Aarikka-Stenroos, 2014). These barriers tend to prevent or slow down innovation (Larsen & Lewis, 2007). By analyzing external factors, organizations become more open.

Likewise, governments and research institutions can develop frameworks for innovation development. These special environments enable smoother interactions among stakeholders at the local level. For instance, science parks offer ideal conditions for innovation (Bellavista & Sanz, 2009) and greater collaboration (Audretsch et al., 2020). Science parks are driven by policy and are sponsored by governments (Huang et al., 2012), giving organizations cheaper access to crucial yet limited resources (Torres de Oliveira et al., 2022). These initiatives are especially important in emerging economies, which have high autonomy and responsibility for innovation and development (Huang et al., 2012).

The innovation process and competitiveness both depend on knowledge (Nonaka, 1994), especially tacit knowledge (Leonard & Sensiper, 1998). After its creation, new knowledge is converted into products, services, and processes (Choy et al., 2006). Studies have revealed the central role of knowledge in innovation at the individual and organizational levels. Studies have also shown that it is crucial to understand the role of knowledge in deriving benefits for individuals and organizations (Jiang et al., 2024) and that knowledge transfer exerts a positive impact on innovation (Wang et al., 2024). Organizations faced with changing consumer desires and growing market demands must develop knowledge-intensive strategies to build and maintain their competitive advantage by innovatively developing and using their capabilities (Igbonaju et al., 2024). Hence, the following hypothesis is proposed:

H6: The innovation process mediates the relationship between knowledge management and organizational performance.

Based on a review of the relevant literature and PLS-SEM-based studies in which knowledge has been found to affect innovation and performance, the conceptual model shown in Fig. 1 is presented (Chauduri et al., 2023; Rodrigues et al., 2023; Stefan et al., 2024; Turkmegdan & Tuna, 2022; Zia et al., 2023).

Research method

For the purposes of this study, knowledge management was defined as the process of creating, capturing, storing, integrating, implementing (Choo & Bontis, 2002), distributing, sharing (Skyrme, 2001), and using knowledge (Armstrong, 2009) to enhance organizational performance (Chen et al., 2018). Accordingly, four key knowledge management processes were chosen for analysis, namely creation, integration, implementation, and sharing. These knowledge management processes were chosen to meet the goal of this study of analyzing the influence of these four key processes on innovation and organizational performance.

PLS-SEM was used for this complex exploratory analysis. This

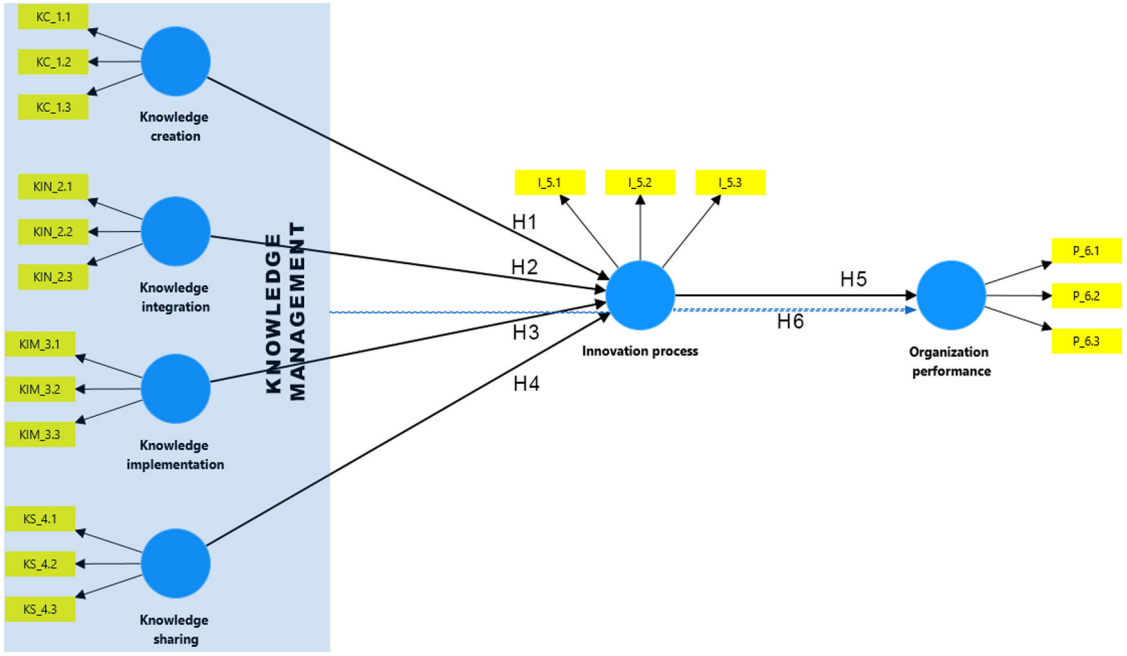

Fig. 1. Theoretical framework
Notes. Authors' own work.

method is particularly suitable when existing theories are not sufficiently developed to support covariance-based structural equation modeling (CB-SEM) approaches (Hair et al., 2011). The study aimed to examine the complex relationship between knowledge management processes, innovation, and organizational performance. Therefore, PLS-SEM was an ideal choice thank to its flexibility in analyzing these relationships with moderate sample sizes. A key advantage of PLS-SEM is its ability to manage complex models and estimate latent variable parameters using multiple indicators without imposing strict sample size requirements or relying on data normality, unlike CB-SEM (Chin, 1998). This feature was essential for the current study, which was based on data from 528 respondents across various industries. PLS-SEM effectively maximizes the explained variance of dependent variables. In this study, it thus enabled the assessment of how knowledge management processes affect innovation and, in turn, organizational performance. Another key feature is its ability to model indirect relationships, which was crucial for verifying the mediating role of innovation in the relationship between knowledge management and organizational performance (Henseler et al., 2009). In conclusion, the choice of PLS-SEM was appropriate for robust and rigorous testing of the complex theoretical model proposed in the present study. It thus enabled a deep understanding of the relationships among the studied variables.

Population and sample

Determining the proportion of large enterprises in the total population of innovative firms was essential to understand the dynamics of such firms. Of the 2900 innovative firms that existed in Romania at the time of the study, 274 were classified as large (TEMPO TEMPO_INO102A).[1] Thus, the proportion of large enterprises among all innovative firms was approximately 9.45 %. This figure underlined their central role in the business ecosystem.

The distribution of firms by region highlights a varied distribution within the Romanian economy. The South-Muntenia region had 169 firms, of which 30 were large. The South-East region had 99 firms, of which 19 were large. The most dynamic region was Bucharest-Ilfov, with 1248 firms, of which 83 were large. This figure reflects the high concentration of business activity in the capital and its surroundings. There were 30 of these large companies in the South-Muntenia Region, 19 in the South-East Region, and 83 in the Bucharest-Ilfov Region. From this total of 132 large companies, 528 respondents (managers and operational personnel) replied to the questionnaire.

The specific objectives of the study were defined as follows:

O1: Objective 1 was to examining the effects of the processes of creating, integrating, implementing, and sharing knowledge on the innovation process within organizations in Romania. This analysis provided insight into how each knowledge management process contributes to organizations' ability to innovate.

O2: Objective 2 was to investigate the effects of the innovation process on organizational performance. This analysis explained how innovation influences organizations' performance in terms of reducing costs, increasing competitiveness, and improving productivity.

