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From sharing to shaping: Role of knowledge quality and ambidexterity in SME innovation performance

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ABSTRACT

This study investigates the role of knowledge sharing quality (QKS) in shaping innovation performance within small and medium-sized enterprises (SMEs), emphasizing the mediating effects of organizational ambidexterity. Drawing on the knowledge-based view and dynamic capabilities perspective, we propose that the extent and quality of knowledge shared—specifically its accuracy, relevance, and actionability—critically influence innovation outcomes. Survey data from 260 SME managers in Serbia were analyzed through structural equation modeling. The findings reveal that tacit knowledge sharing significantly enhances QKS, whereas explicit knowledge sharing does not. Furthermore, QKS positively affects innovation performance. Critically, exploitative and explorative ambidexterity mediate this relationship—the capacity to balance refinement and exploration is essential for translating high-quality knowledge into innovation success. These results extend prior research by unpacking the mechanisms through which SMEs can convert knowledge resources into innovation capability. Implications for theory and practice are discussed, offering actionable insights for SME leaders seeking to foster innovation through strategic knowledge management.

Introduction

Innovation is widely recognized as a key driver of economic growth, organizational competitiveness, and long-term value creation, especially in knowledge-intensive environments (Tushman & O'Reilly, 1996). Although large enterprises often dominate the current discourse on innovation systems, small and medium-sized enterprises (SMEs) have increasingly attracted scholarly and policy attention for their entrepreneurial dynamism and ability to adapt rapidly. (Durst et al., 2023; Durst & Edvardsson, 2012). Representing over 90 % of businesses and more than half of the global employment (OECD, 2020), SMEs are essential engines of innovation, particularly in emerging and transition economies (Petrov et al., 2020). However, their innovation potential is often limited by the liability of smallness (Aldrich & Auster, 1986), including various resource constraints (Jarillo, 1989), limited access to formal knowledge systems, underdeveloped organizational infrastructures, and managerial centrality (Durst et al., 2023). Additionally, SMEs rely on the concept of open innovation (Chesbrough, 2003) to access the external knowledge and technology necessary for their growth and development (de Zubielqui et al., 2019).

In this context, knowledge sharing has emerged as a crucial mechanism enabling innovation in SMEs (Anser et al., 2022). Knowledge sharing—the exchange of experiences, know-how, and insights among individuals or organizational units—is linked to improved performance, learning, and innovation outcomes (Anand et al., 2021; Li, 2021), as well as increased employee engagement (Lukić Nikolić & Labus, 2024). Knowledge sharing is different from knowledge transfer and exchange. Knowledge transfer refers to the flow of knowledge between organizational units, such as departments or divisions, not between individuals. Conversely, knowledge exchange can refer to the actions of knowledge seeking and sharing (Wang & Noe, 2010). Existing literature focused on the frequency or type of knowledge exchanged (tacit vs. explicit),

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overlooking the critical dimension of the quality of knowledge sharing (QKS). QKS refers to the accuracy, reliability, relevance, timeliness, and actionability of shared knowledge in solving organizational problems and fostering innovation (Chiu et al., 2006; Ganguly et al., 2019; Asiaei et al., 2023; Sahibzada et al., 2024). Unlike quantity-based measures, QKS emphasizes the usefulness and applicability of knowledge, ensuring that shared information can be effectively reused and translated into organizational value (Al-Faouri, 2023). As firms increasingly operate in uncertain and dynamic environments, the presence of knowledge flows and their usefulness, accuracy, and actionability determine innovation performance (Ganguly et al., 2019; Sahibzada et al., 2020).

Despite calls for more detailed assessments of knowledge processes, QKS remains under-theorized and under-measured, particularly in the SME context (Ganguly et al., 2019; Lee et al., 2006). Nevertheless, research exploring knowledge sharing in SMEs has increased (Durst et al., 2023), including that of Alshanty & Emeagwali (2019), Boateng et al. (2020), Games & Rendi (2019), and Martínez-Costa et al. (2019). This is a significant oversight, as SMEs often rely on informal, interpersonal knowledge channels rather than codified systems, making the quality of these exchanges central to their strategic functioning. Furthermore, little is known about the mechanisms that enable SMEs to convert high-quality shared knowledge into innovation outputs (de Zubielqui et al., 2019).

Thus, we introduce *organizational ambidexterity* (OA) as a critical mediating capability. While prior research links high-quality knowledge sharing to improved innovation performance (Ganguly et al., 2019), it has not fully explained how this transformation occurs in resource-constrained and informally structured SMEs. Ambidexterity, the firm's ability to exploit existing knowledge and explore new opportunities simultaneously, provides a dynamic capability perspective (O'Reilly & Tushman, 2013) that captures this conversion mechanism. By integrating exploitative and explorative ambidexterity into the model, we address a key question: how can SMEs effectively act on the knowledge they possess to sustain innovation? This theoretical integration allows us to extend existing knowledge management research while offering practical insights into the strategic behaviors that enable SMEs to innovate under conditions of uncertainty.

OA has emerged as a key dynamic capability for organizations to address paradoxical demands in innovation management (Clauss et al., 2021; O'Reilly & Tushman, 2013). While OA has been widely studied in large, complex organizations, its application in SMEs remains underdeveloped. Studies that utilized large companies often cannot be generalized to SMEs, mainly due to the SMEs' resource limitations and organizational simplicity (Lubatkin et al., 2006). Moreover, existing studies have rarely explored ambidexterity as a mediating capability through which high-quality knowledge sharing affects innovation performance (Asiaei et al., 2023). This mediating role is especially critical in SMEs, where strategic and operational decisions are intertwined, and ambidextrous behavior emerges from top management engagement (Lubatkin et al., 2006).

This study addresses these gaps by modeling how QKS, fueled by tacit and explicit knowledge sharing, enhances SME innovation performance directly and through the dual pathways of explorative and exploitative ambidexterity. We draw on two core theoretical lenses: the knowledge-based view (KBV) of the firm, emphasizing knowledge as the most strategically significant resource (Grant, 1996), and the dynamic capabilities framework, highlighting the importance of higher-order capabilities, such as ambidexterity, for adapting to change (Teece & Pisano, 1994). These perspectives jointly suggest that the value of knowledge sharing is not automatic but contingent upon the firm's capacity to act on it through adaptable organizational processes.

