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Knowledge Management Implementation in Small and Medium-Sized Enterprises in Serbia: Current State, Challenges, and Success Factors

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Abstract

Background: Small and medium-sized enterprises (SMEs) play a significant role in the economy of any country, with their economic importance and contribution continually growing. Knowledge management (KM) is becoming increasingly important as a factor in the development and sustainability of these enterprises. However, SMEs still insufficiently apply knowledge management practices. This paper analyzes the application of knowledge management (KM) processes in small and medium-sized enterprises (SMEs) in Serbia, with a focus on key factors influencing successful implementation.

Purpose: The aim of this paper is to analyze and determine the level of development of knowledge management processes in small and medium-sized enterprises in Serbia, as well as to identify the factors influencing its implementation, in order to explore possibilities for improving the current state and practices within SMEs.

Study design/methodology/approach: The research was conducted on a sample of 171 SMEs using surveys and interviews as research instruments. The collected data were analyzed using descriptive statistics, correlation, and regression analysis in SPSS software.

Findings/conclusions: The results show that the knowledge management process in SMEs is still underdeveloped. Correlation analysis confirmed the existence of a statistically significant relationship between KM implementation and several key influencing factors. Regression analysis further confirms that leadership support - identified as having the strongest impact - is the key factor positively influencing KM implementation in SMEs. The obtained results indicate the need for a systematic approach and strategic support from management in order to improve knowledge management practices in the SME sector, which represents a significant development opportunity for enhancing competitiveness in this sector.

Limitations/future research: Study limitations include the specificity of the sample and the local context, which makes it more difficult to generalize the results to SMEs in other countries. The underdevelopment of knowledge management practices and understanding in Serbian SMEs, as well as the limited awareness of this field among managers, further restricts the applicability of the findings. Additionally, reliance on respondents' subjective opinions may lead to bias in the answers.

Keywords
Knowledge, Knowledge Management, Small and medium-sized enterprises (SMEs), Knowledge management processes, Success factors.

Introduction

Small and medium-sized enterprises (SMEs) play a significant role in the economy of any country, with their economic importance and contribution continually growing. "According to data from 2021, the SME sector accounts for 99.9% of all business entities in Serbia, employs 64.3% (almost two-thirds) of the workforce, generates 66.2% of turnover, creates 59% of gross value added, and contributes 37.2% to exports and 53.4% to imports of the non-financial sector (*Strategy for the Development of SMEs*, 2023)."

Small and medium-sized enterprises represent a crucial component of Serbian economic development. They significantly contribute to job creation, innovation (Anicic et al., 2025), and poverty reduction. Furthermore, these enterprises play a substantial role in fostering economic growth and national prosperity (Akber et al., 2023; Malesu & Syrovátka, 2025; Syzdykova & Azretbergenova, 2025). Despite their importance, small and medium-sized enterprises face significant financial constraints that limit their capacity to invest in modern technologies (Anicic et al., 2025).

Limited financing and an underdeveloped capital market restrict access to alternative funding sources (Anicic et al., 2025). Consequently, effective knowledge management within small and medium-sized enterprises becomes increasingly vital for their development and long-term sustainability.

This is also indicated by the growing number of scientific and professional papers devoted to knowledge management in SMEs.

According to the study by Durst et al. (2022), the number of scientific papers dedicated to knowledge management in SMEs peaked in 2021.

The authors analyzed and systematized papers published in academic journals between 2012 and 2022. They concluded that the growing interest in this topic may be linked to global challenges such as climate change, the COVID-19 pandemic, and political unrest in Ukraine.

It is assumed that these events and their consequences may have encouraged SMEs to invest more in knowledge management in order to maintain business continuity during and after crises.

A 2023 study by the same authors demonstrates that research on knowledge management in small and medium-sized enterprises (SMEs) has expanded to include areas such as knowledge-related risks, knowledge management strategy, and opportunities for longitudinal studies. The study underscores the necessity of an integrated approach to knowledge management that incorporates strategies, risk considerations, and the interconnections among knowledge management processes.

The authors also identify practical implications for SME managers, including increasing awareness of the significance of knowledge management, enhancing resource management, formulating comprehensive knowledge management strategies, addressing knowledge-related risks, and systematically monitoring the effectiveness of knowledge management practices (Durst et al., 2023).

Comparable findings are presented in a study by Farooq (2023), which conducted a bibliometric analysis of publications examining the relationship between knowledge management and organizational performance from 1988 to 2021.

The results indicate a significant increase in research interest in this topic since 2000, reflecting the growing recognition of knowledge management as a critical factor in achieving sustainable competitive advantage for organizations.

The authors assert that effective knowledge management can substantially enhance organizational performance and enable organizations to respond more effectively to the challenges of the contemporary business environment.

These global challenges and the increasing importance of knowledge management have motivated the authors to examine the situation in developing countries such as Serbia, focusing on the application of knowledge management processes in SMEs.

While the results indicate that similar challenges could emerge in countries with comparable economic characteristics, the analysis is limited to Serbia's national context and does not assert that identical factors are present in all developing countries.

Following the direction of previous research, the authors contribute to the existing literature by

identifying factors that contribute to a higher level of KM process implementation in SMEs.

The aim of this paper is to analyze and determine the level of development of knowledge management processes in small and medium-sized enterprises in Serbia, as well as to identify the factors influencing its implementation, in order to explore possibilities for improving the current state and practices within SMEs.

The following sections include a review of existing literature on KM practices in SMEs. The methodological framework of the research conducted on a sample of Serbian SMEs is presented in the third section, along with the research instruments used.

The fourth section presents the results of the quantitative research, including descriptive statistics and the identification of key factors through correlation analysis, further supported by multiple regression analysis.

The paper concludes with the fifth section, which synthesizes the theoretical and empirical parts. It also outlines the contributions of the research, implications for future studies, and research limitations, emphasizing the continued importance of knowledge management in the context of Serbian SMEs.