O3: Objective 3 was to determine the mediating effects of innovation on the relationship between knowledge management processes and organizational performance. This analysis involved testing the hypothesis that innovation mediates the relationship between knowledge management and organizational performance.

A quantitative research design using data from a structured questionnaire was applied to evaluate the four key knowledge management processes of creation, integration, implementation, and sharing and their effects on innovation and organizational performance. The questionnaire was distributed to a sample of managers and operational personnel across various Romanian industries. They were selected because of their direct involvement in knowledge and innovation management. The questionnaire consisted of statements rated on a 5-point Likert scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). The questionnaire thus evaluated respondents' views on knowledge management processes and their influence on innovation and performance.

The data were analyzed in SPSS for descriptive statistics and SmartPLS for the PLS-SEM. SPSS was used for detailed descriptive analyses. Specifically, frequencies and percentages were calculated to

[1] http://statistici.insse.ro:8077/tempo-online/#/pages/tables/insse-table (accessed March 2, 2024).

enhance the understanding of respondents' distribution across demographic and organizational categories. This statistical method identified key traits of the population and established a foundation for further data interpretation. SPSS also enabled rigorous assessment of the questionnaire's reliability and validity using the Cronbach's alpha coefficient for each scale. This assessment ensured the internal consistency of the measurements. SmartPLS was then used to test the structural models proposed in this research. It enabled in-depth analysis of the relationships between the latent variables involved in the processes of knowledge management, innovation, and organizational performance. The conceptual analysis was carried out by evaluating convergent and discriminant validity. The direct and indirect effects between the latent variables were also evaluated. Thus, the analysis provided a rigorous assessment of the complex interdependencies in organizational dynamics.

Results

Respondent demographics

This section provides in-depth analysis of the distribution of respondents by role (operations or management) across the Romanian regions of Bucharest-Ilfov, South-Muntenia, and South-East Romania. This analysis revealed the distribution of job roles in the sample. These data were interpreted in relation to regional dynamics and implications for knowledge management, innovation, and organizational performance.

General distribution of respondents

The study sample consisted of 528 respondents. Operational staff represented 75 % of all respondents. Managers accounted for the remaining 25 %. These data reflect a typical organizational structure, in which the number of operational employees is usually higher than that of managers (Table 1). This structure can be explained by the nature of operations, which require more staff. In contrast, management functions require a smaller number of employees, but with more responsibility.

Distribution by region

In the Bucharest-Ilfov region, there were 332 respondents. Regarding the distribution of professional roles, 249 worked in operations, constituting 75 % of the total, whereas 83 were managers, representing 25 %. This distribution reflects not only the organizational structure of the region but also the economic characteristics of the Romanian capital. Bucharest-Ilfov is a focal point for a variety of industries, with a high presence of multinationals. It thus requires a high number of operational staff to carry out extensive operations (Table 2). The considerable proportion of managers underlines the importance of leadership and strategic coordination, crucial aspects for adapting and prospering in a dynamic and competitive business environment. This analysis thus highlights a correlation between the structure of the workforce and the economic status of Bucharest-Ilfov, emphasizing its essential role in the national economy.

Regarding the professional structure in the South-Muntenia region, most respondents (74.8 % of the 119 interviewees) had operational positions. Meanwhile, 25.2 % held management positions. This distribution suggests a prevalence of the operational activities that are a feature of a predominantly industrial economy. The professional structure is similar to the one observed for Bucharest-Ilfov, but on a smaller scale (Table 3). The prevalence of operational personnel can be attributed to the specific requirements of the manufacturing sector and other industries, which require a large number of workers to perform daily tasks. The consistent proportion of managers across regions reflects a need for coordination and strategic functions, which are essential for streamlining industrial processes and ensuring efficient resource management. This structure can influence the development and modernization of the region, with important implications for its economic future.

The South-East region is home to key strategic ports on the Black Sea. There were 75 respondents, of which 74.7 % were operational and 25.3 % were in management. The job role distribution is comparable to that of other regions. However, the smaller sample suggests limited economic diversification (Table 4). The similar proportions of employees in operations and management indicate efficient organizations, although the overall size of the workforce seems to be lower than in more developed regions. This situation could reflect a focus on small businesses, which, despite their limitations, can still achieve efficiency within the local market.

The analysis shows a relatively uniform organizational structure across Romania. This observation implies consistency in the distribution of operational and management staff across the three regions considered in this study. This finding suggests possible standardization of human resources practices at the national level. The results not only reflect a coherent workforce structure but also underline the crucial role of the Bucharest-Ilfov region. This region is a vital economic hub with a high presence of operational staff and managers. This high presence of workers reflects the complexity and diversity of operations in this area.

The implications of these observations are relevant for knowledge management, given that the demographic structure in each region could influence how knowledge is managed, innovation is promoted, and organizational performance is assessed. Moreover, differentiated regional strategies are necessary. For example, industrialized regions such as South-Muntenia may require a greater focus on assimilating technical knowledge. Meanwhile Bucharest-Ilfov could benefit from strategies oriented toward innovation and efficient knowledge management in a competitive business environment.

In conclusion, the detailed analysis of the job profile of respondents highlights a consistent pattern in their job role distribution. These findings provide a solid basis for further research on the impact of knowledge management on innovation and organizational performance, as well as the assessment of the implications of these practices on development and innovation strategies throughout Romania.

Table 1
Respondents' job role distribution (full sample across three Romanian regions).

		Frequency	Percent	Valid percent	Cumulative percent
Valid	Operational staff	396	75.0	75.0	75.0
	Managers	132	25.0	25.0	100.0
	Total	528	100.0	100.0	

Notes. Authors' own work.

Table 2
Respondents' job role distribution (Bucharest-Ilfov region).

		Frequency	Percent	Valid percent	Cumulative percent
Valid	Operational staff	249	75.0	75.0	75.0
	Managers	83	25.0	25.0	100.0
	Total	332	100.0	100.0	

Notes. Authors' own work.

Table 3
Respondents' job role distribution (South-Muntenia region).

		Frequency	Percent	Valid percent	Cumulative percent
Valid	Operational staff	89	74.8	74.8	74.8
	Managers	30	25.2	25.2	100.0
	Total	119	100.0	100.0	

Notes. Authors' own work.

Table 4
Respondents' job role distribution (South-East region).

		Frequency	Percent	Valid percent	Cumulative percent
Valid	Operational staff	56	74.7	74.7	74.7
	Managers	19	25.3	25.3	100.0
	Total	75	100.0	100.0	

Notes. Authors' own work.

Descriptive statistics

This section examines the reliability and validity of the constructs used in the research model. Confirmatory factor analysis and descriptive statistics were used to assess the extent to which the latent variables were properly measured by the selected items. The composite reliability (CR) values were considered satisfactory, ranging from 0.7 to 0.9 (Hair et al., 2019). In this study, all item loadings were greater than 0.7 (Hair et al., 2022).

A threshold of 0.40 for component loadings was used (Gefen & Straub, 2005; Hair et al., 2019). For the item KIM_3.3, the value was close to but exceeded this threshold (0.506), so it was accepted. Removal of an item with a value of more than 0.40 (Hair et al., 2014) undermines theoretical significance, leading to distorted conclusions. Therefore, this item was retained in the study. However, the value for KS_4.1 ("AI is used to disseminate knowledge") was 0.344. Therefore, it could not be accepted. Cronbach's alpha was also greater than or equal to 0.7 (Henseler & Sarstedt, 2013). All average variance extracted (AVE) values were greater than 0.5 (Hair et al., 2014). Composite reliability (CR) values were greater than 0.7, ranging from 0.835 to 0.941 (Jang & Lee, 2019; Nemțeanu et al., 2022). Variance inflation factor (VIF) values for all variables (Table 5) were greater than 0.5. These values indicated that multicollinearity was not a problem (Becker et al., 2015; Sobaih & Elshaer, 2022).