Building on these two theoretical perspectives, this study highlights its novelty by shifting the focus from the quantity of knowledge sharing, which dominated prior research (Ismail & Yusof, 2010), to the QKS, as emphasized more recently (Ganguly et al., 2019; de Zubielqui et al., 2019). This paper focuses on QKS analysis, which ensures accuracy, reliability, and usefulness of exchanged knowledge, emphasizing that the value of knowledge increases through quality exchange (Ismail & Yusof, 2010). Researchers have analyzed the factors influencing QKS (Ismail & Yusof, 2010) and its importance in supply chain management (Al-Faouri, 2023) but have not explored its detailed relationship with knowledge sharing, innovation, and company performance, which are key business goals. From the KBV perspective, QKS refines the understanding of knowledge as a resource, emphasizing that the possession, accuracy, relevance, and applicability of knowledge make it a strategically valuable and suitable tool for increasing performance, innovativeness, and competitiveness. From a dynamic capabilities perspective, our findings expand the understanding that high-quality knowledge sharing and ambidexterity capabilities improve a firm's innovation ability. Therefore, QKS can be viewed as a micro-foundation that supports the development and implementation of dynamic capabilities.

The empirical setting for this research is Serbia, a country that exemplifies many tensions characteristic of transition economies: growing innovation ambition, structural reform, and institutional uncertainty. Serbia's SMEs contribute over 65 % of national employment and generate nearly 60 % of gross domestic product; nonetheless, they face chronic challenges in innovation management, including technological lag, weak networks, and limited absorptive capacity (Erić et al., 2012; Hollanders, 2023; Reid & Markianidou, 2024). This context is suitable for exploring the strategic roles of QKS and OA in fostering innovation within resource-constrained but agile firms. To investigate these relationships, we conducted a cross-sectional survey of 260 SME managers in Serbia and analyzed the data using SEM in the analysis of moment structures (AMOS). The model examines (1) the effect of tacit and explicit knowledge sharing on QKS, (2) the impact of QKS on innovation performance, and (3) the mediating roles of exploitative and explorative ambidexterity.

The remainder of this paper is structured as follows. Section 2 reviews the relevant literature and develops the research hypotheses, while Section 3 outlines the methodology, including sampling, measurement, and analytical procedures. Subsequently, Section 4 presents the results of the empirical analysis, and Section 5 discusses the findings in light of existing theories and offers implications. Finally, Section 6 concludes the paper with limitations and directions for future research.

Literature review and hypothesis development

Knowledge sharing in SMEs: tacit and explicit dimensions

Knowledge sharing (KS) forms the backbone of knowledge-based organizational processes, enabling the flow of information, skills, and experience among individuals and teams within firms (Wang & Noe, 2010). In SMEs, KS has a more critical role due to the limited availability of formalized knowledge management systems. SMEs typically operate with flatter hierarchies, informal structures, and interpersonal communication norms, making them more reliant on socially embedded mechanisms of knowledge exchange (Albawwat, 2022; Anand et al., 2021). As such, SMEs tend to foster an environment conducive to more fluid, spontaneous, and personalized knowledge interactions (Shafique et al., 2022).

Within this context, the two principal modalities of knowledge sharing—tacit and explicit knowledge—must be distinguished (Nonaka & Takeuchi, 1995). Tacit knowledge is inherently personal, experiential, and difficult to articulate. It is acquired and transferred through socialization, mentorship, and informal dialogue. This makes it particularly potent in SMEs, where employees often work closely and under flexible conditions (Durst et al., 2023; Polanyi, 1967). Tacit knowledge is essential for tasks that require intuitive judgment, adaptation, and problem-solving—hallmarks of innovation under uncertainty. This aligns with recent theoretical work that characterizes tacit knowledge as inherently situated, relational, and resistant to codification, highlighting its central, yet underexplored, role in entrepreneurial and innovation

(Wuytens et al., 2025).

Conversely, explicit knowledge refers to information that can be systematically codified, stored, and transmitted through formal documents, including manuals, reports, databases, or written procedures. While explicit knowledge can be scaled and spread across wider organizational boundaries, it may lack the depth and contextual richness needed for strategic sensemaking and adaptive innovation (Ganguly et al., 2019). This distinction is particularly relevant in SMEs, where decision-making often depends on practical insights rather than standardized documentation.

Despite the well-established distinction between tacit and explicit KS, recent scholarship argues that focusing solely on the type or volume of knowledge shared may be insufficient for understanding its impact on firm outcomes (de Zubielqui et al., 2019). Increasingly, attention has shifted toward QKS, defined as the degree to which the shared knowledge is accurate, useful, timely, and applicable in solving business problems and driving innovation (Asiaei et al., 2023; Sahibzada et al., 2024). However, empirical investigations into how tacit and explicit knowledge individually contribute to QKS remain limited. Tacit knowledge exchanges, due to their contextual and experiential nature, may offer more actionable insights to enhance QKS, particularly in SMEs where informal mechanisms prevail (Albawwat, 2022). Contrarily, the effectiveness of explicit knowledge sharing in enhancing QKS may depend on the firm's absorptive capacity, digital infrastructure, and knowledge alignment mechanisms (de Zubielqui et al., 2019).

This study investigates the effects of tacit and explicit knowledge sharing on QKS to deepen our understanding of these relationships. Based on this, we propose the following hypotheses:

H1a: Tacit knowledge sharing positively influences the quality of knowledge sharing.

H1b: Explicit knowledge sharing positively influences the quality of knowledge sharing.

