Does knowledge management mediate the relationship between entrepreneurial orientation and firm performance?

Rafal Kusa, Marcin Suder, Joanna Duda, Wojciech Czakon and David Juárez-Varón

Abstract

Purpose – This study investigates the impact of entrepreneurial orientation (EO) and knowledge management (KM) on firm performance (PERF), as well as the mediating role of KM in the EO–PERF (EO-PERF relationship). In particular, this study aims to explain the impact of KM on the relationship between the EO dimensions and PERF; dimensions are risk-taking (RT), innovativeness (IN) and proactiveness (PR).

Design/methodology/approach – This study uses structural equation modelling and fuzzy-set qualitative comparative analysis (fsQCA) methodologies to explore target relationships. The sample consists of 150 small furniture manufacturers operating in Poland (out of 1,480 in the population).

Findings – The study findings show that KM partially mediates the IN–PERF relationship. Furthermore, fsQCA reveals that KM accompanied by IN is a core condition that leads to PERF. Moreover, the absence of KM (accompanied by the absence of RT and IN) leads to the absence of PERF. In addition, the results show that all the variables examined (RT, IN, PR and KM) positively impact PERF.

Originality/value – This study explores the role of KM in the context of EO and its impact on PERF in the low-tech industry. The study uses simultaneously two methodologies that represent different approaches in the search for the expected relationships. The findings reveal that KM mediates the EO-PERF relationship.

Keywords Knowledge management, Risk-taking, Innovativeness, Proactiveness, Small and medium-sized enterprises, PLS-SEM and fsQCA

Paper type Research paper

Highlights

- RT, IN, PR and KM positively impact PERF;

- KM partially mediates the IN–PERF relationship;

- KM accompanied by IN leads to PERF; and

- Absence of KM (accompanied by absence of RT or IN) leads to absence of PERF.

1. Introduction

Although entrepreneurial orientation (EO) impact on firm performance (PERF) has long attracted scholarly attention, the last two decades of empirical scrutiny have brought ambiguous findings (Wales, 2016). Departing from this observation, researchers have examined curvilinear relationships (Wales *et al.*, 2013), introduced moderating (Engelen *et al.*, 2015; Galbreath *et al.*, 2020) and mediating (Wang, 2008; Gupta *et al.*, 2020) variables to capture the complexity of the relationship between a business orientation and

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its firm level outcomes. While contextual factors such as stakeholders pressure (Guo and Wang, 2022) or social capital (Ince *et al.*, 2023) appear as relevant, increasing attention is given to knowledge-related constructs (Gupta *et al.*, 2020). Indeed, it is difficult to capture the relationship between EO and PERF without involving systematic processes and structures related to organisational learning (Jeong *et al.*, 2019), knowledge sharing (Singh *et al.*, 2021) and knowledge management (KM) (Ferraris *et al.*, 2019). Such KM processes as acquisition, conversion and application of knowledge (Alavi and Leidner, 2001) are likely to increase and manage the variance of firm's performance generated by EO (Wales, 2016). And yet, the role of KM in mediating the relationship between EO and PERF has not been thoroughly examined. Our study taps into this gap.

According to Miller (1983), a company can be described as entrepreneurial if it shows characteristics such as creativity, proactivity and risk-taking (RT). This initial set was extended by Lumpkin and Dess (1996), who added further dimensions: competitive aggressiveness and autonomy. These characteristics constitute the concept of EO. Researchers commonly use the concept of EO to study or understand the entrepreneurial behaviour of a company. Gupta and Gupta (2015) define EO as the propensity to act autonomously and innovatively, to take risks and to be proactive under appropriate market conditions. According to Rauch *et al.* (2009), EO refers to basic concepts and standard operating procedures. EO can be defined as the many methods of developing strategic initiatives that key decision makers use to achieve the overall goal of the company. Our study follows Miller's (1983) approach and examines RT, innovativeness (IN) and proactiveness (PR) as dimensions of EO. In particular, we address the relationship between EO and PERF.