Analysis of the *Knowledge creation* construct indicated an overall average response of 3.296. This value suggested that respondents tended to agree that their organizations emphasized knowledge creation processes such as recruiting talented candidates, valuing employees with unique knowledge, and gaining insights from dynamic markets. In terms of reliability, Cronbach's alpha for this construct was 0.763, which exceeded the recommended threshold of 0.7. This value indicated solid internal consistency. In terms of validity, the values for the AVE (0.672) and CR (0.860) were both greater than the corresponding thresholds, confirming the convergent validity of this construct. All items had standardized loadings greater than 0.7, which showed that they adequately measured the latent concept.

For the *Knowledge integration* construct, the overall average response was 3.508. This value indicated that organizations made moderate use of knowledge integration processes such as knowledge mapping, strategic alliances, and partnership engagements. Cronbach's alpha was 0.708, suggesting adequate internal consistency for this construct. The values for the AVE and CR were 0.632 and 0.837, respectively. These values were also satisfactory, supporting convergent validity. As with *Knowledge creation*, the items that measured this construct had standardized loadings greater than 0.7, confirming that they were relevant indicators of knowledge integration.

The *Knowledge implementation* construct had an overall average response of 3.746, indicating frequent use of training programs, stimulating learning activities, and monitoring for knowledge implementation. The reliability of the construct was measured by Cronbach's alpha, which took a value of 0.736. This value was acceptable. However, one of the items in this construct, KIM_3.3 ("Monitoring knowledge implementation"), had a lower loading (0.506) than the others. However, it was kept in the model because its removal could have undermined the theoretical significance of the construct. The values for the AVE (0.569) and CR (0.790) were also within acceptable limits.

The *Knowledge sharing* construct had an overall average response of 3.508. This value reflected a moderate degree of knowledge sharing in

Table 5
Confirmatory factor analysis and descriptive statistics.

Construct	Item	Measure	Mean	SHARP	Loading (St. Est.)	Cronbach's alpha	AVE	CR
1. Knowledge creation (KC)								
	KC_1.1	Organization recruits talented candidates.	3.193	1.603	0.857	0.763	0.672	0.860
	KC_1.2	Organization values employees with unique knowledge.	3.062	1.755	0.835			
	KC_1.3	Organization acquires information from dynamic markets.	3.634	1.422	0.775			
Average			3.296					
2. Knowledge integration (KIN)								
	KIN_2.1	Organization uses knowledge mapping for its employees.	3.098	1.259	0.765	0.708	0.632	0.837
	KIN_2.2	Organization uses strategic alliances.	3.633	1.618	0.840			
	KIN_2.3	Organization uses partnership commitments	3.794	1.484	0.777			
Average			3.508					
3. Knowledge implementation (KIM)								
	KIM_3.1	Organization uses training programs to find new knowledge.	3.621	1.357	0.874	0.736	0.569	0.790
	KIM_3.2	Organization stimulates learning activities.	3.746	1.403	0.828			
	KIM_3.3	Organization monitors knowledge implementation.	3.871	1.144	0.506			
Average			3.746					
4. Knowledge sharing (KS)								
	KS_4.2	Knowledge is shared 360 degrees inside the organization.	3.591	1.303	0.908			
	KS_4.3	Knowledge is shared among employees through experimentation.	3.426	1.303	0.784			
Average			3.508					
5. Innovation (I)								
	I_5.1	Organization creates new products and services.	3.494	1.867	0.837	0.757	0.672	0.860
	I_5.2	Organization develops new ways to work.	3.538	1.945	0.840			
	I_5.3	Organization uses new technologies to innovate.	3.583	1.285	0.781			
Average			3.538					
6. Performance (P)								
	P_6.1	Organization is reducing costs and errors.	3.650	1.372	0.810	0.719	0.639	0.841
	P_6.2	Organization is increasing competitiveness.	3.496	1.379	0.785			
	P_6.3	Organization is improving productivity.	3.534	1.553	0.803			
Average			3.560					

Notes. CR = composite reliability; AVE = average variance extracted; *** $p < 0.000$. Items removed if indicator below 0.5. All item loadings > 5 indicates indicator reliability (Hulland, 1999). All AVE > 0.5 indicates convergent reliability (Bagozzi & Yi, 1988; Fornell & Larcker, 1981a). All CR > 0.7 indicates internal consistency (Gefen et al., 2000). All Cronbach's alpha > 0.7 implies indicator reliability (Nunnally, 1978; Nunnally & Bernstein, 1994). Authors' own work.

organizations through 360-degree sharing or experimentation. The item KS_4.1 ("AI is used to disseminate knowledge") was removed from the model due to its low loading (0.344), which was below the acceptable minimum threshold. However, the Cronbach's alpha value of 0.751 and the AVE and CR values of 0.735 and 0.847, respectively, indicated that the construct was still robust, ensuring adequate measurement of the concept of knowledge sharing.

The *Innovation* construct had an overall average response of 3.538. This value suggested that organizations constantly focused on creating new products and services, developing new ways of working, and using new technologies for innovation. The reliability of the construct was supported by the Cronbach's alpha value of 0.757. The values for the AVE (0.672) and CR (0.860) confirmed convergent validity. The standardized loadings were greater than 0.7 for all items, indicating that they were valid measures of innovation in organizations.

The final construct, *Performance*, had an overall average response of 3.560. This value showed that organizations focused on reducing costs and errors, increasing competitiveness, and improving productivity. The construct's reliability was confirmed by a Cronbach's alpha score of 0.719. The AVE and CR values of 0.639 and 0.841, respectively, were all within acceptable limits. These results indicated that organizational performance was well captured by the selected items.

The analysis thus confirmed that all evaluated constructs were valid and reliable, providing a strong foundation for testing the research hypotheses. Although some items had small loadings, they were retained in the model to maintain theoretical significance and avoid distortions in the conclusions. In sum, the descriptive statistics and confirmatory factor analysis indicated that the proposed model was strongly supported by the empirical data.

Discriminant validity of the scale

According to the Fornell-Larcker procedure (Fornell & Larcker, 1981b), the lowest value for the AVE was for the latent variable KIM (0.569). This value was higher than the minimum threshold of 0.5 (Chin, 2009; Höck & Ringle, 2010). The AVE values were higher than the correlation coefficient between the given variables and all other variables. Therefore, the reflective model met the criteria for discriminant validity (Table 6). The parameter values ranged from 0 to 1. These values confirmed the model's robustness and showed that it met all necessary conditions for successful evaluation (Hair et al., 2011).

Although this criterion is effective, it has some limitations. Specifically, it does not consider the influence of latent variables on other constructs outside the model (Table 6).

The AVE value for the innovation process was 0.820. This value suggested that it effectively captured the variation in the items that measured it. This value was higher than the highest correlation with other constructs in the model, namely 0.630 with organizational performance. Hence, innovation process was a well-defined construct, without significant overlaps with other variables. Recognizing the innovation process as a key element is crucial to an organization's success.