Quality of knowledge sharing and innovation performance

A growing body of research affirms the importance of KS in fostering innovation across organizations, especially SMEs. However, recent literature has shifted focus from the quantity of shared knowledge to its quality (Durst et al., 2023; Ganguly et al., 2019), recognizing that, in knowledge-intensive and rapidly evolving environments, strategic relevance, contextual specificity, and timeliness of knowledge have a greater bearing on innovation outcomes than sheer volume (Sahibzada et al., 2024). Thus, the concept of QKS reflects the usefulness, clarity, accuracy, and actionability of knowledge exchanged within an organization (Ganguly et al., 2019) and is increasingly acknowledged as a distinct construct with meaningful implications for firm performance (Asiaei et al., 2023). This perspective is particularly relevant for SMEs, which often operate under conditions of limited slack resources, flat hierarchies, and informally structured communication flows. In such settings, high-quality shared knowledge enables more efficient decision-making, enhances cross-functional collaboration, and allows for faster ideation and execution of innovations (Li, 2021). It also supports organizational responsiveness to environmental uncertainty, which is critical for innovation in volatile market conditions (Durst & Edvardsson, 2012). Moreover, QKS supports learning-by-doing and facilitates a richer exchange of embedded expertise, which is vital for aligning innovation strategies with operational realities and market demands (Anand et al., 2021).

QKS differs from other related constructs, such as absorptive capacity or knowledge-centered culture. Absorptive capacity is directed toward the efficient identification and use of external knowledge (Ajmal et al., 2025), while knowledge-centered culture represents clearly defined norms and values that guide employees toward the efficient creation and use of knowledge (Ba Le & Tuyen, 2025). These related constructs aim to motivate employees to facilitate and encourage knowledge sharing (Ba Le & Tuyen, 2025; Al Mansoori et al., 2025), contributing to QKS.

Despite its increasing recognition, QKS remains conceptually and empirically less researched in the SME literature. Most existing research treats knowledge sharing as a monolithic or undifferentiated process without accounting for the varying strategic value or applicability of the knowledge shared (Albawwat, 2022; Durst et al., 2023). This gap has hindered a more nuanced understanding of how shared knowledge translates into innovation outputs, especially in contexts where informal learning and tacit exchanges dominate knowledge flows. Furthermore, QKS enhances innovation not merely by facilitating knowledge access but by shaping organizational routines and sensemaking processes essential for integrating external inputs into internal capabilities (Feldman & Pentland, 2003; Zahra & George, 2002).

Additionally, the impact of QKS may not be uniform across all types of innovation. Earlier research suggests that the effectiveness of high-quality knowledge sharing in enabling radical innovation depends on the nature of a firm's knowledge base. Specifically, firms with a broad knowledge base will more likely achieve radical innovation through internal knowledge sharing, as it allows for the recombination of diverse knowledge domains. Conversely, firms with a deep knowledge base, characterized by specialized expertise, may benefit more from market knowledge acquisition to drive radical innovation, as external inputs can complement and extend their existing capabilities (Zhou & Li, 2012). This highlights the contingent nature of QKS and the importance of aligning knowledge-sharing practices with the firm's strategic knowledge profile. For SMEs that must simultaneously pursue short-term survival and long-term adaptability, the strategic deployment of high-quality knowledge becomes pivotal for innovation performance. Recent findings in agribusiness contexts further affirm that market orientation and organizational learning capabilities jointly foster innovation ambidexterity. This underscores how firms strategically transform high-quality knowledge into exploratory and exploitative outcomes (Corchuelo Martínez-Azúa et al., 2025).

While foundational knowledge-sharing processes are essential, the quality of shared information—its relevance, interpretability, and alignment with strategic goals—ultimately determines whether it will enhance a firm's ability to innovate. This leads to the formulation of the following hypothesis:

H2. The quality of knowledge sharing positively influences innovation performance in SMEs.

Quality knowledge sharing as an antecedent to ambidexterity in SMEs

Organizational ambidexterity refers to a firm's dynamic capability to balance two strategic imperatives: exploitation, refining and extending existing competencies, and exploration, pursuing new knowledge, technologies, or markets (March, 1991; O'Reilly & Tushman, 2013). This dual capacity enables firms to achieve efficiency while maintaining adaptability, crucial in the context of rapid technological disruption, shifting consumer preferences, and uncertain market conditions (Lavie et al., 2010; Raisch & Birkinshaw, 2008).

Traditionally, ambidexterity has been studied in large, complex organizations where structural mechanisms, such as differentiated subunits or parallel innovation systems, facilitate the simultaneous pursuit of exploration and exploitation (Benner & Tushman, 2003; Tushman & O'Reilly, 1996). Nevertheless, recent research has emphasized the growing relevance of OA in SMEs, as these firms navigate competitive pressures and strive for sustainable innovation in volatile environments (Clauss et al., 2021; Lubatkin et al., 2006).

Unlike large corporations, SMEs typically lack the formal structures, resource slack, or hierarchical separation that facilitate structural ambidexterity. Their ability to balance exploration and exploitation often relies on more emergent, context-sensitive mechanisms, including individual ambidexterity of employees, leadership adaptability, cross-functional collaboration, employee empowerment, and real-time decision-making (Caniëls et al., 2017; Jansen et al., 2012). This behavioral or contextual ambidexterity is shaped by how effectively information

and knowledge are shared and leveraged throughout the organization, not by rigid formalization.

Within this perspective, QKS emerges as a critical antecedent to ambidexterity in SMEs. High-quality knowledge facilitates exploitation by reinforcing routines, improving operational efficiency, and enabling incremental innovation (Zhou & Li, 2012). Simultaneously, it fosters exploration by enriching organizational learning, stimulating ideation, and encouraging experimentation with novel approaches (Asiaei et al., 2023; Shafique et al., 2022).

When SMEs foster strategically aligned knowledge sharing, particularly among top management teams, they enhance their ability to balance refining existing capabilities with pursuing new opportunities. This capacity for ambidexterity is contingent on behavioral integration, enabling firms to distinguish when to exploit established resources and when to explore innovative paths (Lubatkin et al., 2006). As Zahra and George (2002) argue, a firm's absorptive and transformative capabilities, often rooted in routines of high-quality knowledge integration, determine its ability to pursue dual innovation paths.

Empirical research supports the link between strategic knowledge processes and ambidexterity in SMEs. Lubatkin et al. (2006) found that behavioral integration among top management teams, characterized by open communication, mutual trust, and collaborative decision-making, enables small firms to pursue exploration and exploitation. Clauss et al. (2021) highlight the strategic agility role in allowing firms to reconcile ambidexterity demands, with knowledge-based responsiveness being a key enabler in dynamic environments. Moreover, the knowledge-centered culture, closely aligned with QKS, has been shown to promote exploitative and explorative innovation (Gui et al., 2022).