Andersen (2009) argued that the relationship between EO and PERF is complex and ambiguous. Established studies indicate that the relationship between EO and performance is positive (Lumpkin and Dess, 1996; Dess *et al.*, 1997; Wiklund and Shepherd, 2005; Roxas, 2009; Lechner and Gudmundsson, 2012). However, Rauch *et al.* (2009) showed that the correlation between EO and performance is moderately high and that the relationship is robust to different operationalisation of key constructs as well as to cultural contexts. The dimensions of EO (IN, RT and PR) are likely to influence firm's performance in combination rather than in isolation (Huang *et al.*, 2023). Lomberg *et al.* (2017) argue that the EO–PERF relationship is context-dependent. In this vein, Irwin *et al.* (2018) posit that strategic human capital moderates the relationship between EO and SME performance. Other studies suggest that the correlation between EO and organisational effectiveness is low or insignificant (Andersen, 2009; Renko *et al.*, 2009). Furthermore, the results of Kurtulmuşa and Warner (2015) showed that EO activities did not provide better financial performance (FP) in SMEs. Finally, there are studies which show mixed or non-linear relationships between EO and organisational performance (Wales *et al.*, 2013). This difference in results is explained by D'Souza and Fan (2022), who reveal a negative and curvilinear relationship between EO and organisational performance for emerging organisations and a positive and curvilinear relationship for post-emergent organisations. The EO–performance relationship has also been studied in SMEs. Sidek and Rosli (2021) find that access to external finance partially mediates the relationship between EO and small PERF, while Isichei *et al.* (2020) show that IN and PR, as dimensions of EO, have a significant impact on performance in SMEs. Ambiguous evidence regarding the relationship between EO and organisational performance suggests that this topic requires further research (Wales, 2016). In particular, factors that can mediate or moderate the EO–performance relationship need to be incorporated in the examination of the role of EO in the generation of firm's performance. One of such factors is KM (Real *et al.*, 2014).

In recent decades, KM has emerged as a significant field within the broader discipline of Information Systems (Land, 2009). Its significance stems from the recognition that we now reside in a knowledge society, where knowledge has become a vital element for

organisational competitiveness. This growing interest in organisational knowledge and KM has led to the emergence of a class of information systems known as knowledge management systems (KMS). Effective management of knowledge creation and sharing has emerged as a critical source of competitive advantage for organisations, as knowledge assets empower them to outperform their competitors (Lee et al., 2016). Creating knowledge plays a pivotal role in the economic development of nations, as progress in technological innovation hinges on effective management of knowledge (García-Hurtado et al., 2022). Knowledge sharing encompasses both codified information and informal feedback, as highlighted by Magni et al. (2023). Over the past decade, there has been an exponential evolution in innovation, knowledge and their management within organisations (Saura and Reyes-Menendez, 2021). Consequently, a plethora of companies today prioritise the acquisition of new data to extract insights that can enhance their products and services. Effective management of tacit knowledge is a cornerstone in enhancing the service quality of enterprises (Zhang et al., 2021; Zhu and Zhang, 2010). Enhancing KM capabilities can facilitate the implementation of human resource management systems (Zhuo, 2017). The positive and negative implications of innovations are a subject of rigorous debate among scholars in the field of innovation management. For instance, there is an ongoing discussion on how innovation can align with sustainability, even as concerns about job disparities resulting from automation underscore the importance of upholding human rights (Del Giudice et al., 2023). In the face of intense competition, innovation has been recognised as a key solution to the challenges encountered by companies operating in such environments; to foster innovation within organisations, effective utilisation of KM and intellectual capital is crucial (Yu et al., 2022). In addition, changing market environment requires companies to act entrepreneurially, in particular, to pursue opportunities effectively; the success of this pursuit is determined by the knowledge of the company.