In the case of knowledge creation, the AVE value of 0.823 suggested that it effectively captured the variation in processes aimed at attracting and using talent, as well as obtaining key data from ever-changing markets. The maximum correlation was with knowledge integration. This correlation value of 0.620 was also lower than the AVE. These results thus supported the argument that this variable measured a distinct construct. This precision in defining and measuring knowledge creation was crucial, given that these processes underpin innovation and, therefore, organizational competitiveness.

Knowledge implementation had an AVE value of 0.754, indicating that it adequately captured variation in this area. Although the correlation between knowledge implementation and knowledge integration was moderately high (0.605), it was substantially lower than the AVE value, thereby confirming the distinctiveness of this construct. This distinctiveness was essential because it highlighted the notion that knowledge implementation not only depends on knowledge integration but also has its own way of functioning.

With an AVE of 0.795, knowledge integration was observed to be effective in capturing variation in key issues such as strategic partnerships and engagements within teams. Its highest correlation was with knowledge creation (0.620). However, this value did not exceed the AVE, confirming the stability and distinctiveness of this construct. Thus, knowledge integration could be considered a facilitating process for innovation and organizational efficiency.

Knowledge sharing had a high AVE value of 0.857. This AVE value was the highest of all analyzed constructs. This value indicated an impressive ability to measure variation in its items. Correlations with knowledge integration (0.581) and knowledge implementation (0.601) were also less than the AVE, reinforcing the idea that knowledge sharing was a clearly defined construct. Its relevance lies in fostering internal knowledge development and promoting the transfer of expertise and innovation among an organization's members.

Organizational performance had an AVE value of 0.799. This value reflected an effective ability to capture variation in its items. The high correlation with the innovation process (0.630) was to be expected, given the interdependencies between innovation and organizational performance. However, this correlation was less than the AVE. This result supported the idea that organizational performance was a distinct construct, despite being closely related to the processes of innovation and knowledge.

The results confirmed that all constructs in the model met the Fornell-Larcker discriminant validity criterion. Each construct was found to measure a distinct concept, without significant overlaps. These results are essential to ensure that inter-construct relationships can be correctly interpreted. This validity means that researchers and practitioners can trust that the relationships identified between latent variables are genuine and not the result of conceptual confusion.

In conclusion, this model was found to be robust and was observed to effectively evaluate the influence of knowledge management on innovation and organizational performance. Its discriminant validity underpins the results and enables further investigation. It suggests that

Table 6
Discriminant validity analysis (Fornell-Larker criterion).

	Innovation process	Knowledge _creation	Knowledge _implementation	Knowledge _integration	Knowledge _sharing	Organization _performance
Innovation process	0.820					
Knowledge _creation	0.428	0.823				
Knowledge _implementation	0.378	0.496	0.754			
Knowledge _integration	0.421	0.620	0.605	0.795		
Knowledge _sharing	0.426	0.480	0.601	0.581	0.857	
Organization _performance	0.630	0.239	0.223	0.214	0.198	0.799

Notes. Diagonal elements (in bold) are the square root of the average variance extracted (AVE); Diagonal elements are the correlations among constructs, $^{**}p < 0.01$. Diagonal elements are the square of correlations. Authors' own work.

knowledge management facilitates both innovation and organizational performance, with major practical implications.

As an alternative to the Fornell-Larcker criterion, the HTMT (Heterotrait-Monotrait Ratio) method was proposed in 2015, offering a more robust approach (Henseler et al., 2015). A maximum threshold of 0.85 (or equal to 0.90) is recommended (Henseler et al., 2015; Sarstedt et al., 2019). In this study, all values were less than 0.85 (Hair et al., 2019), confirming acceptable levels of validity and reliability of the constructs. HTMT assesses correlations between latent variables. A value of less than 0.90 is considered an indication of acceptable discriminant validity. It thus provides a deeper understanding of the relationships between variables (Henseler et al., 2016). The results for this method are shown in Fig. 2.

The data were analyzed to establish the reliability and validity of the measures and to validate the relationships among the latent constructs (Fig. 3).

The evaluation of model fit is another essential component of PLS-SEM. Various fit indices were used to assess model fit. The standardized root mean square residual (SRMR) assessed the discrepancy between observed and predicted covariance matrices, with values below 0.08 signifying a good fit (Dash & Paul, 2021; Supriyanto et al., 2023). Additional fit indices were also used, namely the unweighted least squares discrepancy (d_ULS), geodesic discrepancy (d_G), Chi-square, and normed fit index (NFI). These fit indices provided diverse indications of model performance, each with its own thresholds and limitations (Table 7).

The SRMR values were 0.102 for the saturated model and 0.103 for the estimated model. Both slightly exceeded the acceptable threshold of 0.08. These values indicated that although the model did not perfectly fit the observed data, the discrepancies were not significant, suggesting a reasonably compatible fit. Other indices, namely the d_ULS and d_G, complemented the analysis, highlighting the internal discrepancies of the model.

The d_ULS values were 1.601 for the saturated model and 1.632 for the estimated model. These values reflected moderate discrepancies, without revealing major problems. The d_G index had values of 0.521 for the saturated model and 0.522 for the estimated model. Likewise, these values showed an adequate geodetic approximation between the theoretical concept and the observations. The Chi-square test was also an important fit indicator, with values of 1675.304 for the saturated model and 1682.963 for the estimated model. These values suggested relatively high discrepancies. However, given its sensitivity to the sample size, similar values are frequently encountered in analyses of complex models. The NFI evaluated model improvement over a null model. NFI values of 0.570 for the saturated model and 0.569 for the estimated model indicated a modest contribution relative to an uncorrelated model. These results suggested that while the proposed model had acceptable robustness, there was potential for improvement.

In summary, the conclusions of the analysis of fit are that although the proposed model had a relatively favorable fit, there were notable discrepancies between the theoretical model and the empirical data. Hence, additional adjustments were needed to refine the links between the latent variables and to optimize the applied measurements and better capture the complexity of the studied constructs.

Hypothesis testing was used in PLS-SEM to evaluate the relationships between the model's latent variables. This section presents the results of the hypothesis testing based on beta coefficients, 2.5 % and 97.5 % confidence intervals, *t* and *p* values, and statistical significance (Table 8).

H1 posited that knowledge creation positively influences the innovation process. H1 was supported by the results of the analysis. The beta coefficient was 0.217. This value confirmed the existence of a positive and moderate relationship between these two variables, suggesting that an increase in the knowledge created within an organization is likely to lead to more efficient and frequent innovations. The *t* value of 4.236, combined with an extremely low *p* value of less than 0.001, reinforced the evidence that these results were not accidental and instead reflected a significant correlation. Also, the limits of the confidence interval (0.117 and 0.315) did not include zero, adding scientific rigor to the interpretation of the data. These results suggest that the positive effect of knowledge creation on innovation is not only theoretically viable but also practically applicable. In conclusion, the results underline the