1. Theoretical framework

In today's business environment, knowledge is recognized as a strategic resource and a key factor for achieving and maintaining competitiveness (Al Koliby et al., 2025; Hafeez et al., 2025), while knowledge management is regarded as a determinant that significantly influences the overall performance of any organization (Abbas & Kumari, 2023; Baporikar, 2024; Chaudhary et al., 2025; Cheng et al. 2024; Cristache, 2025; Minnetti et al., 2025; Pacheco et al., 2025; Rosulj & Petrovic, 2024; Sari et al., 2024; Shehzad et al. 2024;).

Beyond academic literature, the importance of knowledge is also emphasized through international management system standards that define knowledge management (KM) requirements.

In addition, more recent research highlights the crucial role of knowledge sharing, as well as the importance of the quality of the process itself—namely the accuracy, relevance, and applicability of shared information—in achieving innovation performance and overall efficiency in SMEs (Dzenopoljac et al., 2025). A study conducted in Indonesian state-owned enterprises shows that knowledge management significantly enhances both innovation capability and innovation performance, thereby confirming its strategic role in creating competitive advantage (Harsono et al., 2025).

Al Koliby et al. (2025) emphasize that knowledge management practices—particularly knowledge acquisition, sharing, and application—are key drivers of sustainable performance improvement in SMEs. The authors point out that systematic knowledge management contributes to the identification of new business opportunities, increased productivity, and more successful implementation of innovative and environmentally sustainable solutions.

Research on SMEs in Indonesia shows that effective knowledge management significantly fosters the development of green innovations, which, in turn, positively affects organizational performance and strengthens firms' competitive advantage (Achmad & Wiratmadja, 2025). The authors also stress that systematic knowledge management helps uncover new business opportunities, increases productivity, and facilitates the implementation of innovative and environmentally sustainable solutions.

Tarambiwa et al. (2025) indicate that systematic knowledge management has a significant impact on supply chain performance in SMEs, particularly through the mediating role of knowledge sharing. Specifically, people-oriented systematic knowledge management, combined with active knowledge sharing, positively affects SME performance and survival, especially in developing countries.

Research on SMEs in the tourism sector highlights the importance of systematically integrating knowledge management into daily SME activities, and of linking it to the firm's mission, strategy, and objectives to provide better, more timely decision-making support.

The authors point out that in the tourism sector affected by earthquakes, knowledge management significantly influences business adaptability, risk mitigation strategies, and business losses, but does not directly affect business recovery (Iqbal et al., 2025).

Clause 7.1.6 of the ISO 9001:2015 standard, Quality Management Systems — Requirements, explicitly introduces the requirement for knowledge management, marking its formal recognition within the standard.

This requirement is also implicitly reflected in the inclusion of the concept of documented

information and the emphasis placed on planning processes, which are fundamentally implemented through the creation and application of organizational knowledge (Rosulj et al., 2022).

Additionally, the SRPS ISO 30400:2019 standard, Human Resource Management – Vocabulary, defines knowledge management as a set of activities, methods, and tools that enable organizations to manage their knowledge effectively.

While Jovanovic (2014) defines a knowledge management system as a set of ideas, rules, and methods for collecting, creating, storing, transferring, and applying knowledge within an organization.

Integrated activities within the knowledge management process highlight the importance and role of a specific category of knowledge: organizational knowledge. This form of knowledge is most commonly defined as a combination of the organization's human resources, intellectual property, infrastructural capacities, and market-related assets.

Based on this understanding, it is essential for an organization not only to manage existing knowledge but also to continuously foster its creation and dissemination within its environment.

Consequently, knowledge management cannot be viewed as an isolated concept, as it depends on a wide range of interrelated and interdependent elements within the organization. There are numerous components of a knowledge management system, among which the most relevant include: knowledge portals, content management systems (CMS), audio-video conferencing tools, Web 2.0 technologies, and data warehouses.

These technologies significantly contribute to the development and successful implementation of knowledge management in an organizational context. Among them, the Data Warehouse stands out as a key component, as it provides a solid foundation for generating information that can subsequently be transformed into knowledge (Trninic et al., 2011).

While data warehouses play a significant role in information generation, they are not essential for implementing knowledge management in small and medium-sized enterprises. These organizations frequently rely on more flexible, cost-effective data sources that align with their specific needs and resource constraints.

Shaik et al. (2024) emphasize the significance of strategic knowledge management-especially in the context of SMEs-because it enables them to recognize and utilize their unique knowledge resources and develop new knowledge and competencies essential for success.

Knowledge management is gaining increasing importance, particularly within SMEs. The SRPS ISO 30401:2019 standard, Knowledge Management Systems – Requirements, emphasizes that organizations can no longer rely on the spontaneous dissemination of knowledge or assume that sufficient knowledge will be available to keep pace with change.

Instead, it highlights the need for organizations to systematically and intentionally develop, reinforce, apply, and reuse knowledge – at a pace that exceeds the speed of environmental and organizational change (Rosulj et al., 2021).

However, SMEs still apply knowledge management practices insufficiently (Levy et al., 2003; Ngah & Wong, 2020; Valencia-Arias et al., 2024; van Zyl et al. 2022;). Systematic approaches to KM and its implementation in SME management are rarely observed, especially in less developed countries, due to limited resources, weaker institutional support, and a lack of awareness about the potential benefits of knowledge management (Samir, 2020).

Additionally, SMEs face another challenge-a lack of appropriate KM methods (Wielgórka, 2022). Knowledge management methods include identifying, organizing, and applying both tacit and explicit knowledge held by employees (Shaik et al., 2024). While explicit knowledge is documented and separate from individuals-thus easily transferable-tacit knowledge is personal, acquired through practical experience, and more difficult to share with others (Ivanovic, 2019; Shaik et al., 2024;).

Knowledge management presents a particular challenge for SMEs in terms of identifying useful knowledge, accessing it, and properly maintaining and applying existing knowledge -especially since SME owners often lack a vision for KM development, focusing instead on tangible financial flows (Egbu et al., 2005).

Many SMEs either lack an understanding of the KM process or are only beginning to recognize the benefits its implementation can offer, which significantly slows their adoption of formal and systematic KM practices (McAdam & Reid, 2001).