Some research indicates that KM impacts entrepreneurship at the organisational level. For example, KM capacity and ambidexterity capability influence entrepreneurial creativity and the promotion of entrepreneurial intensity. Consequently, by developing KM capability and fostering entrepreneurial creativity, a firm can achieve ambidextrous innovation, ultimately enhancing its entrepreneurial intensity and overall performance (Mokhtarzadedeh et al., 2022). Entrepreneurial knowledge impacts antecedents of entrepreneurial intentions (Liao et al., 2022). Furthermore, KM orientation has a positive and significant effect on ambidextrous entrepreneurial innovation and overall PERF, particularly when the firm possesses strong dynamic capabilities (Latif et al., 2021). Advances in technology have led to the adaptation of business models to the connected era (Sanchez-Robles et al., 2023). The new era of digitalisation has brought with it new challenges, concerns and opportunities, provoking new reflection on the digitalisation of management (Scuotto et al., 2023). Market-oriented culture mediates the relationships of top management team (TMT)-shared leadership and firm innovation capability (Singh et al., 2022). Similarly, the innovation capability of the company mediates the influence of the market-oriented culture and PERF, and the influence of TMT-shared leadership and PERF. Sustainable human resource management views employees as a very important resource for the organisation, while paying close attention to their preferences, needs and perspectives (Sypniewska et al., 2023). What has been called the war for talent in companies has become a key element in organisations that want to be competitive. The application of good talent management (TM) must be complemented with adequate compensation systems to achieve efficient retention strategies for talented employees (Luna-Arocas et al., 2020). TM has already been studied and verified in terms of its impact on performance and productivity, and this has led to more and more research that generates a professional and scientific interest with other variables, such as ethical behaviour (Luna-Arocas and Danvila-del-Valle, 2022). TM and ethical behaviour would reinforce work environments, by restoring confidence in the organisation. Likewise, TM implies greater loyalty of talent, that is an antecedent of the intention to stay in the organisation. Organisational ecosystems face

individual, organisational and contextual challenges, which have a major impact on TM. TM performance is not determined by a single condition. Instead, it results from the combination of several factors (Nieto-Aleman *et al.*, 2023). In the rapidly changing market environment, innovative work behaviour plays an important role in improving small and medium enterprises' (SMEs) efficiency and competitiveness (Yousaf and Palazzo, 2023). The digital transformation of companies involves a set of substantial changes in all areas of the organisation. TM can be analysed from the perspective of the variables that attract and retain talent, with organisational changes caused by digital transformation being an influence on TM and talent attraction and retention (Guerra *et al.*, 2023). For knowledge-intensive entrepreneurial firms to thrive, they must effectively leverage their knowledge resources to gain a competitive edge; this requires a combination of EO and KM processes, including knowledge acquisition, application, conversion and protection (Mostafiz *et al.*, 2023). By cultivating an entrepreneurial mindset and implementing effective KM practises, these firms can harness their knowledge assets to drive innovation, improve performance and secure a sustainable competitive advantage.

There exists a notable relationship between KM models and entrepreneurial organisations, mediated by strategic entrepreneurship (Bhardwaj, 2019). When KM models align with the demands, expectations and perceptions of customers, it allows entrepreneurs to develop proactive KM strategies. This, in turn, enhances strategic entrepreneurship within the organisation (Alhamdi, 2022). By improving strategic entrepreneurship, entrepreneurs can better design and implement effective KM models that drive innovation, responsiveness and overall organisational performance. EO and knowledge creation influence PERF (Elidjen *et al.*, 2022). In the context of family firms, the effective combination of strategic knowledge management (SKM) capability and EO is a condition of their success (Mostafiz *et al.*, 2021).