Considering the foregoing, we posit that QKS acts as a cognitive and informational foundation for both dimensions of organizational ambidexterity in SMEs.

H3a. The quality of knowledge sharing positively influences exploitative ambidexterity.

H3b. The quality of knowledge sharing positively influences explorative ambidexterity.

Mediating role of ambidexterity in the QKS-innovation relationship

The dynamic capabilities framework posits that firms must continuously adapt, integrate, and reconfigure internal and external knowledge resources to respond to turbulent environments and sustain competitive advantage (Eisenhardt & Martin, 2000; Teece & Pisano, 1994; Teece et al., 1997). Within this framework, OA has been widely recognized as a critical mechanism for translating knowledge into innovation outcomes (Lavie et al., 2010; O'Reilly & Tushman, 2013). However, the process by which OA channels knowledge quality into innovation remains under-researched, particularly in SMEs.

QKS enables organizations to access accurate and timely information and contextually relevant and strategically aligned insights (Ganguly et al., 2019; Sahibzada et al., 2024). Nevertheless, high-quality knowledge alone does not guarantee innovation unless the firm has the organizational routines and capabilities to utilize it effectively. In this regard, ambidexterity serves as a key dynamic capability that allows firms to activate, absorb, and operationalize high-quality knowledge.

Specifically, exploitative ambidexterity supports incremental innovation by leveraging and refining existing competencies, optimizing operational routines, and reinforcing efficiency-oriented processes (Benner & Tushman, 2003; Zhou & Li, 2012). In SMEs, where formal structures for innovation may be lacking, ambidexterity often stems from the behavioral integration of the top management team. This construct refers to the extent to which leaders engage in open information exchange, collaborative decision-making, and mutual respect. Such integration enables firms to pursue exploitative and explorative activities simultaneously. Conversely, behaviorally integrated teams facilitate exploitative ambidexterity by applying high-quality internal knowledge to refine existing competencies, enhance operational efficiency, and incrementally improve products and processes. The same integrative dynamic supports explorative ambidexterity by fostering experimentation, cross-functional collaboration, and openness to novel ideas—conditions necessary for radical innovation. As such, behavioral integration serves as a foundational mechanism through which SMEs translate strategically relevant knowledge into short-term performance gains and long-term adaptability (Lubatkin et al., 2006).

This dual-path view is particularly critical for SMEs, where resource limitations necessitate a delicate balance between exploiting known opportunities and exploring emergent ones. Unlike larger firms with dedicated research and development units or formal innovation departments, SMEs often rely on informal processes, agile decision-making, and cross-functional teamwork to navigate innovation challenges (Caniëls et al., 2017). Thus, the ability to act ambidextrously becomes a core competency through which high-quality knowledge is translated into tangible innovation outcomes (Gui et al., 2022).

Despite the theoretical logic, empirical studies investigating the mediating role of OA in the QKS-innovation relationship remain scarce, particularly in SME. Most existing research treats knowledge sharing and innovation as directly linked, overlooking the intervening processes that determine whether and how knowledge is transformed into innovation. Building on the dynamic capabilities perspective and recent empirical insights, we argue that ambidexterity functions as a conversion mechanism, enabling SMEs to deploy high-quality knowledge in either exploitative or explorative directions depending on strategic needs and environmental conditions. Accordingly, we propose the following hypotheses:

H4a. Exploitative ambidexterity mediates the relationship between the quality of knowledge sharing and innovation performance.

H4b. Explorative ambidexterity mediates the relationship between the quality of knowledge sharing and innovation performance.

The proposed research model is presented in Fig. 1.

Method

This study focuses on SMEs in Serbia, a country classified as an Emerging Innovator in the European Innovation Scoreboard (Hollanders, 2023). Serbia's innovation performance (IP) has significantly improved, increasing by 8.5 % points over the EU average, mainly due to advances in broadband internet access, growth in venture capital, and increases in product and business process innovation, design applications, and employment in innovative firms (Nikolic & Filipovic, 2022). Knowledge plays a central role in each of these innovation domains.

SMEs in Serbia are well-positioned to contribute to innovation due to their inherent flexibility, growing access to technological infrastructure, and managerial knowledge and technical expertise necessary for developing new products, services, and business models (de Zubielqui et al., 2019). Nevertheless, they continue to face challenges typical of transition economies, such as limited absorptive capacity, managerial centrality, and underdeveloped innovation ecosystems (Erić et al., 2012; Hollanders, 2023; Reid & Markianidou, 2024). These tensions make Serbia a compelling context for examining how QKS and organizational ambidexterity influence innovation performance within resource-constrained yet agile organizations.

Questionnaire design

The research instrument was carefully developed based on validated constructs from prior literature to ensure content validity and theoretical alignment with the study's conceptual framework. The original questionnaire was developed in English, translated into Serbian, and back-translated to confirm linguistic and conceptual equivalence, ensuring measurement consistency across cultural and linguistic contexts. A preliminary version of the questionnaire was piloted with 20 SME managers in Serbia to assess the clarity, relevance, and linguistic