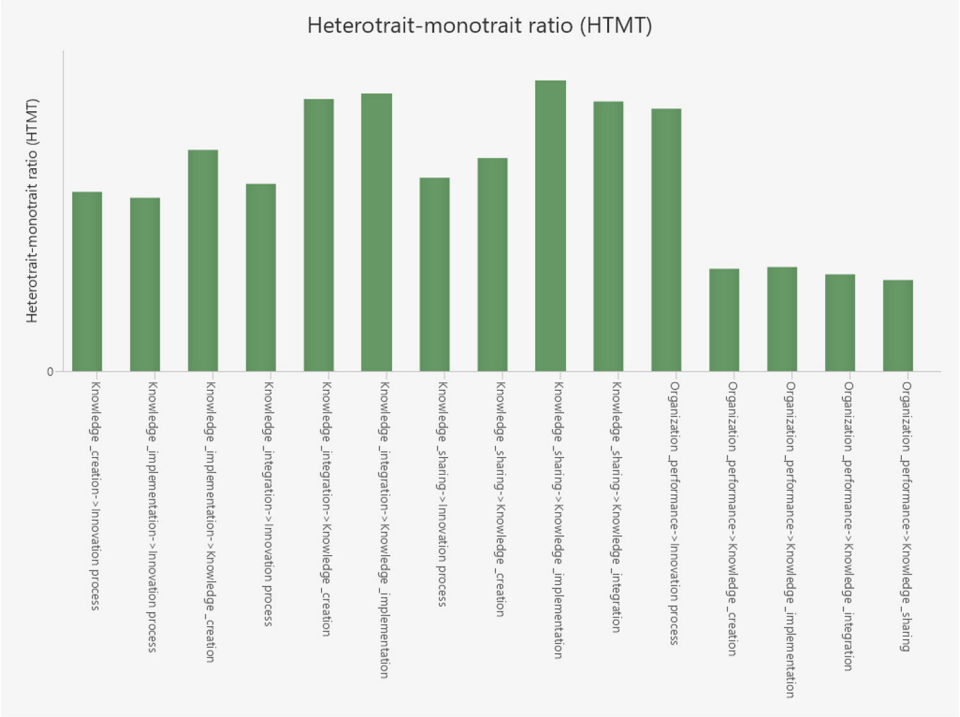

Fig. 2. HTMT for constructs in the model
Notes. Authors' own work.

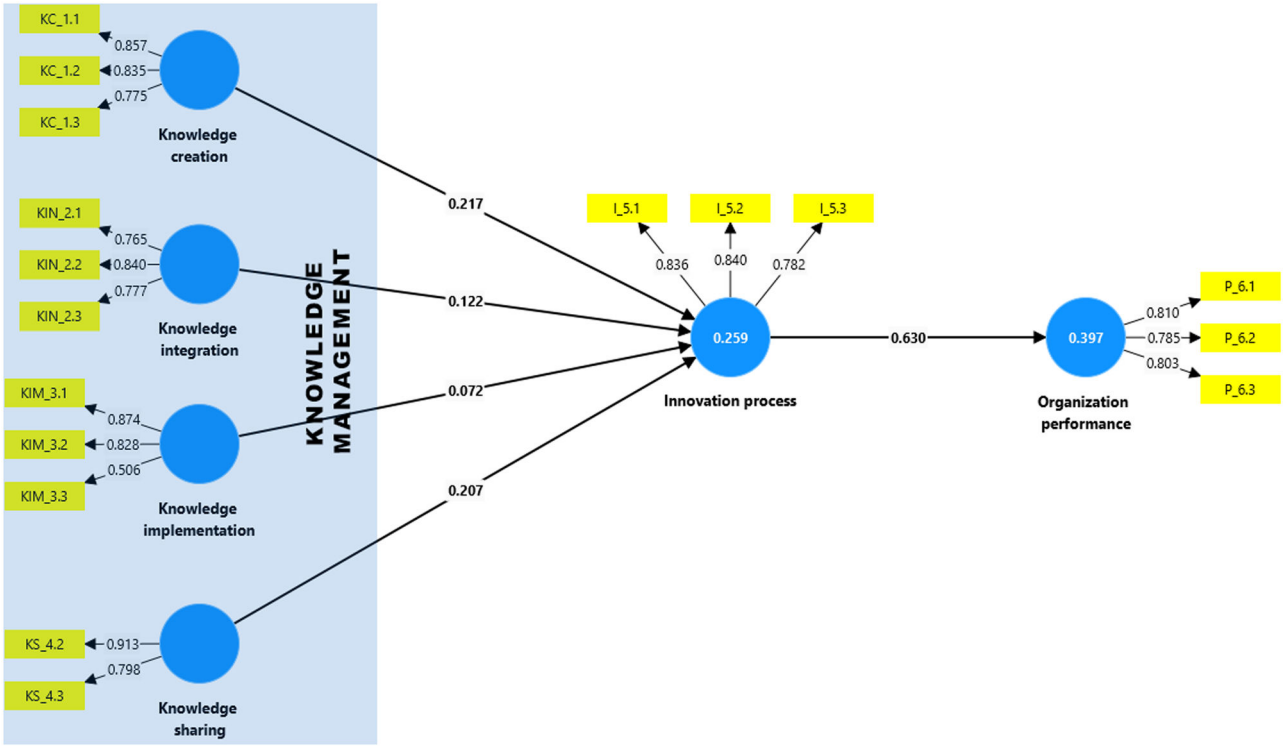

Fig. 3. Structural model of results
Notes. Authors' own work using PLS-SEM software.

Table 7
Goodness-of-fit tests.

	Saturated model	Estimated model
SRMR	0.102	0.103
d_ULS	1.601	1.632
d_G	0.521	0.522
Chi-square	1675.304	1682.963
NFI	0.570	0.569

Notes. Authors' own work.

importance of intellectual capital and knowledge creation mechanisms in driving innovation processes in organizations.

Analysis of H2 revealed a significant correlation between knowledge integration and the innovation process. These results suggest that an environment that facilitates collaboration and synergies in ideas contributes positively to the development and implementation of innovations. The beta coefficient was 0.122, indicating a small positive effect. The *t* statistic of 2.205 and *p* value of 0.028 indicated that the hypothesis was significant at the 95 % confidence level. The confidence interval of 0.013 to 0.232 indicated that the observed effect was a genuine and consistent phenomenon. Thus, effective knowledge integration appears not only to support innovation but also to be crucial for generating innovative solutions. These results highlight the importance of promoting interdisciplinary collaboration and dynamic information exchange within organizations. This deep understanding of the correlation between knowledge integration and innovation can guide development strategies and help firms realize their competitive potential.

H3 posited that the implementation of knowledge has a positive impact on the innovation process. The rigorous statistical analysis failed to confirm this hypothesis. The beta coefficient was 0.072, so the relationship was positive. However, it was also weak, with a *t* value of 1.315 and a *p* value of 0.189. Hence, although the relationship occurred in the expected direction, it was not strong enough to be considered significant. Accordingly, the confidence interval of −0.032 to 0.182 included zero. This result implies that the observed effect may be random, with no real connection to the innovation process. In conclusion, the data do not support H3. This finding highlights the limitations in understanding the interaction between knowledge implementation and innovation. It suggests the need for further research to examine this complex relationship more deeply.

In the analysis of the effects of knowledge sharing on the innovation process (H4), the results were highly significant. According to the results, this form of intellectual collaboration had a positive and significant impact on innovation dynamism and efficiency. The beta coefficient was 0.207, suggesting a moderate positive relationship. This result implies that, as the level of knowledge sharing increases, the innovation process also improves. The statistical data underlined the significance of this relationship. The *t* value of 4.211 and *p* value of less than 0.001 support the conclusion that the result is not accidental but

Table 8
Hypothesis testing using confidence intervals, *t* statistics, and *p* values in PLS-SEM.