Despite the associations mentioned above, the relationships between EO, KM and PERF are still not well understood. Previous research provides fragmented and ambiguous evidence of the relationships among these concepts. Some studies show that knowledge-related factors can affect the relationship between EO and performance (e.g. Matsuno *et al.*, 2002; Adam *et al.*, 2022). However, there is evidence that EO-related factors can also impact the relationship between KM and PERF. For example, EO partially mediates the relationship between KM and performance (Abu Bakar *et al.*, 2014) and the relationship between KM processes, intellectual capital and innovation (Yu *et al.*, 2022). In addition, factors associated with EO, such as innovation quality, are found to mediate the relationship between customer KM and PERF (Chaithanapat *et al.*, 2022). Furthermore, competitive intensity moderates the relationship between customer KM and innovation quality (Chaithanapat *et al.*, 2022). In addition, EO can act as a moderator in the relationship between knowledge application and performance, positively influencing their connection (Ha *et al.*, 2021). Moreover, EO moderates the relationship between intra-firm knowledge sharing and knowledge application (Li *et al.*, 2009).

In response to the ambiguity of the existing stock of knowledge, our study investigates the role of KM in the context of EO and its impact on PERF. This study aims to explain the impact of KM on the relationships between the dimensions of EO, that is, RT, IN and PR and PERF.

This study uses partial least squares structural equation modelling (PLS-SEM) and fuzzy-set qualitative comparative analysis (fsQCA) methodologies to explore the above relationships. The sample comprises 150 small furniture manufacturers operating in Poland. This study intends to contribute to the literature on entrepreneurship and KM by deepening our understanding of the role of KM in the context of EO. In particular, by testing the mediating role of KM, this study aspires to add value to the stream of research on factors that affect the relationship between EO and PERF and to studies on the importance of KM for entrepreneurial activity, including innovation. These are to be the most original

contributions; however, not the only ones. The study also intends to contribute to research on the impact of EO on performance, as well as KM on performance, by examining these relationships in the context of small manufacturing firms.

The remainder of the article presents the theoretical background, methodology, results of the PLS-SEM and fsQCA examination, discussion with the previous literature, limitations and recommendations for future research and final conclusions.

2. Theoretical background and hypotheses development

EO is believed to have an impact on PERF; however, this impact is likely to be ambiguous as some actions are successful, but other fail to yield satisfactory outcomes (Wales, 2016). EO in general increases the variance in PERF (Wales et al., 2013). In addition, EO is a multidimensional construct, and the impact of its particular dimensions is likely to be different. Consequently, our study examines separately the impact of three dimensions of EO, namely, RT, IN and PR. Furthermore, previous studies show that the impact of EO and its dimension vary depending on the type of outcome [e.g. FP, firm growth (FG) and firm competitiveness (FC)].

2.1 Entrepreneurial orientation dimensions and performance

One of the dimensions of EO is RT. RT is defined as the propensity to engage in risky and costly activities (Schillo, 2011) rather than those that are prudent and cautious (Edwards et al., 2014). RT reflects the subjective probability of systemic failure or possible loss, but is also understood as a personality trait that influences attitudes toward entrepreneurship (Al-Mamary and Alshallaqi, 2022). Bluhm and Krahnen (2014) argue that every financial decision is associated with risk. RT is believed to have a positive effect on entrepreneurial intention (Al-Mamary et al., 2020; Moraes et al., 2018; So et al., 2017); however, some researchers argue that the ability to take risks does not affect entrepreneurial intention (Koe, 2016). Al-Mamary and Alshallaqi (2022) show that an important motivator for RT is the desire to perform better than the competition.

RT propensity has been studied in various contexts, e.g. training in business attitudes for students (Al-Mamary and Alshallaqi, 2022; Koe, 2016) or market condition variables, where Al-Nashmi (2017) showed that entrepreneurs are more likely to take risks when there are changes in the market. In corporations, RT is critical to a company's performance and long-term survival (Sanders and Hambrick, 2007) and is dependent on the life cycle of the organisation; it is higher in the introduction and decline stages and lower in the maturity and growth stages (Shahzad et al., 2019).

Despite numerous studies on the relationship between RT and PERF, there are no clear results in this area. For example, Ghotnian et al. (2013) found that there is a correlation between RT and PERF and González et al. (2021) reported the moderating effects of contextual factors (particularly industry, market, country institutional development and IN) on the relationship between risk orientation and FP. However, Naldi et al. (2007) found that RT has a negligible correlation with performance; in some contexts, RT increases performance, but not in others. Therefore, we hypothesise the following.