Research also shows that KM processes in SMEs are mostly informal, often ad hoc, without a clear strategy or IT support (Coyte et al., 2012; Hutchinson & Quintas, 2008). Authors such as

Levy et al. (2003) and Wee & Chua (2013) emphasize that small and medium-sized enterprises (SMEs) are generally effective in knowledge creation, but less proficient in knowledge retention and preservation.

Shaik et al. (2024) suggest that SMEs can enhance their operations by relying on external knowledge sources, such as universities, consulting firms, and industry experts. Through collaboration with these sources, enterprises gain access to new ideas and insights that can contribute to the development and improvement of their products and services. Furthermore, these authors emphasize that SMEs can greatly benefit from fostering an environment where knowledge is actively shared among employees-something that can be enabled through internal digital platforms such as wikis, discussion forums, or by organizing workshops and seminars for knowledge exchange.

The role of knowledge management is widely acknowledged in the process of digital business transformation. Supported by digital technologies, effective knowledge management enables organizations to identify the drivers of transformation, pinpoint the areas that require change, and establish priorities throughout the change process. Without appropriate knowledge management, digital transformation cannot realize its full potential, as knowledge serves as the foundation for strategic decision-making and effective change management (Erceg & Zoranovic, 2022).

Numerous authors (Bollinger & Smith, 2001; CWA 14924-1:2004; Egbu et al., 2005; Handtrack, 2009; McAdam & Reid, 2001; Ngah & Wong, 2020; Scurtu & Neamtu, 2015; Wee & Chua, 2013; Wong & Aspinwall, 2004) emphasize that leadership must be aware of the need for implementing KM, as well as recognize its benefits, significance, and value.

Leadership styles directly influence knowledge management practices within organizations, as evidenced by a study conducted in an Indian software company.

The study finds that directive and supportive leadership styles negatively affect knowledge management processes. Conversely, consultative and delegating styles significantly enhance knowledge creation, storage, organization, and application (Singh, 2008).

In addition, ethical leadership has been shown to significantly reduce knowledge hiding within organizations, distinguishing it from the previously discussed leadership styles (Koay & Lim, 2022).

Accordingly, leadership commitment and support are highlighted as key factors for the successful implementation of knowledge management in SMEs.

On one hand, effective KM implementation in SMEs requires leadership commitment and support (Ngah & Wong, 2020; Scurtu & Neamtu, 2015; van Zyl et al. 2022; Wee & Chua, 2013;), as well as an understanding of KM's connection to other parts of the enterprise (Pour & Asarian, 2019). On the other hand, SMEs often fail to recognize their full potential (Ngah & Wong, 2020).

Pellegrini et al. (2020) provide a comprehensive attempt to systematize and map the literature on the relationship between leadership and knowledge management over the past two decades. While the paper selection process may involve some subjectivity, this concern is addressed by the analysis's reliability, confirmed by a high Krippendorff's alpha coefficient (>0.80).

Previous research indicates that knowledge management significantly improves organizational performance, innovation, and organizational competitiveness, with leadership's role often highlighted as a key factor in this process. However, most empirical studies focus on large enterprises and developed economies, whereas small and medium-sized enterprises (SMEs), particularly in developing countries, remain understudied. Given the dominant role of SMEs in the economic structure, limited resources, and underdeveloped organizational and managerial practices, Serbia represents a specific research context in this regard. It is particularly unclear how leadership characteristics affect individual knowledge management processes in such an environment. Given that the literature most frequently emphasizes leadership as a key prerequisite for successful knowledge management implementation, this paper analyzes leadership-related factors as potential predictors of knowledge management processes in Serbian SMEs.

2. Research methodology

Based on the literature review, it can be concluded that knowledge management (KM) is of exceptional importance for small and medium-sized enterprises (SMEs).

However, its practical implementation is often underdeveloped, particularly in developing countries. In this context, the key research question arises: how is the knowledge management process implemented in Serbian SMEs, and which factors are crucial for its successful execution?

The hypothesis accompanying this research question is: "The implementation of knowledge management processes in small and medium-sized enterprises in Serbia is underdeveloped."

The collected data were analyzed using descriptive statistics, correlation, and regression analysis in SPSS software. Interviews and a survey questionnaire were employed as research instruments.

The population of this study consists of micro, small, and medium-sized enterprises from the manufacturing and service sectors within the private sector in the Republic of Serbia.

The respondents consisted of owners, as well as top, middle, and lower levels of management, as part of the managerial structure, due to their roles in management and decision-making.

Information regarding active SMEs was obtained from the CompanyWall Business database (https://www.companywall.rs/), which indicated that at the time of the study approximately 270,000 micro, small, and medium-sized enterprises were active.

The research began with a pilot study conducted on a sample of 12 SMEs in Serbia. The aim of the pilot study was to assess the clarity and comprehensibility of the questionnaire items from the respondents' perspective.

Before the final distribution of the questionnaire, its content was revised based on suggestions provided by participants in the pilot phase. Additionally, feedback obtained through short interviews during the pilot phase was used to refine the questionnaire for improved clarity and linguistic accuracy.

The questionnaire was sent via email to approximately 3000 SMEs. Generally, respondents showed little inclination towards this form of cooperation and exhibited limited interest in completing the questionnaire.

However, around 20% of contact addresses were nonexistent or invalid, while an additional number of businesses (about 10%) indicated that they were in the process of shutting down or had already ceased operations.

Additionally, approximately 10–15% of respondents reported insufficient familiarity with the concept of knowledge management and therefore declined to participate in the research. The number of remaining businesses decreased significantly after these exclusions.

Given the low willingness to participate in survey research, the questionnaire was sent twice to all businesses for which valid contact information was available.

After five months (June–October 2023), the total random sample for the quantitative study comprised 171 SMEs.

To determine the adequacy of the sample size (Cohen, 1988), the GPower method was employed (Faul et al., 2009; Kang, 2021;). Following the GPower analysis for the correlation test, the recommended sample size was 115 SMEs based on specified parameters, including an effect size $|\rho| = 0.3$ and power (1-β err prob) = 0.95. For multiple linear regression analysis, with parameters including effect size $f^2 = 0.15$, power (1-β err prob) = 0.95, and number of predictors = 4, the recommended sample size was 129.