	Paths	Path coeff. (P) or (β)	2.5 %	97.5 %	*t* statistics (|O/STDEV|)	*p* value	Result of statistical test
H1	Knowledge _creation -> Innovation process	0.217	0.117	0.315	4.236	0.000	Supported
H2	Knowledge _integration -> Innovation process	0.122	0.013	0.232	2.205	0.028	Supported
H3	Knowledge _implementation -> Innovation process	0.072	−0.032	0.182	1.315	0.189	Rejected
H4	Knowledge _sharing -> Innovation process	0.207	0.108	0.302	4.211	0.000	Supported
H5	Innovation process -> Organization _performance	0.630	0.576	0.682	23.365	0.000	Supported

Notes. Authors' own work.

reflects a real correlation. The confidence interval was 0.108 to 0.302. Given that it did not include zero, this result reinforces the validity of the hypothesis and suggests that knowledge sharing significantly influences the innovation process. Hence, the results suggest that organizations that foster a culture of collaboration and open information exchange are more likely to develop effective and relevant innovative solutions.

Analysis of the relationship between the innovation process and organizational performance revealed a significant positive correlation, indicated by a beta coefficient of 0.630. This value demonstrated the substantial impact of innovation on organizational efficiency and success. The confidence interval of 0.576–0.682 provided further validation of the stability and robustness of this correlation. It suggests that, in most cases, the innovation process has a direct relationship with performance improvement. The *t*-statistic of 23.365 reflected the significance of this hypothesis, with an associated *p* value of 0.000 indicating that the observed results are not accidental but reflect a genuine and consistent trend in the data. Thus, H5 is significant, reinforcing the argument that an effective innovation strategy can lead to superior organizational performance in an increasingly competitive and dynamic business environment.

Mediation analysis was used to investigate potential mediation in the relationship between the independent and dependent variables. H6 posited that the innovation process mediates the relationship between knowledge management and organizational performance (Table 9). This analysis drew on the work of Baron and Kenny (1986), Preacher and Hayes (2004), and Zhao et al. (2010), who have developed rigorous methods for analyzing mediation. Baron and Kenny (1986) proposed a classical mediation model, whereas Preacher and Hayes (2004) proposed the bootstrap method to calculate the indirect significance of the mediator effect. Zhao et al. (2010) contributed by developing a more detailed perspective on types of mediation.

Knowledge management had a significant direct effect on organizational performance, with a value of 0.505. This value suggests that, independently of any mediator, knowledge management influences organizational performance. This result reflects the importance of the effective organization of information and internal knowledge. When the innovation process was included as a mediator, the direct effect of knowledge management on organizational performance fell to 0.268, although it remained significant. This change indicates a complex relationship in which the innovation process mediates the effect of knowledge management.

A key aspect of the analysis was the indirect effect. The value of the indirect effect was 0.336, with robust significance reflected by the bootstrap method. These results suggest that knowledge management influences organizational performance by catalyzing the innovation process, which then contributes to performance. The 95 % confidence interval of 0.280 to 0.402 confirmed that this indirect effect was not only present but also consistent and reliable. The total effect value of 0.359 captured the combined contribution of both direct and indirect effects. It suggests that knowledge management is crucial for organizational performance, particularly in terms of innovation. The variance accounted for (VAF) was 93.59 %, suggesting complete mediation, according to the criteria of Preacher and Hayes (2004) and Zhao et al. (2010). This result means that a significant percentage of the impact of knowledge management occurs through innovation. This finding underscores the importance of the innovation process in organizational strategy.

The mediation analysis emphasizes innovation's crucial role in linking knowledge management to organizational performance. Many organizations, notably including SMEs, drive economic growth, employment, and technological advancement, as well as innovation in many countries (Soriano & Castrogiovanni, 2012). The results suggest that organizations should invest in driving innovation by embracing knowledge management. Not only does it improve organizational performance, but it also helps turn knowledge into tangible competitive advantages. The results of the study confirm the criteria of Baron and Kenny (1986) regarding complete mediation. They therefore emphasize the need for innovative approaches in knowledge management. For organizations today, adapting and integrating the innovation process into knowledge management strategies is essential for achieving organizational excellence.

This study establishes a strong link between knowledge management processes, particularly knowledge creation and sharing, and organizational innovation. These findings confirm the hypotheses and echo those of previous studies that emphasize the central role of knowledge exchange in stimulating innovation (Alavi & Leidner, 2001; Nonaka & Toyama, 2003). However, the weaker impact of knowledge implementation on innovation raises some questions. This finding suggests that merely integrating knowledge into organizational processes may not be sufficient to achieve meaningful innovation.

These findings are subject to alternative interpretations. For example, in certain organizations, even if knowledge is implemented, rigid processes or organizational culture may hinder its effectiveness in encouraging innovation. This phenomenon may reflect a gap between implementation and use, where knowledge is formally integrated but not translated into innovation due to a lack of a collaborative culture or supporting mechanisms (Crossan & Apaydin, 2010).

Another intriguing finding is the mediating role of innovation between knowledge management and organizational performance. This finding confirms that innovation serves as a conduit for transforming knowledge into enhanced performance. It also aligns with recent studies supporting the idea that innovation is a vital intermediary between effective knowledge management and competitive edge (Tortorella et al., 2024). However, studies have shown that this relationship may vary by organization type or economic context (Garud & Nayyar, 1994).

Comparing the current findings with those of existing studies shows that this research extends the literature by integrating multiple processes of knowledge management and by testing the mediating role of innovation. Scuotto et al. (2024) observed a similar effect of innovation on performance. However, their analysis lacked depth regarding knowledge processes. The present study contributes substantially to the literature by thoroughly examining this topic in greater detail.

One unexpected aspect of the findings is the lack of a significant influence of knowledge implementation on innovation. This discovery is surprising, given that knowledge implementation is often seen as a crucial step in adopting innovation. A possible explanation for this apparently contradictory result is that, in some organizations, knowledge implementation is not adequately supported by an organizational culture that is open to change or by the necessary leadership to leverage this knowledge. Another possible explanation is that knowledge implementation is often a long and challenging process, and the results of innovation do not appear overnight. This situation may account for the weak influence of this variable in the current study (Davenport & Prusak, 1998).

Table 9
Mediation analysis.

Assumptions	Direct without mediator	Sig.	Direct with mediator	Sig.	Indirect effect	*p* value (bootstrap)	LCL 2.5 %	UCL 97.5 %	Total effect	VAF	Type of mediation
KM -> *I* -> *P*	505	0	0.268	0	0.336	0	0.280	0.402	0.359	93.59	Full mediation

Notes. KM = knowledge management; *I* = innovation; *P* = organizational performance; VAF = variance accounted for. Authors' own work.

Discussion

This study explores how knowledge management influences the innovation process and, subsequently, organizational performance. It focuses on four key knowledge management processes, namely creation, integration, implementation, and sharing, examining how they contribute to innovation and performance. In relation to this focus, digital technologies are reshaping entrepreneurship, increasingly affecting small business strategies (Ferreira et al., 2024).

The aim of this study was to determine the extent to which knowledge management facilitates innovation and to investigate whether innovation mediates the relationship between knowledge management and organizational performance. Data were collected using a questionnaire distributed to operational staff and managers from various industries across three regions in Romania. Data were analyzed using SPSS for descriptive analysis and SmartPLS for structural equation modeling (PLS-SEM).

The analysis showed that knowledge creation and sharing processes significantly affected innovation, suggesting that these activities are crucial for generating ideas and facilitating collaboration within organizations. Knowledge integration had a moderate impact on innovation, highlighting the importance of cooperation and the synergy of ideas. A surprising result was that knowledge implementation did not significantly affect innovation. This result suggests that the effective implementation of knowledge may depend on other variables such as organizational culture or the ability to experiment and assimilate new knowledge quickly.