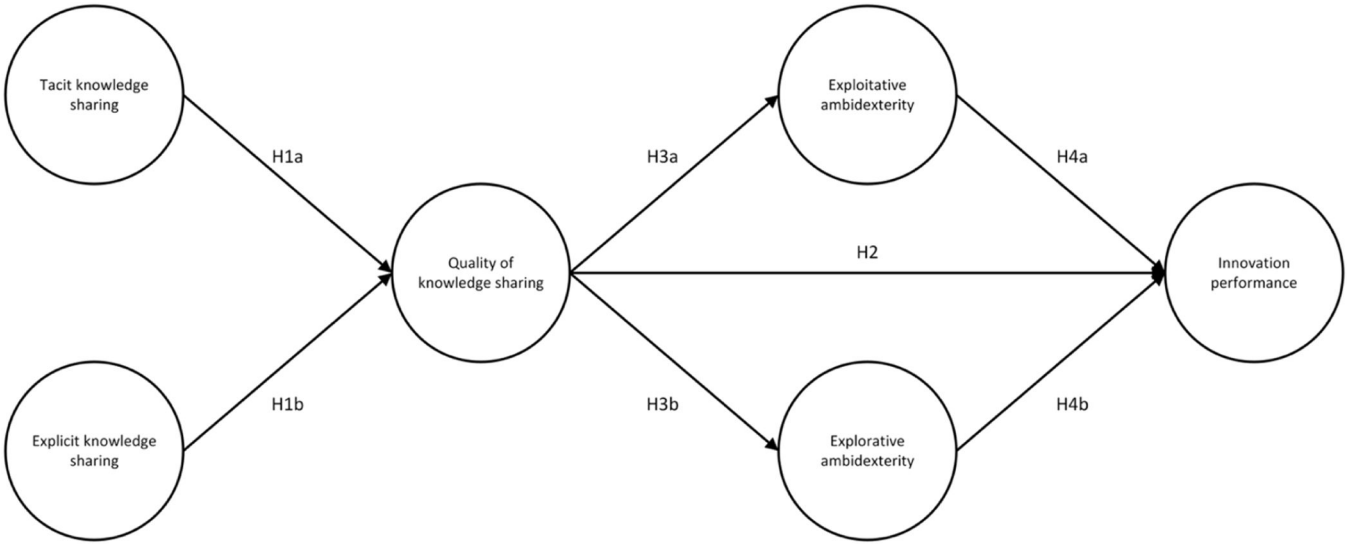

Fig. 1. Research model.

precision of the items. Based on the feedback received, minor revisions were made to improve readability and reduce ambiguity, strengthening the instrument's face validity. The finalized questionnaire contained 24 core items that operationalized six latent variables relevant to the proposed model: explicit knowledge sharing, tacit knowledge sharing, QKS, exploitative ambidexterity, explorative ambidexterity, and innovation performance. Additionally, demographic questions were included to capture respondent characteristics such as years of work experience, managerial level, and supervisory span of control.

All items were measured using a 5-point Likert scale from 1 ("do not agree at all") to 5 ("completely agree"), allowing respondents to indicate their level of agreement with each statement. The measurement of *explicit knowledge sharing* (EKS) was based on a three-item scale developed by Wang et al. (2014), focusing on the formal articulation and dissemination of codified knowledge within the firm. *Tacit knowledge sharing* (TKS) was captured using four items adapted from Wang et al. (2014), reflecting informal and experiential knowledge exchange typically transmitted through interpersonal interaction. The QKS construct was measured using four items adapted from Chiu et al. (2006) and Ganguly et al. (2019), which assess the clarity, accuracy, reliability, and completeness of the knowledge being exchanged. Respondents evaluated statements such as the following: "The knowledge shared by my colleagues is understandable," "The knowledge shared by my colleagues is accurate," "The knowledge shared by my colleagues is reliable," and "The knowledge shared by my colleagues is complete." These items collectively capture the extent to which knowledge shared within the firm is available, actionable, and trustworthy, distinguishing it from knowledge-sharing frequency or type.

Exploitative and *explorative ambidexterity* were measured with four items each, derived from Fu et al. (2018) and Sanal et al. (2013). Exploitative ambidexterity addresses the extent to which firms refine and extend existing capabilities to improve efficiency and support incremental innovation. Conversely, explorative ambidexterity focuses on experimentation, discovery, and the pursuit of novel opportunities. Finally, IP was operationalized using five items adapted from Li (2021), Hassan et al. (2023), and Tian et al. (2021), encompassing the firm's success in developing new products, processes, and business models.

Data collection and survey distribution

The data collection process was conducted over a 7-month period, from October 2023 to May 2024. The survey was distributed to SME managers in Serbia through online channels and in-person outreach at professional gatherings, SME clusters, and regional chambers of commerce. Participation was voluntary, and respondents were assured of full anonymity and confidentiality, in compliance with ethical research standards. The dataset was also employed in a related yet independent study, which focused on different constructs and research questions. (Dzenopoljac et al., 2025).

To ensure respondents could provide evaluations of firm-level processes, such as knowledge sharing and innovation practices, two screening criteria were imposed: participants had to be employed in firms with fewer than 250 employees, meeting the OECD (2020) definition of an SME, and have a minimum of 5 years of professional experience, a proxy for cognitive proximity to strategic and operational decision-making (Gkypali & Roper, 2024).

The survey was distributed to approximately 3,000 SMEs in Serbia. To maximize participation, four rounds of invitations were sent during the data collection period, resulting in 12,000 distributed messages. These efforts resulted in 260 valid responses, which corresponds to a modest response rate. Nevertheless, this is consistent with response levels reported in similar SME survey research, particularly in emerging and transition economies where organizational access is limited. Regarding managerial roles, the sample included 58 % top-level managers, 28 % operational-level managers, and 14 % tactical or mid-level managers. Regarding work experience, a significant portion (64.2 %) had over 16 years of professional tenure, adding to the credibility of the findings, while 20.4 % and 15.4 % reported 5–10 and 10–15 years of experience, respectively. The span of control varied, with 39.9 % managing 1–5 employees and 26.2 % overseeing more than 21 employees. Regarding industry distribution, the final sample covered a broad range of SMEs. Specifically, 2.3 % operated in the primary sector (e.g., agriculture, forestry, mining), 25.3 % in the secondary sector (e.g., manufacturing and construction), 59.1 % in the tertiary sector (e.g., trade, services, tourism, finance, consulting, non-profit), and 13.2 % in the quaternary sector (e.g., IT, ICT, knowledge-based and professional services). This diversity provided a rich and balanced perspective on the internal dynamics of Serbian SMEs, particularly regarding knowledge-related practices and innovation behavior.

This sampling strategy was deliberately designed to ensure variability in organizational roles and experience levels, enhancing the generalizability of the findings. The context of Serbia, as an innovation-emerging economy experiencing structural transformation, further supports the relevance of this empirical setting for investigating dynamic capabilities, such as ambidexterity and knowledge quality (Erić et al., 2012; Hollanders, 2023).

Analytical strategy

To test the hypothesized relationships among the constructs, the study employed SEM using the AMOS software package. SEM was chosen for its ability to assess complex causal relationships involving direct and indirect effects, as well as for its appropriateness with sample sizes exceeding 200 observations (Bacon, 1997). Unlike Partial Least Squares Structural Equation Modeling (PLS-SEM), Covariance-Based Structural Equation Modeling (CB-SEM) is more suitable for testing and confirming the theory, providing better model fit indices, and factor-based models (Dash & Paul, 2021), which aligns with the observed model.