Thus, a sample of 171 SMEs exceeded the recommended minimum sample size, even with a high statistical power of 0.95, indicating that the results are statistically reliable. The choice of a medium effect size ($\rho = 0.3$; $f^2 = 0.15$) is based on Cohen's (1988) recommendations, which are commonly applied in social and organizational research when moderate relationships between variables are expected.

Although a minimum power level of 0.80 is generally recommended, a power of 0.95 was selected as a more stringent criterion to reduce the probability of Type II error and increase the robustness of the conclusions, which is consistent with contemporary recommendations for empirical research (Lakens, 2013; Serdar et al., 2020).

In line with previous findings from the literature, and in the context of this research, in order to determine the level of knowledge management process implementation in SMEs in Serbia, the respondents assessed the knowledge management processes on a Likert scale, based on their personal opinion and from the perspective of their application within their company.

Given that managerial experience with KM, leadership approach, and leadership support are identified in the literature as significant factors influencing KM implementation, a correlation test was used to examine the relationships between these factors and the level of KM process implementation.

Based on the established correlations, multiple linear regression was applied to analyze the variables that demonstrated significant associations.

Multiple linear regression was employed to examine the effects of multiple independent variables on the dependent variable. The overall

statistical significance of the model was assessed using the F-test, while the individual contributions of the predictors were interpreted using t-tests, standardized coefficients (Beta), and p-values; p-values < 0.05 were considered statistically significant.

Regression analysis was used to assess the influence of factors such as experience in knowledge management, leadership approach, and leadership support on the implementation of KM processes.

Managerial experience, approach, and support for KM were treated as independent variables, while KM processes were considered the dependent variable.

One of the analyses conducted in this study involved testing the variables for normal distribution. For this purpose, the Shapiro–Wilk test was used, as it is particularly suitable for small to medium-sized samples and provides a reliable assessment of deviations from normality.

The goal of this analysis was to determine the nature of the variables to ensure the appropriate statistical tests were used in further data processing.

The test results indicated statistically significant deviations from normality ($p < 0.05$), which justified the use of nonparametric statistical methods, such as the Kruskal–Wallis test, for group comparisons. In these analyses, p-values below 0.05 were considered statistically significant.

Although the Shapiro–Wilk test revealed deviations from normal distribution, Pearson's correlation and multiple linear regression were also applied despite these departures, due to their robustness to moderate violations of normality assumptions and ordinal levels of measurement (Norman, 2010), particularly in larger samples ($N > 150$).

Moreover, the application of these methods was aligned with the study's objective of assessing the strength and direction of linear relationships between variables. Parametric methods, including correlation and regression analyses, retain their validity and statistical power even when data deviate from an ideal normal distribution (Field, 2018).

3. Research results

The research findings are presented in three parts. The first part includes the demographic characteristics of the sample, i.e., the distribution of small and medium-sized enterprises and the respondents.

The second part focuses on analyzing attitudes toward the awareness and application of knowledge management, including leadership experience and approach, the level of support for KM processes, and the degree of KM implementation in SMEs.

Finally, the third part examines the influence of the aforementioned factors on the knowledge management process.

The distribution of SMEs based on specific enterprise characteristics is shown in Table 1.

Table 1 Sample: Distribution of companies by business orientation (activity) and by size (criterion: average number of employees).

SME characteristics	Number of SMEs	Number	Percentage (%)
Business orientation	Service enterprise	92	53,8
	Manufacturing enterprise	34	19,9
	Mixed (manufacturing and service)	45	26,3
	Total	171	100%
Number of employees*	Micro (1–9 employees)	74	43,3
	Small (10–50 employees)	62	36,3
	Medium (51–250 employees)	35	20,5
	Total	171	100%

Source: According to the Accounting Law: 73/2019-11, 44/2021-4

Based on the results in Table 1, it can be concluded that service enterprises are the most represented in the sample (53.8%), while manufacturing enterprises are the least represented (19.9%).

Additionally, the study included 74 micro enterprises (43.3%), 62 small enterprises (36.3%), and 35 medium-sized enterprises (20.5%).

The distribution of respondents in the sample according to demographic characteristics is presented in Table 2.

The data presented in Table 2 indicate that the highest percentage of respondents (35.7%) hold an undergraduate academic degree (bachelor's level), while the smallest proportion of SME managers in the sample hold a doctoral degree.

Furthermore, according to Table 2, the majority of respondents-more than half (64.3%)-belong to the top management level.

Respondents from middle management account for 22.8%, while those from lower management are the least represented, with 12.9%.

Table 2 Sample – Distribution of Respondents by Position in the Enterprise

Demographic Characteristics of Respondents		Number of respondents	Percentage %
Management Level	Top management (including owners)	110	64,3
	Middle management	39	22,8
	Lower management	22	12,9
	Total	171	100
Level of education	Secondary school	24	14,0
	Higher school – Higher vocational school	20	11,7
	Undergraduate academic studies (University degree)	61	35,7
	Master's studies	41	24,0
	Magister studies	15	8,8
	Doctorate	10	5,8
	Total	171	100

Source: the authors

To determine the degree of knowledge management process implementation, it is essential to examine management's experience with knowledge management in SMEs. In the following section, by analyzing the respondents' attitudes, the level of knowledge and understanding of knowledge management processes by SME management was assessed.

The questionnaire item related to knowledge of the knowledge management process was: "Which of the following statements best reflects your experience with knowledge management?"

The offered responses ranged from basic awareness of the knowledge management process to the level of its establishment and implementation, with respondents instructed to select only one option.

The respondents' answers are shown in Table 3, where the largest number of participants (62 out of 171), or 36.3%, selected the statement: "I am not familiar with knowledge management but am interested in learning more."

These results suggest that a significant portion of the respondents have no experience with implementing KM processes, but they are nevertheless interested in gaining more knowledge about the concept.

On the other hand, the results show that 49 respondents indicated that a knowledge management process has been established and is being implemented in their enterprise.

Based on this, it can be assumed that 28.7% of respondents have practical experience in executing this process. Only 2.3% stated that they have no experience and are not interested in applying it.

Table 3 also presents the results of the Shapiro–Wilk test, which indicate the extent to which the distribution of respondents' responses deviates from normality.