H1. RT positively impacts PERF.

The next dimension of EO, namely, IN refers to the adoption and/or implementation of something "new" (Urban and Matela, 2022). Innovation is also defined as "the ability to transform knowledge into value through the implementation of new or improved products, processes and systems" (Kalotra, 2014, p. 81) It involves some kind of measurement contingent on a firm's propensity to innovate (Urban, 2012). A company is considered innovative when it adopts innovations; the degree of IN is commonly defined as the number of innovations adopted over a certain period of time and can be measured in various ways,

e.g. number of innovative procedures, creative ideas and first-to-market introduction of new products and services or the frequency with which new ideas are introduced (Calantone et al., 2002).

IN is one of the key conditions of performance and competitive advantage of a company (Burns and Stalker, 1961; Porter, 1990; Hult et al., 2004; Prahalad and Krishnan, 2008; Li et al., 2023) and can determine its future success and survival (Lintukangas et al., 2019). In addition, suppliers' IN is positively related to buyer production performance (Azadegan and Dooley, 2010) and corporate sustainability (Gualandris and Kalchschmidt, 2014); in particular, the ability to exploit innovation opportunities can lead to better sustainability (Teece, 2007, 2012). It is worth noting that environmental innovations have a positive impact on all measured company performance, while social innovations had mixed effects (Hermundsdottir and Aspelund, 2022); according to Rezende et al. (2019), the results are mixed due to the time lag between innovation adoption and economic performance. There are also ambiguities regarding the impact of innovation on FP (Martínez-Ferrero and Frías-Aceituno, 2015; Pätäri et al., 2012); in particular, there is no clear answer as to whether firms that adopt innovation perform better or whether financially successful firms implement more innovation, including sustainability. The above considerations have led us to hypothesise as follows.

H2. IN positively impacts PERF.

PR is the next commonly recognised dimension of EO. Wales et al. (2013) posit that proactivity is a central dimension of EO, as it defines the future of the firm, and is strongly related to search and exploration strategies. PR refers to seeking opportunities, forward-looking perspective and anticipation of future demand and readiness to compete (Rauch et al., 2009; Venkatraman, 1989; Covin and Slevin, 1991). According to Lumpkin and Dess (1996), PR is the conceptual opposite of passiveness. PR affects PERF (e.g. Lumpkin and Dess, 1996; Rauch et al., 2009), also in SMEs (Tang et al., 2014), where proactive entrepreneurial behaviour positively affects SME performance (Liem et al., 2019). Lomberg et al. (2017) observed that PR can have a dominant impact (compared with other dimensions of EO) in low-tech SMEs. However, Rosenbusch et al. (2013, p. 649) posit that small firms should "avoid proactive and RT strategies in hostile environments" due to resource limitations. In the hospitality and tourism industry, companies that show proactive orientation to the external environment are better able to anticipate customer needs and are more successful in bringing new products to market (Hurtado-Palomino et al., 2022). Based on the above, we hypothesise as follows.

H3. PR positively impacts PERF.

2.2 Entrepreneurial orientation dimensions and knowledge management

Entrepreneurial firms are constantly seeking access to knowledge (Keh et al., 2007; Boso et al., 2013; Chen and Liu, 2020) because according to the EO strategy, the search for new information helps to create more value for customers and to be proactive (Keh et al., 2007; Cheng and Huizingh, 2014). EO and its dimensions can also impact other characteristics of a company. For example, previous research provides evidence that dimensions of EO affect positively firm digitalisation (Kusa et al., 2023). Similarly, there is evidence regarding a positive association between EO and KM (Iqbal and Malik, 2019), including a positive impact of EO on KM (Adam et al., 2022). More specific analyses show that the success of family firms is based on an effective SKM capability in conjunction with an EO (Mostafiz et al., 2021). Furthermore, both RT and PR of EO show a significant relationship with KM processes, while IN of EO is not found to be significant (Nasution et al., 2021). Furthermore, EO acts as a moderator in the relationship between knowledge application and performance, positively influencing their connection (Ha et al., 2021). Accordingly, we predict the following relationships:

H4. RT positively impacts KM.