Prior to structural analysis, a series of preliminary statistical tests was conducted to confirm the adequacy of the data and the measurement model. Reliability was examined using Cronbach's alpha. Additionally, composite reliability (CR), average variance extracted (AVE), and Harman's one-factor test were computed to assess convergent validity. Descriptive statistics were used to evaluate the distribution and variability of the observed variables, and correlation analysis was used to assess the strength and direction of associations among constructs. The measurement model fit was evaluated using multiple fit indices, including the normed chi-square (χ^2/df), Comparative Fit Index (CFI), Tucker–Lewis Index (TLI), Incremental Fit Index (IFI), Root Mean Square Error of Approximation (RMSEA), and Normed Fit Index (NFI).

To examine the mediating role of exploitative and explorative ambidexterity in the relationship between the QKS and innovation performance, a bootstrapping procedure was implemented. This technique generates confidence intervals (CIs) through repeated random sampling and is considered superior to traditional methods, such as the Sobel test, particularly in estimating indirect effects with greater statistical power and precision (Khalil et al., 2021; Li, 2021).

Results

Descriptive statistics and Pearson correlation coefficients were calculated to provide an overview of the data. As shown in Table 1, exploitative ambidexterity (ExploiA) had the highest mean (M = 4.212, SD = 0.878)—refining existing capabilities is a dominant strategic focus among Serbian SMEs. Explorative ambidexterity (ExplorA) followed (M = 3.869, SD = 1.066), with a higher standard deviation, indicating variability in firms' innovation orientation. TKS (M = 3.872) was rated more highly than EKS (M = 3.697), reinforcing the idea that informal knowledge flows are more embedded in SMEs (Albawwat, 2022).

Correlational results revealed strong, positive relationships between key constructs. EKS and TKS were significantly correlated (r = 0.733, p < 0.001), consistent with the complementary nature of formal and informal knowledge exchanges (Wang & Noe, 2010). A similarly strong correlation was observed between ExploiA and ExplorA (r = 0.796, p < 0.001)—these capabilities coexist in dynamic firms (Clauss et al., 2021; O'Reilly & Tushman, 2013). IP positively correlated with all independent variables, with QKS showing a moderate but significant relationship (r = 0.343, p < 0.001), supporting prior findings on the strategic role of high-quality knowledge in driving innovation (Asiaei et al., 2023; Sahibzada et al., 2024).

Overall, the descriptive and correlational results provide initial empirical support for the proposed model. The data suggest that tacit knowledge sharing is more prominent than explicit knowledge sharing in Serbian SMEs, and firms with higher levels of ambidexterity and high-quality knowledge flows tend to report stronger innovation performance. These insights reinforce the relevance of investigating the interplay between QKS, ambidexterity, and innovation within the SME context.

Reliability and validity analysis

To ensure the robustness of the measurement model, a series of reliability and validity tests was conducted. These included assessments of internal consistency reliability, convergent validity, and factor loadings. Table 2 presents the detailed results for all constructs.

Internal consistency was first evaluated using Cronbach's alpha, with all constructs exceeding the recommended threshold of 0.70 (Nunnally & Bernstein, 1994), confirming satisfactory internal consistency across the scales. Cronbach's alpha for the overall model was 0.846, indicating high reliability. Notably, among individual constructs, IP exhibited the highest Cronbach's alpha value (0.882), suggesting strong coherence among its items. These results are consistent with previous studies that used similar scales to capture innovation outcomes in SMEs (Hassan

Table 2
Analysis of reliability and validity.

Variables	*Factor loading*	*Cronbach's alpha*	*CR*	*AVE*
Explicit knowledge sharing		0.867	0.933	0.822
EKS_1	0.817			
EKS_2	0.833			
EKS_3	0.801			
Tacit knowledge sharing		0.855	0.927	0.762
TKS_1	0.793			
TKS_2	0.715			
TKS_3	0.636			
TKS_4	0.603			
Quality of knowledge sharing		0.869	0.912	0.724
QKS_1	0.767			
QKS_2	0.804			
QKS_3	0.833			
QKS_4	0.776			
Exploitative ambidexterity		0.853	0.917	0.737
ExploiA_1	0.660			
ExploiA_2	0.776			
ExploiA_3	0.846			
ExploiA_4	0.811			
Explorative ambidexterity		0.857	0.946	0.815
ExplorA_1	0.889			
ExplorA_2	0.848			
ExplorA_3	0.823			
ExplorA_4	0.735			
Innovation performance		0.882	0.914	0.883
IP_1	0.868			
IP_2	0.904			
IP_3	0.896			
IP_4	0.442			
IP_5	0.421			
Simple size: 260				

Source: Authors

Table 1
Correlation matrix and descriptive statistics.

Variables	EKS	TKS	QKS	ExploiA	ExplorA	IP	Mean	SD
EKS	1						3.697	1.031
TKS	0.733**	1					3.872	0.892
QKS	0.523**	0.662**	1				3.833	0.844
ExploiA	0.563**	0.608**	0.538**	1			4.212	0.878
ExplorA	0.551**	0.563**	0.521**	0.796**	1		3.869	1.066
IP	0.276**	0.284**	0.343**	0.336**	0.378**	1	3.791	0.786
Simple size: 260								

Source: Authors

et al., 2023; Li, 2021; Tian et al., 2021). Convergent validity was examined using CR and average AVE. All CR values exceeded the minimum acceptable level of 0.70 (Hair et al., 2019), ranging from 0.912 – 0.946, indicating high internal reliability of the latent constructs. Similarly, all AVE values were above the 0.50 threshold recommended by Fornell and Larcker (1981), ranging from 0.724 to 0.883—the constructs share a sufficient proportion of variance with their corresponding indicators. To further examine data consistency, Harman's one-factor test was applied. Harman's one-factor test indicated that a single factor accounted for 49.53 % of the variance, which is below the 50 % threshold—no single component explains a dominant share of the variance (Podsakoff et al., 2003). Therefore, common method bias does not represent a significant problem.