Considering that the research is based on a sample composed of SME management representatives, and given the findings from the previous analysis related to the level of familiarity with the knowledge management process, it is important to examine whether differences in experience exist among management groups based on their educational level and managerial position.

Table 3 Management experience in knowledge management and normality test

	Management Experience in Knowledge Management	Number of respondents	Percentage (%)	Tests of Normality Shapiro-Wilk		
				Statistic	df	Sig.
1.	I am not familiar with "Knowledge Management", but I am interested in learning more.	62	36,3	,411	171	,000
2.	I am not familiar with "Knowledge Management" and not interested in implementing it in our company.	4	2,3	,538	171	,000
3.	I am not familiar with "Knowledge Management", but I am interested in implementing it in our company.	28	16,4	,507	171	,000
4.	We have planned to establish a "Knowledge Management" process, but it is not yet completed.	28	16,4	,507	171	,000
5.	The "Knowledge Management" process has been established and is being implemented.	49	28,7	,450	171	,000
	Total	171	100			

Source: the authors

The results of the Kruskal-Wallis test [$\chi 2(5)=13.58$; $p=0.019$], indicate a statistically significant difference in management experience with knowledge management based on educational level (Table 4).

Table 4 Kruskal-Wallis Test of Leadership Experience in Knowledge Management

Leadership and company characteristics	Knowledge management experience		
	Chi-Square	df	Asymp. Sig.
Level of Education	13,580	5	,019
Management Level	,139	2	,933

Source: the authors

The research results show that the level of education has a statistically significant impact on experience in knowledge management, indicating that this variable varies depending on the educational background of SME managers.

On the other hand, a management position does not have a statistically significant impact on knowledge management experience.

In addition to experience, the literature (Egbu et al., 2005; Wee & Chua, 2013; Durst et al., 2022; Bollinger & Smith, 2001; CWA 14924-3, 2004) emphasizes the importance of leadership's approach to and support for knowledge management as key factors for the successful implementation of knowledge management in SMEs.

Accordingly, this study analyzed the approach of SME leadership to knowledge management and the extent to which it provides support.

To assess the approach, respondents in the sample were asked whether there is a written procedure regulating the knowledge management process in their company and whether there is a designated person responsible for knowledge management (Table 5).

The level of leadership support for knowledge management is presented in Table 6. Tables 5 and 6 also present the results of the Shapiro–Wilk test, which indicate the extent to which the distribution of respondents' responses deviates from normality.

Table 5 Respondents' Answers on the Existence of a Procedure and a Responsible Person for Knowledge Management

Leadership Approach to Knowledge Management			Descriptive Statistics		Tests of Normality Shapiro-Wilk		
			Number of SMEs	Percentage	Statistic	df	Sig.
Existence of a Written Knowledge Management Procedure	1.	Does not exist	138	80,7	,494	171	,000
	2.	Exists	33	19,3			
	Total		171	100			
Existence of a Responsible Person for KM in the Company	1.	Does not exist	96	56,1	,349	171	,000
	2.	There is a person partially engaged in KM tasks	46	26,9			
	3.	Exists	29	17			
	Total		171	100			

Source: the authors

Table 6 Assessment of Leadership Support for Knowledge Management

Leadership Support for KM	Descriptive Statistics					Tests of Normality Shapiro-Wilk		
	N	Min	Max	Mean	SD	Statistic	df	Sig.
	171	1	5	3,78	,94895	,107	171	,000

Source: the authors

Based on the analyzed sample of small and medium-sized enterprises (SMEs) in Serbia, the results presented in Tables 5 and 6 lead to the following conclusions:

- The leadership's approach to knowledge management shows that this process is not given sufficient importance. This is confirmed by the fact that only 19% of respondents indicated that the knowledge management process is formally documented, while only 17% of SMEs have a responsible person dedicated to this process.
- The support that leadership provides to knowledge management is not at a satisfactory level, as reflected by the average support rating of 3.76, indicating moderate but insufficiently developed commitment of leadership in this area of enterprise management.

The subsequent part of the study involved empirical testing of respondents' attitudes regarding the level of knowledge management process implementation in their companies.

Respondents rated the level of implementation on a five-point Likert scale.

Table 7 presents the mean scores for each process, showing the extent to which knowledge management processes are applied in practice within the observed SMEs.

Additionally, Table 7 presents the results of the Shapiro–Wilk test, which indicate the extent to

which the distribution of respondents' responses deviates from normality.

Table 7 Descriptive Statistics of Knowledge Management Process Implementation

Knowledge Management Processes	Descriptive Statistics					Tests of Normality Shapiro-Wilk		
	N	Min	Max	Mean	SD	Statistic	df	Sig.
Knowledge Acquisition	171	1	5	3,81	,7314	,084	171	,003
Knowledge Application	171	1	5	4,14	,81161	,149	171	,000
Knowledge Sharing	171	1	5	3,65	1,0167	,106	171	,000
Knowledge Retention	171	1	5	3,27	1,0829	,066	171	,004

Source: the authors

Based on the obtained results, it can be concluded that knowledge management processes in small and medium-sized enterprises (SMEs) in Serbia are implemented to an insufficient extent. According to the average rating of 4.15, the process of knowledge utilization (application) is the most implemented, indicating that SMEs actively use available knowledge in their daily operations. The processes of knowledge acquisition (Mean = 3.81) and knowledge sharing (Mean = 3.65) are somewhat less represented. The lowest-rated process is knowledge retention and protection (Mean = 3.29), which suggests that mechanisms for preserving and securely storing knowledge are underdeveloped, potentially posing a risk to the long-term sustainability and transfer of knowledge within the enterprise.

The next step involved identifying differences in the implementation of knowledge management processes based on company size, the existence of a written knowledge management procedure, and the presence of a person responsible for knowledge management processes.

The results of the Kruskal-Wallis test (Table 8) indicate that the practice of implementing knowledge management processes does not differ by company size; that is, the application of these processes is similar across micro, small, and medium enterprises.

However, differences exist depending on whether the process is formally documented and whether there is a designated person managing these processes.