The mediation analysis showed that innovation fully mediated the relationship between knowledge management and organizational performance. This finding indicates that the positive effects of knowledge management on performance are mainly achieved through innovation. The current study is in line with existing theories that emphasize the central role of knowledge in driving organizational innovation and competitiveness. For example, Nonaka (1994) have argued that knowledge is a key driver of innovation, an idea that is also supported by the present findings. This study makes an additional contribution to literature by highlighting the role of innovation as a mediator. The confirmation of this mediating role is in line with the findings of research by Preacher and Hayes (2004), who emphasized the importance of innovation in transferring the benefits of knowledge management to organizational performance. Along these lines, firms can become more agile and dynamic by developing three meta-capabilities: strategic sensitivity, driving unity, and resource flexibility (Kraus et al., 2018).

The findings indicate that organizations can adopt strategies to foster a culture of collaboration and enhance the knowledge management and innovation processes. Most importantly, they can implement formal mechanisms for creating knowledge sharing, an essential step in promoting collaboration and innovation within organizations. By implementing structured practices such as digital collaboration platforms, mentoring programs, and periodic workshops, organizations can facilitate effective information transfer between teams and departments. For example, some organizations have internal digital platforms such as wikis or databases that are accessible to all employees. These platforms help eliminate knowledge silos and contribute to a more collaborative and well-informed work environment. This systematic approach not only improves operational efficiency but also stimulates creativity and innovation among employees.

Encouraging collaboration and innovation is essential for a dynamic and productive work environment. The implementation of reward systems for collaborative behaviors can motivate employees to become involved in knowledge exchange processes, thus contributing to the ongoing development of the organization. Rewards do not have to be monetary. Publicly recognizing achievements or offering professional growth opportunities to those who make outstanding contributions to innovation and collaboration can have a major impact. At the same time, awarding teams that propose innovative solutions or improvements to internal processes through the exchange of best practices can strengthen team spirit and create an organizational culture oriented toward excellence.

Encouraging a collaborative leadership style is vital for creating a dynamic and innovative work environment. Leaders should prioritize collaboration, encouraging the free exchange of ideas and constructive interactions among employees. Regular meetings where team members can openly discuss their projects, challenges, and potential solutions can facilitate this process. This approach promotes a culture of transparency and open communication. Managers can also organize brainstorming sessions or open forum meetings, where employees can express their ideas without fear of criticism. Such initiatives increase the capacity for innovation and the involvement of the entire team.

At the same time, professional training and employee development are essential for promoting a collaborative organizational culture. Allocating extensive resources to training programs that emphasize the development of collaborative skills and knowledge management is crucial. For instance, trainings focused on effective communication, team problem solving, and the optimal use of digital collaboration platforms are valuable to improve the knowledge exchange process and stimulate innovation. Regular training sessions are vital for equipping employees with the skills necessary for effective knowledge creation and dissemination within the organization.

Continuously assessing and refining collaboration processes is important for organizations to stay competitive in a dynamic environment. Organizations can implement a system for periodic evaluation of the effectiveness of these processes. Such a system should include both employee feedback and team performance analyses. Doing so helps identify bottlenecks that prevent knowledge sharing. Through these assessments, organizations can adapt and refine collaboration processes, ensuring they are aligned not only with the dynamic needs of employees but also with emerging market demands. This proactive approach optimizes operational efficiency and helps create a more collaborative and innovative work environment.

The study has several notable limitations. Primarily, data collected solely from organizations in Romania may limit the broader applicability of the findings across different cultural or economic contexts. Additionally, employing a self-report methodology introduces the risk of subjective biases because participants' perceptions may not reflect objective reality.

Extending this research internationally could improve the understanding of how knowledge management and innovation interact across various regions and organizational cultures. Also, applying an experimental design could provide deeper insights into the specific impact of various knowledge management interventions. Longitudinal studies could reveal how relationships evolve over time, offering a dynamic perspective that cross-sectional studies lack.

Conclusions

The findings indicate that organizations with strong knowledge creation and sharing processes have a significantly higher likelihood of achieving superior innovation outcomes. Knowledge creation allows organizations to develop innovative ideas and solutions from both internal and external sources, providing a competitive advantage in a dynamic environment. Organizations that foster a collaborative culture for knowledge sharing among employees and departments are more adept at transforming this knowledge into specific innovations, including new products, enhanced processes, and improved work methods.

This section summarizes the results of the study, highlighting the theoretical, practical, and managerial implications of the findings. It brings together the key insights from the study, highlighting its major contributions and providing recommendations for future action.

Theoretical implications

This study enhances the understanding of the role of knowledge management in fostering innovation and boosting organizational performance. PLS-SEM reveals that knowledge creation and sharing are the primary drivers of innovation, whereas knowledge implementation has a negligible impact. These findings support the existing literature and provide deeper insight into the complex relationships among the latent variables included in the model.

The results confirm that innovation fully mediates the relationship between knowledge management and organizational performance, as posited by Preacher and Hayes (2004). This finding suggests that the impact of knowledge management on performance is achieved almost entirely through innovation, adding a new theoretical dimension to the literature.

This study enhances the theoretical understanding of knowledge management and innovation, refining existing theories and offering new insights into the complex links between knowledge processes and organizational performance. The study directly challenges some traditional hypotheses about how knowledge management processes lead to innovation and organizational performance.

The findings show that not all knowledge management processes affect innovation equally. Specifically, knowledge creation and sharing significantly affect innovation, whereas knowledge implementation does not. This finding contrasts with traditional theories that posit that all knowledge management processes are critical for innovation (Nonaka, 2005). Thus, this study refines knowledge management theory by suggesting that processes such as creation and sharing are more important for stimulating innovation than implementation. This discovery may prompt further research to explore why and how these processes have a greater influence in certain organizational contexts.

The findings advance existing theories by showing that innovation mediates the link between knowledge management and organizational performance. Although innovation is essential for success, its mediating role in linking effective knowledge management to performance remains underexplored in the literature (Teece, 1998). This study shows that innovation enables the transformation of accumulated knowledge into specific performance outcomes. This finding extends innovation management theories by offering a clearer model of innovation's crucial mediating role in transforming knowledge into competitive advantage.

The findings on the weak impact of knowledge implementation on innovation suggest the need for reevaluation of traditional theories regarding the relationship between implementation and innovation. Although knowledge implementation is considered a crucial step in most knowledge management models, this study indicates that implementation alone may not suffice to drive innovation. This finding highlights the need to adapt and expand theoretical models to acknowledge that innovation is influenced more strongly by knowledge creation and sharing processes than by implementation (Zack, 1999). In sum, this study challenges the hypothesis that all knowledge management processes affect innovation to the same degree. Future research should investigate the distinctions between knowledge processes and the conditions that enhance their impact on innovation and performance.

This study contributes in a meaningful way to the specialized literature by refining and expanding existing theories on knowledge management and innovation. It offers new theoretical perspectives on how organizations can use knowledge to encourage innovation and enhance performance. The findings pave the way for new research and enhance the current understanding of the complex interplay between knowledge management and innovation (Khan et al., 2024).

Practical implications

This study offers organizations guidance for performance enhancement. Practitioners should focus on knowledge creation and sharing processes, which are found to be essential for fostering innovation. The following paragraphs offers some specific guidelines for organizations.