Factor loadings for all observed items were examined to ensure individual item reliability. Consistent with recommendations by Cheung et al. (2024), most item loadings were above the acceptable threshold of 0.50, demonstrating that each item significantly contributes to its respective latent variable. The only exceptions were two items under the innovation performance construct (IP_4 and IP_5), which showed factor loadings below 0.50 (0.442 and 0.421, respectively). Consequently, these items were excluded from further analysis to improve model accuracy and construct validity. The remaining three items in the IP construct maintained strong loadings (0.868–0.904), preserving the integrity of the construct without compromising its dimensionality.

Measurement model

To assess the adequacy of the measurement model, a confirmatory factor analysis was performed using AMOS. The results indicate that the model demonstrates acceptable fit across key indices. Specifically, the normed chi-square (χ^2/df = 2.383), Comparative Fit Index (CFI = 0.952), Tucker–Lewis Index (TLI = 0.938), Incremental Fit Index (IFI = 0.953), and Normed Fit Index (NFI = 0.922) all exceed recommended thresholds. The Root Mean Square Error of Approximation (RMSEA = 0.073) also falls within the acceptable range, suggesting a good approximation of model fit (Hooper et al., 2008). The results are shown in Table 3.

These results provide empirical support for the validity of the measurement model and confirm that the latent constructs—explicit and tacit knowledge sharing, knowledge sharing quality, ambidexterity (explorative and exploitative), and innovation performance — are reliably represented by their observed indicators. Importantly, the refinements made to the innovation performance construct, removing two items with low factor loadings, contributed to the improved parsimony and psychometric robustness of the model without compromising conceptual breadth. This step was consistent with established best practices in SEM and measurement refinement (Cheung et al., 2024; Hair et al., 2019).

Table 3
Fit indices of the research model.

Fit indices	Cut-off value	Results of the research model
Chi-square (χ2)	Low	462.361
Degrees of freedom (df)		194
p-value	≥ 0.05	0.000
χ2/df	2 < χ2/df < 5	2.383
NFI	> 0.80/0.90	0.922
CFI	> 0.90	0.952
RMSEA	< 0.08	0.073
IFI	> 0.90	0.953
TLI	> 0.90	0.938
Simple size: 260		

Source: Authors

Hypothesis testing

The structural model was assessed using SEM to test the direct effects proposed in the conceptual framework. The model fit indices for the structural model — χ^2/df = 3.502, CFI = 0.911, IFI = 0.912, TLI = 0.888, NFI = 0.881, and RMSEA = 0.098—suggest an acceptable, though slightly suboptimal, fit compared to the measurement model. Nonetheless, the values remain within acceptable bounds for interpreting structural relationships (Hooper et al., 2008).

Table 4 presents the standardized path coefficients, critical ratios, and p-values for each hypothesized path. The results provide partial support for the proposed relationships. H1a was strongly supported (β = 0.761, p < 0.001)—tacit knowledge sharing significantly enhances QKS, consistent with prior research emphasizing the context-rich, action-oriented nature of tacit knowledge in SME environments (Albawwat, 2022; Ganguly et al., 2019). Conversely, H1b was not supported (β = 0.061, p = 0.367)—codified knowledge flows may have a limited impact on QKS in the SME context.

Although explicit knowledge sharing is available through documents, databases, or reports, it often lacks sufficient applicability without additional context or interpretation. In the SME context, where structures are less formalized and processes often depend on individual knowledge and experience, this may limit the potential of explicit knowledge sharing. Thus, while knowledge is available in databases or documents, it may not be usable without additional conditions, such as social interactions among employees, greater flexibility in work, and delegation of decision-making. When interpreting these results, the starting points of the knowledge-based view and dynamic capability theory must be considered: knowledge becomes a primary resource only when it can be used to create value (Grant, 1996) and competitive advantage (Teece & Pisano, 1994). Otherwise, explicit knowledge sharing does not contribute to QKS.

H2, which proposed a positive effect of QKS on innovation performance, was also supported (β = 0.187, p = 0.024), reinforcing the central claim that high-quality, strategically aligned knowledge sharing contributes to innovation outcomes (Asiaei et al., 2023; Sahibzada et al., 2024). This finding affirms the relevance of QKS as a distinct and actionable construct within the knowledge management and innovation literature, particularly in dynamic SME environments.

Mediation analysis

To test the mediating roles of ExploiA and ExplorA in the relationship between QKS and innovation performance, a bootstrapping procedure with 5,000 resamples was employed using AMOS. This approach is widely endorsed for its ability to generate robust CIs for indirect effects, particularly in small to medium-sized samples (Li, 2021). A mediating effect is confirmed when the 95 % bias-corrected CI for the indirect effect does not contain zero.

The results, shown in Table 5, provide strong support for both mediation hypotheses. First, ExploiA significantly mediated the relationship between QKS and IP (indirect effect β = 0.127, p = 0.044), with a 95 % CI ranging from 0.028 to 0.331. The direct effect of QKS on IP remained significant (β = 0.216, p = 0.038), indicating partial mediation. Thus, H4a is supported—QKS fosters refinement of internal processes, enabling SMEs to achieve incremental innovation through

Table 4
Results of the structural model.

Path	β	CR	p	Support
H_{1a}: TKS QKS	0.761	7.878	0.000	Yes
H_{1b}: EKS QKS	0.061	0.061	0.367	No
H_2: QKS IP	0.187	2.253	0.024	Yes
Simple size: 260				

Source: Authors

Table 5
Mediation results.

Path	Direct effects		Indirect effects				Support
	ß	P	ß	p	95 % CI Lower	95 % CI Upper	
H4a: QKS ExploiA IP	0.216	0.038	0.127	0.044	0.028	0.331	Yes (Partial)
H4b: QKS ExplorA IP	0.177	0.033	0.126	0.012	0.051	0.199	Yes (Partial)
Simple size: 260							

Source: Authors

operational improvements (Benner & Tushman, 2003; Zhou & Li, 2012).

Similarly, the ExplorA pathway yielded a significant indirect effect (β = 0.126, p = 0.012), with a 95 % CI ranging from 0.051 to 0.199. The corresponding direct effect of QKS on IP (β = 0.177, p = 0.033) remained significant, indicating partial mediation and supporting H4b. Thus, high-quality knowledge sharing also fuels experimentation, idea generation, and learning behaviors, all of which contribute to more radical forms of innovation (Asiaei et al., 2023; Tian et al., 2021). These results underscore the dual-path nature of ambidexterity in enabling SMEs to translate knowledge into innovation and highlight the importance of context-responsive capabilities in leveraging knowledge quality.