Table 8 Kruskal-Wallis Test of Knowledge Management Processes

Company Characteristics		Knowledge Management Processes			
		Knowledge Acquisition	Knowledge application	Knowledge sharing	Knowledge retention
Company size	Chi-Square	3,193	4,392	2,608	,549
	df	2	2	2	2
	Asymp. Sig.	0,203	,111	,271	,760
Existence of Documented KM Procedure	Chi-Square	10,447	11,861	21,324	12,198
	df	1	1	1	1
	Asymp. Sig.	,001	,001	,000	,000
Existence of Responsible Person for KM	Chi-Square	15,087	25,749	13,423	14,672
	df	2	2	2	2
	Asymp. Sig.	,001	,000	,001	,001

Source: the authors

The practice of knowledge retention in SMEs in Serbia was analyzed from several perspectives:

- how often a company loses essential knowledge when an employee leaves,
- what are the most common reasons for the company's inability to retain appropriate knowledge, and
- whether the leadership takes measures to ensure that, in the event of an employee's departure, the company does not lose critical (specific) knowledge.

The results showing how often SMEs lose necessary knowledge due to employee departure, as well as the reasons behind it, are presented in Table 9.

Table 9 Frequency of Knowledge Loss and Contributing Reasons

	Frequency of Knowledge Loss	Number of SMEs	Percentage (%)	Reasons Why SMEs Lose Knowledge	Number of SMEs	Percentage (%)
1.	Yes, frequently	13	7,6	Termination of employment	81	47,4
2.	Yes, but rarely	96	56,1	Lack of knowledge retention mechanisms	72	42,1
3.	No, never	62	36,3	Retirement	38	22,2
	Total	171	100			

Source: the authors

Based on the results in Table 9, it can be seen that more than 60% of SMEs lose essential knowledge when an employee leaves. Only 36.3% of SMEs stated that they never lose essential knowledge. The most common reason SMEs lose necessary knowledge is the termination of employment, followed by the lack of mechanisms for knowledge retention.

Based on the results in Table 10, it is evident that owners of micro and small enterprises rarely, or almost never, lose essential knowledge.

Table 10 Frequency of Knowledge Loss by Company Size and Management Levels

Frequency of Knowledge Loss	Company size			Management level			
	Micro	Small	Medium	Lowest	Middle	Top	Owner
Rarely	36	33	27	14	23	22	37
Often	6	4	3	0	6	1	6
Never	32	25	5	8	10	11	33

Source: the authors

From a methodological perspective, it was necessary to investigate whether the frequency of knowledge loss differs depending on the size of the enterprise, the existence of a documented knowledge management procedure, and the presence of a person responsible for knowledge management processes.

The results of the Kruskal-Wallis test (Table 11) show that there are statistically significant differences in how often companies lose essential knowledge, depending on the size of the enterprise and whether they have a designated person responsible for knowledge management.

Table 11 Kruskal-Wallis Test of the Frequency of Essential Knowledge Loss

		Frequency of Essential Knowledge Loss
Company size	Chi-Square	7,446
	df	2
	Asymp. Sig.	,024
Existence of a documented knowledge management procedure	Chi-Square	,532
	df	1
	Asymp. Sig.	,466
Presence of a person responsible for knowledge management	Chi-Square	11,521
	df	2
	Asymp. Sig.	,003

Source: the authors

Regarding measures taken to retain knowledge within the company, out of a total of 171 SMEs, only 63 reported taking certain actions to ensure knowledge remains within the company, with micro enterprises being the most active in implementing knowledge retention measures (Table 12).

Table 12 Number of SMEs Taking Measures to Retain Knowledge

Taking Measures to Retain Knowledge	Company size			
	Micro	Small	Medium	Total
	29	24	10	63

Source: the authors

To assess how the absence of mechanisms for knowledge retention and sharing affects individual knowledge management processes, a correlation test was applied, and the results are shown in Table 13.

The correlation test indicates that the lack of mechanisms for retaining and sharing knowledge negatively impacts individual knowledge management processes; in other words, the fewer the mechanisms for knowledge retention and sharing, the lower the level of implementation of knowledge management processes.

Table 13 Correlation Between the Absence of Mechanisms for Knowledge Retention and Sharing and Individual Knowledge Management Processes

		Acquiring Knowledge	Applying Knowledge	Sharing Knowledge	Retaining Knowledge
Absence of established mechanisms for knowledge sharing and retention	Pearson Correlation	-,251**	-,207**	-,252**	-,207**
	Sig. (2-tailed)	,001	,006	,001	,007
	N	171	171	171	171

Source: the authors

In the next step, an analysis was conducted to examine the relationship between the implementation of knowledge management processes and previously considered factors, such as experience in the field, organizational approach, and support from management (Table 14).

All factors (such as experience, approach, and management support) show a statistically significant correlation with knowledge management processes.

The strongest and most significant correlation of knowledge management processes is with management support, meaning that among all

factors, management support has the greatest influence, highlighting its key role in the implementation of knowledge management processes in SMEs.

Management support is crucial for all knowledge management processes, especially for motivating employees to acquire and share knowledge.

Next, a multiple regression analysis will be presented to examine the impact of the previously analyzed factors, as a group of independent variables, on knowledge management processes as dependent variables. The standardized regression coefficients (Beta) allow for a comparison of the relative strength of the independent variables within the same model.

The results of the regression analysis for the knowledge acquisition process are shown in Table 15.