H5. IN positively impacts KM.

H6. PR positively impacts KM.

2.3 Knowledge management and performance

KM is essential to acquire, convert, apply and protect knowledge assets, which play a vital role in value creation. Most of the dimensions of KM, namely, knowledge acquisition, knowledge conversion and knowledge protection, have a positive association with PERF (Ha *et al.*, 2021). In addition, there is a significant impact of KM on organisational performance in the manufacturing industry (Latif *et al.*, 2021; Mbaidin, 2022). As innovation positively influences PERF, firms that are able to effectively exploit their knowledge and generate innovative outcomes are more likely to achieve better performance outcomes (Roxas *et al.*, 2014). In this regard, the positive impact of knowledge acquisition on product IN is relevant (Presutti *et al.*, 2022). Effective utilisation of KMP can compensate for lower levels and maximise the benefits of intellectual capital in terms of innovation performance (Hussinki *et al.*, 2017). Currently, information technologies facilitate the impact of KM. For example, big data analytics (BDA) helps improve PERF through the management and integration of knowledge (Ferraris *et al.*, 2019). The impact of KM capacity on PERF can be indirect and can be mediated, for example, through a sequential process involving strategic HRM, administrative innovation and technical innovation (Chawla *et al.*, 2022).

The application of knowledge has the strongest explanatory power for performance, regardless of whether the company is medium-sized or large (Adaileh *et al.*, 2020). Therefore, a significant relationship between KM and performance is observed in SMEs (Abu Bakar *et al.*, 2014). By enhancing knowledge absorption and knowledge exploitation processes, small firms can increase their productivity (Keh *et al.*, 2007; Chen *et al.*, 2012; Seo and Park, 2022), foster innovation capabilities (Gassmann and Enkel, 2004) and ultimately achieve better performance outcomes (Elidjen *et al.*, 2022; Mokhtarzadedeh *et al.*, 2022). Externally sourced knowledge enables the identification and exploitation of opportunities (Foss *et al.*, 2013; Tang *et al.*, 2014; Chen and Liu, 2020). KM is found to be positively and significantly related to the engagement of SMEs in sustainable development practices (Iqbal and Malik, 2019). In addition, there are relationships between customer KM, knowledge-oriented leadership, innovation quality and PERF in SMEs (Chaithanapat *et al.*, 2022). Thus, we propose the following hypotheses.

H7. KM positively impacts PERF.

2.4 Mediating role of knowledge management in the entrepreneurial orientation-performance relationship

Previous examinations of the relationship between EO and performance yield ambiguous results, suggesting that it may be affected by other factors. For instance, KM can impact PERF, but, concurrently, KM can be affected by EO. This suggests that KM can play a role in the EO–performance relationship. Previous studies show that the role of KM can vary. For example, customer KM acts as a mediator in the relationship between knowledge-oriented leadership and innovation quality (Chaithanapat *et al.*, 2022). KM can mediate the relationship between TM and organisational performance (Bagorogoza and Nakasule, 2022). KM processes were found to partially mediate the relationship between high performance work systems and intrapreneurial behaviour (Portalanza-Chavarría and Revuelto-Taboada, 2023). In addition, particular dimensions of KM can play a moderating role, also in relationships among other dimensions of EO. For example, knowledge application mediates the positive association between intra-firm knowledge sharing and a firm's innovation (Li *et al.*, 2009).