Discussion

This study contributes to the growing literature on knowledge-based innovation in SMEs by demonstrating the critical role of QKS and its interaction with organizational ambidexterity in shaping innovation performance. Rather than reaffirming existing relationships between knowledge sharing and innovation, the findings provide new insights into the mechanisms through which SMEs convert shared knowledge into innovation outcomes.

Our findings yield several important contributions. First, we empirically validate the distinct influence of tacit knowledge sharing on QKS, with explicit knowledge showing no significant effect. This highlights the importance of focusing on deeply embedded, experience-based knowledge flows in SME contexts. Second, we demonstrate that QKS significantly enhances innovation performance—the volume of knowledge shared and its quality drive value. Third, and most critically, we show that both dimensions of organizational ambidexterity mediate the quality of the knowledge-sharing-innovation relationship—ambidexterity acts as a crucial conversion mechanism through which high-quality knowledge is translated into innovative outcomes. These insights extend the literature on knowledge management and innovation by emphasizing the role of QKS and the strategic importance of ambidexterity in SMEs. Practically, these findings offer actionable guidance for SME leaders aiming to design knowledge systems and organizational routines that foster efficiency and exploration. Fourth, although these findings emerged from the context of Serbian SMEs, they may have broader applicability in Eastern European countries and some EU countries. The results are applicable in those countries where environmental factors are similar to those in Serbia, such as limited resources, flat hierarchies, and informally structured communication flows. However, differences in the degree of institutional support, digitalization, and organizational culture must be considered, as these factors influence how knowledge is shared and how much it contributes to innovation development. For example, in EU member states with more developed innovation policy systems, formalized knowledge-sharing mechanisms may play a greater role. Similarly, the ability to use ambidexterity capability may vary depending on environmental dynamics or resource availability. Therefore, it is necessary to conduct comparative research within the EU and the Eastern European region to better understand the contextual factors that influence QKS and innovation performance and observe the factors of difference in influence.

This study's findings carry several important implications for SME leaders seeking to foster innovation through strategic knowledge management. First, given the strong influence of tacit knowledge sharing on QKS, managers should invest in informal, experience-based transfer practices that are cost-effective and well-suited to SME environments. Examples include peer shadowing, where employees learn by observing colleagues, and after-action reviews, which enable teams to reflect on completed projects and identify lessons learned collectively. Second, as explicit knowledge sharing did not significantly enhance QKS, SME decision-makers should avoid relying solely on codified knowledge, such as manuals or databases. Instead, explicit knowledge can be embedded into interactive formats—collaborative workshops or knowledge-sharing circles—that combine formal information with contextual interpretation. Finally, given the mediating role of ambidexterity, SMEs should cultivate an environment that enables exploration and exploitation simultaneously. Practical approaches include project teams, enhancing cross-functional collaboration, and innovation labs, providing dedicated spaces for experimentation. Together, these practices illustrate how SMEs can transform high-quality knowledge sharing into sustained innovation outcomes, even under conditions of resource constraint.

Conclusion

The results of this research advance our understanding of how SMEs can transform shared knowledge into innovation outcomes by emphasizing the quality, rather than the quantity or type of knowledge exchanged. The study establishes that tacit knowledge sharing, more so than explicit knowledge, is a key enabler of high-quality knowledge, driving innovation performance through ambidextrous capabilities. Exploitative and explorative ambidexterity serve as partial mediators, illustrating how strategic alignment and behavioral integration allow firms to capitalize on valuable knowledge.

For managers, these findings underscore the importance of fostering informal knowledge flows, cultivating collaborative leadership, and enabling real-time decision-making that supports refinement and experimentation. For researchers, the results call for more nuanced examinations of how knowledge processes interact with dynamic capabilities across varying organizational contexts. Future studies could expand the framework by integrating objective innovation metrics, longitudinal designs, or comparative analyses across sectors and economies. Overall, this study provides a robust foundation for understanding the strategic function of knowledge sharing quality and its embeddedness in ambidextrous SME innovation systems.

Despite its contributions, this study has some limitations. First, the cross-sectional design limits the ability to draw causal inferences about the relationships among knowledge sharing quality, ambidexterity, and innovation performance. Second, the reliance on self-reported data from SME managers may introduce common method bias despite efforts to minimize it. Third, innovation performance was measured subjectively; future research should incorporate objective innovation metrics or external performance indicators. Finally, the study's focus on Serbian SMEs may limit the generalizability of the findings to other institutional or cultural contexts. While Serbia provides a compelling setting as an emerging economy with resource constraints and informally structured communication flows, future studies should replicate this research in developed and emerging economies to capture cross-national variation. Comparative designs would allow researchers to identify whether the role of knowledge sharing quality and ambidexterity is universal or context-dependent, enriching theory and offering more tailored insights for SME managers operating in diverse environments. Although Harman's one-factor test suggests that common method bias is not a major concern in this study, it cannot be entirely ruled out. Future research

would benefit from using multi-source or longitudinal data to further reduce this risk.

Ethical statement

This study involved human participants through an anonymous and voluntary survey. All participants were informed about the purpose of the research and provided their consent prior to participation. No personally identifiable information was collected, and participation was entirely voluntary, with the option to withdraw at any point. The research was conducted in accordance with recognized ethical principles for research involving human subjects, including respect for privacy, autonomy, and confidentiality.

Declaration of generative AI and AI-assisted technologies in the writing process

During the preparation of this work, the authors used Grammarly in order to proofread and refine the formulation of arguments in English, which is not the native language of any of the authors. After using this tool/service, the authors reviewed and edited the content as needed and take full responsibility for the content of the publication.

CRediT authorship contribution statement

Vladimir Dzenopoljac: Writing – review & editing, Methodology, Conceptualization. **Aleksandra Dzenopoljac:** Writing – review & editing. **Jasmina Ognjanovic:** Writing – original draft, Formal analysis, Data curation. **Sascha Kraus:** Writing – review & editing. **Kaisu Puumalainen:** Writing – review & editing.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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