Table 14 Correlation Test Between the Implementation of Knowledge Management Processes and Experience, Approach, and Management Support

		Acquiring Knowledge	Applying Knowledge	Sharing Knowledge	Retaining knowledge
Experience in Knowledge Management	Pearson Correlation	,296**	,268**	,361**	,257**
	Sig. (2-tailed)	,000	,000	,000	,001
	N	171	171	171	171
Existence of Written Procedure for KM	Pearson Correlation	,242**	,260**	,341**	,262**
	Sig. (2-tailed)	,001	,001	,000	,001
	N	171	171	171	171
Presence of Person Responsible for KM	Pearson Correlation	,221**	,285**	,230**	,180*
	Sig. (2-tailed)	,004	,000	,003	,019
	N	171	171	171	171
Management Support for KM	Pearson Correlation	,704**	,552**	,686**	,416**
	Sig. (2-tailed)	,000	,000	,000	,000
	N	171	171	171	171

Source: the authors

Table 15 Regression Analysis of the Knowledge Acquisition Process and Independent Variables

Dependent Variable: Knowledge Acquisition

Independent Variables		Model		F - test		t - test			
		R2	Std. Error	F	F Sig.	B	Beta	t	Sig.
Constant = 1,713	Experience in Knowledge Management	,523	,51108	45,542	,000	,025	,058	,964	,336
	Management Support for Knowledge Management					,506	,656	11,575	,000
	Presence of Person Responsible for KM					,129	,135	2,269	,025
	Existence of Written Procedure for KM (process documentation)					,054	,029	,470	,639

Source: the authors

The regression model (R^2=0,523) examining the influence of factors such as management experience, organizational approach, and management support for knowledge management on the knowledge acquisition process explains 52.3% of the variability in knowledge acquisition and is statistically significant at the 1% significance level ($p < 0.001$).

This means that at least some of the independent variables significantly predict the dependent variable-knowledge acquisition. However, not all independent variables are statistically significant.

The most significant and strongest standardized influence-the strongest predictor in the model-is management support (Beta = 0.656).

The presence of a person responsible for the knowledge management process also has a positive and statistically significant effect, but to a lesser extent (Beta = 0.135). The results indicate that the greater the management support for knowledge management and the appointment of a responsible person for the knowledge management process in SMEs, the more the knowledge acquisition process will be applied.

On the other hand, management experience in knowledge management (Beta = 0.058; Sig. = 0.336) and process documentation (Beta = 0.029; Sig. = 0.639) are not significant predictors in the model.

This suggests that formal elements and experience in knowledge management are not sufficient on their own-the active support and commitment of management are crucial.

The results of the regression analysis for the knowledge application process are shown in Table 16.

Table 16 Regression Analysis of the Knowledge Application Process and Independent Variables

Dependent Variable: Knowledge Application									
Independent Variables		Model		F - test		t - test			
		R2	Std. Error	F	F Sig.	B	Beta	t	Sig.
Constant = 2,408	Experience in Knowledge Management	,358	,6580	23,146	,000	,026	,053	,772	,441
	Management Support for Knowledge Management					,419	,490	7,448	,000
	Presence of Person Responsible for KM					,194	,182	2,650	,009
	Existence of Written Procedure for KM (process documentation)					,131	,064	,893	,373

Source: the authors

The regression model (R^2=0,358) examining the influence of factors such as management experience, organizational approach, and management support for knowledge management on the knowledge application process explains 35.8% of the variability in the knowledge application process and is statistically significant.

However, as with the previous process, not all independent variables are statistically significant. The most significant and strongest standardized influence-the strongest predictor in this model as well-is management support (Beta = 0.490).

The presence of a person responsible for the knowledge management process is also a statistically significant predictor, but with a moderate effect (Beta = 0.182).

The results indicate that the greater the management support for knowledge management and the appointment of a responsible person for the knowledge management process in SMEs, the more the knowledge application process will be implemented.

On the other hand, management experience in knowledge management (Beta = 0.053; Sig. = 0.441) and process documentation (Beta = 0.064; Sig. = 0.373) are not significant predictors in the model.

As with the previous process, this suggests that formal elements and experience in knowledge management are not sufficient on their own-active support and commitment from management are crucial.

The regression model (R^2=0,526) examining the influence of the previously defined factors on the knowledge sharing process is shown in Table 17.

Table 17 Regression Analysis of the Knowledge Sharing Process and Independent Variables

Dependent Variable: Knowledge Sharing									
Independent Variables		Model		F - test		t - test			
		R2	Std. Error	F	F Sig.	B	Beta	t	Sig.
Constant = 1,498	Experience in knowledge management	,526	,7082	46,078	,000	,067	,110	1,849	,066
	Management Support for KM					,653	,610	10,796	,000
	Existence of a Responsible Person for Knowledge Management Process					,096	,072	1,219	,225
	Existence of Written Procedures for KM (Process Documentation)					,368	,143	2,329	,021

Source: the authors

e model (R^2=0,526) explains 52.6% of the variance in knowledge sharing, indicating good predictive power.

The overall model is highly statistically significant, meaning that the independent variables as a group have a significant impact on knowledge sharing.

In this model, the most significant and strongest predictor is management support (Beta = 0.653).

Process documentation is also a statistically significant predictor, but with a moderate effect (Beta = 0.143).

The results indicate that the greater the management support for knowledge management and if SMEs have written procedures regulating knowledge management, the more the knowledge sharing process will be applied in SMEs.

Regarding management's experience in knowledge management (Beta = 0.110; Sig. = 0.066), it can be said that it has potential, but is not a statistically significant predictor in the model.

The existence of a responsible person for the knowledge management process (Beta = 0.096; Sig. = 0.225) is not statistically significant, which may suggest that merely assigning responsibility for knowledge management is not sufficient to encourage knowledge sharing.

The regression model (R^2=0,229) examining the influence of the previously defined factors on the knowledge retention process is presented in Table 18.

Table 18 Regression Analysis of the Knowledge Retention Process and Independent Variables

Dependent Variable: Knowledge Retention									
Independent variables		Model		F - test		t - test			
		R2	Std. Error	F	F Sig.	B	Beta	t	Sig.
Constant = 1,825	Experience in Knowledge Management	,229	,9622	12,324	,000	,053	,081	1,074	,284
	Management Support for KM					,393	,344	4,774	,000
	Existence of a Responsible Person for Knowledge Management Process					,203	,143	1,897	,060
	Existence of Written Procedures for KM (Process Documentation)					-,279	,102	-1,299	,196

Source: the authors

The model (R^2=0,229) explains 22.9% of the variance in knowledge retention, which represents a weaker but still significant predictive value compared to previous models. In this model, the only statistically significant predictor is management support (Beta = 0.344).

Other factors (experience, responsible person, written procedures) do not have a statistically significant impact, although the role of the responsible person is close to statistical significance, but does not cross the 0.05 threshold.

Correlation analysis revealed a statistically significant relationship between all analyzed factors - management experience, approach, management support, and the application of knowledge management processes in SMEs.