For instance, organizations can implement training and development programs that emphasize knowledge creation and the free exchange of ideas and information among employees. They can also promote a collaborative culture by fostering an environment that encourages knowledge sharing to enhance innovation. Organizations should integrate innovation into their overall strategy to enhance the impact of knowledge management on performance. They should use knowledge management as a means to cultivate innovation rather than viewing it as an end in itself.

The study provides valuable insights for practitioners, decision makers, and organizations looking to improve knowledge management and foster innovation. The results imply that the processes of creating and sharing knowledge play pivotal roles in driving organizational innovation. This finding suggests that companies that prioritize these activities stand a greater chance of achieving success.

Most importantly, the results highlight the importance of creating and sharing knowledge to encourage innovation and collaboration. To do so, organizational leaders are encouraged to use tools such as digital collaboration platforms, mentoring initiatives, and dedicated training sessions designed for knowledge exchange. For example, setting up functional intranets allows employees to contribute ideas proactively and access useful information from different parts of the organization, thereby cultivating a collaborative atmosphere. A practical illustration of this idea is the formation of communities of practice, where employees from diverse fields come together to share experiences and insights. These discussion groups foster knowledge sharing and cultivate innovative solutions through the collective expertise of participants.

Furthermore, enhancing knowledge management processes requires both national and organizational policies to build a suitable infrastructure. Governments can play their part by creating funding initiatives aimed at companies that invest in advanced knowledge management technologies such as digital platforms and accessible databases. On the educational front, policies should be oriented toward equipping employees with essential skills through partnerships with academic institutions that can introduce courses that enhance collaborative skills and knowledge-sharing capabilities.

In addition, fostering innovation within organizations calls for an environment where the open exchange of ideas and active collaboration among employees is not just encouraged but embedded in the organizational culture. Managers can implement policies that reward creative initiatives, motivating teams to devise innovative solutions to everyday challenges. A transparent feedback system, combined with internal innovation platforms, allows ideas to flow freely and continuously, contributing to the evolution of both products and processes. This approach fosters creativity while bolstering the organization's long-term innovation capacity through a continuous flow of knowledge.

Leadership is crucial for creating a knowledge-driven and innovative organization. Managers who prioritize transparency and information sharing foster a collaborative and creative environment. Interdepartmental meetings, innovation workshops, and brainstorming sessions promote constructive dialogue. A notable example is the hosting of internal hackathons, where employees from various teams collaborate over a short period to devise innovative solutions in response to organizational challenges. These sessions can result in groundbreaking ideas that contribute meaningfully to the organization's innovation efforts.

Lastly, adopting advanced technologies is becoming increasingly important for organizations aiming to optimize internal processes and foster innovation. Investments in artificial intelligence (AI) and machine learning help firms not only gather and analyze data but also efficiently distribute the data to the right users. For instance, implementing recommendation systems can give employees quick access to relevant knowledge and allow them to collaborate with experts from related fields, ultimately driving innovation and improving organizational performance. These technological solutions are crucial to identify growth opportunities and foster a culture of continuous learning and

development.

Managerial implications

At the managerial level, the study underscores the crucial role of organizational leaders in recognizing knowledge management not just as a functional tool but also as a strategic cornerstone. For managers, it means taking on several key responsibilities.

First, they must act as agents of change, prioritizing the cultivation of an organizational mindset that values both innovation and the continuous exchange of knowledge. This role as agents of change entails fostering a culture that promotes learning and creativity at all levels, helping employees recognize their importance in the organization's success. Second, managers must align organizational strategy with innovation. Integrating knowledge management into the organization's strategic goals allows leaders to leverage innovation as a key growth driver, keeping the organization competitive and adaptable in a rapidly changing environment.

Managers should implement systems to monitor and evaluate knowledge processes on a continuous basis. They must therefore develop mechanisms for ongoing assessment of how knowledge is being created, shared, and applied within the organization. Regularly assessing these processes enables managers to adjust and enhance knowledge management practices, thereby improving the innovation processes that drive organizational advancement.

Practical insights for organizations

Organizations that implement a knowledge management strategy centered on the creation and distribution of resources position themselves favorably in the current competitive landscape, greatly increasing their innovation capacity and ensuring their long-term success (Ben Arfi et al., 2023). Such firms are more capable of adapting to shifting customer demands and evolving business landscapes. The mechanisms through which knowledge creation and sharing contribute to innovation are multiple. Access to diverse knowledge promotes interdepartmental collaboration and cultivates innovative ideas. In addition, a constant flow of knowledge strengthens the flexibility of organizations, supporting continuous innovative processes. Meanwhile, reducing the time required to go from idea to implementation can also become a source of competitive advantage. Knowledge sharing also plays a crucial role in avoiding duplication of effort, enabling more efficient strategic actions and saving precious resources. In conclusion, knowledge management practices enhance innovation and strengthen organizational sustainability.

This study advances knowledge management and innovation by addressing two key gaps in the literature. It studies the key knowledge management processes of creation, integration, implementation, and sharing to assess their collective impact on innovation and organizational performance. Unlike prior research, which has often examined these processes in isolation, this study highlights the essential roles of knowledge creation and sharing in fostering innovation, providing valuable insights for organizations to enhance their overall performance.

The study confirms that innovation mediates the relationship between knowledge management and organizational performance. Although previous research has highlighted the importance of innovation, few studies have explored this particular relationship in depth. The results of the present study show that innovation plays a vital role in transforming knowledge into competitive advantage, addressing a key gap in the literature. These findings mean that future research can investigate how innovation mediates the link between knowledge management and organizational performance, enhancing the understanding of these dynamics.

This study confirms that knowledge management is crucial for organizational success and that its impact is primarily mediated by an organization's innovation processes (Ben Arfi & Hikkerova, 2021). The study underlines the importance of a strategic approach that integrates knowledge and innovation at the heart of the organization's strategy and actions. Applying these principles can enable organizations to improve performance and become more adaptable and competitive in a complex, dynamic business landscape. This research offers a robust theoretical foundation and practical guidelines for managers and organizational leaders, outlining ways to leverage knowledge and innovation effectively.

Suggestions for future research

The study opens several promising avenues for future research. One potential avenue involves exploring how the findings apply across different industries and regions. Examining how organizational culture, size, and economic sector affect the relationship between knowledge management and innovation would be particularly valuable. Understanding these nuances could help determine whether the dynamics observed in this study hold true in diverse contexts or whether adjustments are needed to account for specific industry characteristics.

Future research could examine other mediating or moderating variables that affect the relationship between knowledge management processes and organizational performance. For instance, factors such as leadership style and the use of digital technologies may play a significant role in enhancing or altering this relationship. Investigating these elements could provide researchers with deeper insights into optimizing knowledge management practices for improved organizational performance.

The importance and long-term impact of the present research

This study contributes to knowledge management and innovation by bridging key gaps in the literature and enhancing existing theories, providing valuable theoretical insights and practical applications. The findings have the potential to exert a lasting impact, highlighting new avenues for optimizing organizational processes and fostering innovation. Both of these outcomes are crucial for the sustained success and competitiveness of modern organizations. Ultimately, applying these insights could boost innovation, improve organizational performance, and strengthen competitive positioning in global markets.

CRediT authorship contribution statement

Nicoleta Cristache: Writing – review & editing, Writing – original draft, Validation, Investigation, Conceptualization. **Gabriel Croitoru:** Writing – review & editing, Writing – original draft, Validation, Methodology, Investigation, Conceptualization. **Nicoleta Valentina Florea:** Writing – review & editing, Writing – original draft, Validation, Methodology, Investigation, Formal analysis, Conceptualization.

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