The strongest and most significant association was found between management support and the knowledge management process, indicating that awareness and active support from management are key elements for the successful implementation of knowledge management processes in SMEs, as noted in the literature.

Regression analysis further confirmed the importance of management support as the strongest and most pronounced predictor across all knowledge management process models.

Management support has a statistically significant effect on all processes (acquisition, application, sharing, and retention of knowledge), with the highest standardized coefficient (Beta) values in each model.

Additionally, the presence of a responsible person and process documentation showed a moderate but statistically significant influence in some processes (acquisition, application, and sharing of knowledge), while management experience in knowledge management, although often an important factor in other contexts, did not show a statistically significant impact in any model.

Based on the results obtained, it can be concluded that strengthening the support and commitment of management to knowledge management is one of the prerequisites for a higher level of implementation of knowledge management processes in SMEs, as well as an area for improving the existing state and way of working in SMEs.

Since management support has been identified as the most significant predictor of all knowledge management processes - acquisition, application, sharing, and retention - developing awareness of the importance of knowledge as a strategic resource should be a priority at all management levels.

Discussion and conclusions

The analysis of relevant literature indicates that knowledge management is becoming an indispensable strategic tool for maintaining competitiveness and business continuity in small and medium-sized enterprises (SMEs).

Although the benefits of applying knowledge management are recognized in theory, practice in SMEs, especially in developing countries, shows a low level of formal implementation. Furthermore, the role of management has been identified as a key factor for successful implementation - their commitment, knowledge, and proactive approach can significantly influence the establishment and development of knowledge management systems.

The empirical research conducted on a sample of small and medium-sized enterprises in Serbia confirms findings in the literature (Levy et al., 2003; Ngah & Wong, 2020; Valencia-Arias et al., 2024; van Zyl et al., 2022), which indicate that SMEs largely lag in the development of formal knowledge management approaches.

The results of this study point to an insufficiently developed application of knowledge management processes in SMEs in Serbia. Although respondents, representatives of management structures, expressed interest in knowledge management, a low level of experience in knowledge management and organization of the process in practice was observed.

It was found that less than one-fifth of companies have a formally documented

knowledge management process, as well as a designated responsible person for this process, which significantly affects the insufficient and uneven application of individual knowledge management processes, especially concerning knowledge retention. All this indicates a risk to business continuity and the need for systemic solutions.

By analyzing the organization and level of implementation of knowledge management processes, the question of how knowledge management is implemented in practice in Serbian SMEs was answered, thereby confirming the hypothesis: "The process of applying knowledge management in small and medium-sized enterprises in Serbia is underdeveloped."

Particularly alarming is the fact that more than 60% of enterprises occasionally or frequently lose critical knowledge due to employee turnover, indicating insufficiently developed mechanisms for preserving organizational knowledge. This aligns with findings from authors such as Levy et al. (2003) and Wee & Chua (2013), who highlight that SMEs perform poorly in knowledge retention. Furthermore, analyses have shown that the size of the enterprise does not significantly influence the degree of knowledge management implementation. In contrast, well-structured processes supported by documented procedures and the presence of a designated knowledge management representative significantly contribute to a higher level of knowledge management adoption.

These results are consistent with previous studies (Bollinger & Smith, 2001; CWA 14924-1:2004; Egbu et al., 2005; Handtrack, 2009; McAdam & Reid, 2001; Ngah & Wong, 2020; Scurtu & Neamtu, 2015; Wee & Chua, 2013; Wong & Aspinwall, 2004;), which emphasize the critical role of leadership.

Correlation analysis confirms that factors such as experience, approach, and management support positively influence the implementation of knowledge management processes.

Regression analysis confirms that management support is the most significant and reliable predictor of the successful application of all knowledge management processes. The obtained results are consistent with the findings of other authors (Bollinger & Smith, 2001; Ngah & Wong, 2020; Scurtu & Neamtu, 2015; Singh, 2008; van Zyl et al., 2022; Wee & Chua, 2013;), who emphasize that without a clear vision and commitment from leadership, the implementation of knowledge management remains at the level of ad hoc practices and informal activities.

Appointing a responsible person for knowledge management has a positive impact, especially on the processes of acquiring, applying, and retaining knowledge, while the existence of formal procedures positively affects knowledge sharing, but has a limited impact on other processes. Management's experience in knowledge management has a limited effect and did not prove to be a significant predictor in the analyzed models.

Accordingly, it can be concluded that formal organization of processes through documentation and appointment of a responsible person is beneficial, but without active management commitment, significant effects cannot be achieved, as management support was identified as the most important factor for successful knowledge management application in SMEs.

These findings point to the need for strategic strengthening of organizational support and management engagement, development of specific roles and procedures, as well as education and raising awareness among management about the importance and benefits of knowledge management - not only as a theoretical concept but as a practical and sustainable business practice in SMEs. This highlights the need for a systemic approach to knowledge management in SMEs.

The contributions of this research lie in emphasizing the significance and importance of knowledge management and encouraging its application in SMEs in developing countries such as Serbia, demonstrating how business practice in SMEs can be improved through implementation of knowledge management processes, identifying factors that significantly influence its successful implementation, as well as raising the overall level of understanding and perception of knowledge management in SMEs.

An important aspect of this research is that it was conducted in the SME sector, which constitutes the driving force of the economy and national development, and is one of the key pillars of the country's economic growth.

Implications for further research indicate the need for deeper investigation into ways to raise awareness among SME management and owners about the importance of knowledge management and its role in improving business performance. Future research could also focus on knowledge management culture as another factor enabling the successful implementation of knowledge management in SMEs.

Limitations include the specificity of the sample and the local research context, which makes it difficult to apply the results to all SMEs in other environments or countries, as different legal regulations, economic, and cultural factors may affect the applicability of results elsewhere.

Additionally, adapting academic terminology in knowledge management and the fact that SME management insufficiently understands knowledge management and that these processes do not function fully in SMEs in Serbia, represent limitations of this study. Moreover, the questionnaire relied on respondents' personal opinions, which could lead to bias, as respondents may have aimed to present their companies in a better light.

Declarations

Availability of data and materials

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

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