However, KM can affect particular dimensions of EO in different ways. For example, studies on SMEs in Indonesia show that KM processes mediate the relationship between RT and PR and e-commerce adoption but do not significantly mediate the relationship between IN and e-commerce adoption (Nasution *et al.*, 2021). In addition, there are significant positive correlations between autonomy and active competition (which are also recognised as components of EO) and customer KM competence, as well as its process management and environment-supporting competences (Li *et al.*, 2013). Finally, the analysis of indirect effects reveals that relationships between EO and PERF can be mediated by the knowledge creation process (Simsek and Heavey, 2011; Li *et al.*, 2008; Chen *et al.*, 2012; Karami and Tang, 2019), the acquisition and use of market information (Matsuno *et al.*, 2002; Chen *et al.*, 2012; Keh *et al.*, 2007) as well as the KM process (Adam *et al.*, 2022). The above indications encourage us to propose the following hypotheses.

H8. KM mediates the impact of RT on PERF.

H9. KM mediates the impact of IN on PERF.

H10. KM mediates the impact of PR on PERF.

The hypotheses proposed above are presented in Figure 1.

3. Methodology

3.1 Sample and data collection procedure

The sample of this study consists of small and medium-sized furniture manufacturing firms in Poland. The size of the surveyed population was determined on the basis of the BNF database (www.bnf.pl), which shows that in July 2022 there were 1,480 firms that met the accepted criteria. Before the survey, the questionnaire was face validated during interviews with five owners of companies in the Małopolska region conducted in June–July 2022, and then revised accordingly. Then, data was collected by interviewers using the survey (PAPI) between August and October 2022. The respondents were owners or top managers. A positive response was received from 150 firms that constituted the research sample. Using G*Power 3.1.9.7 software (Faul *et al.*, 2007), we have determined that the statistical power of the sample was 0.986; this value was higher than the required 0.8, indicating an

Figure 1 Theoretical model

Source: Authors' own creation
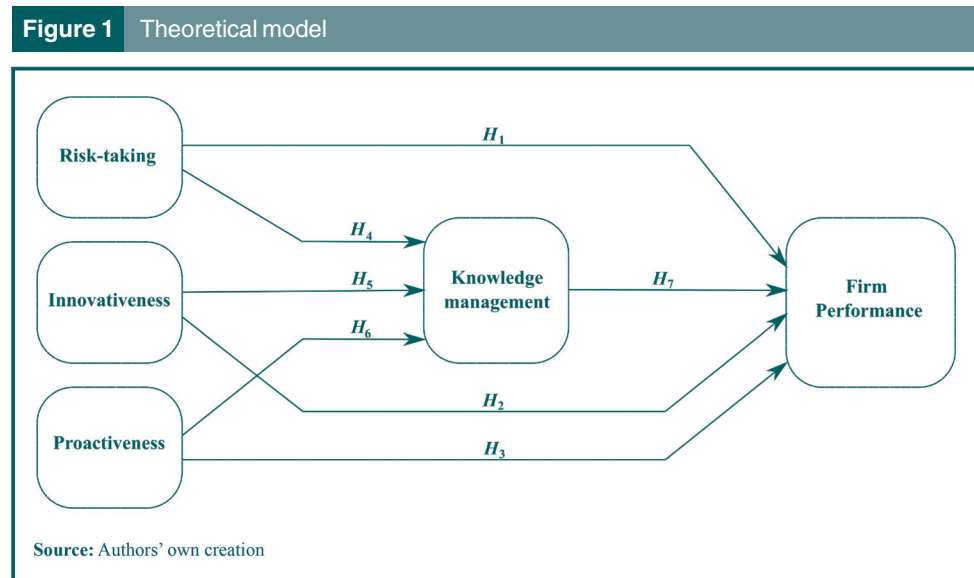
acceptable statistical power of our sample (Cohen, 1988). Table 1 shows the basic characteristics of the sample.

3.2 Variables

The independent variables are RT, IN, PR and KM; constructs of RT, IN and PR are based on previous studies (Hughes and Morgan, 2007; Kusa *et al.*, 2021). The KM construct is a new one; it was inspired by previous analyses on information management (Kettinger *et al.*, 2021) and KM (Mao *et al.*, 2016; Acar *et al.*, 2017). The dependent variable is PERF. This study follows the recommendations of Soininen *et al.* (2012) and distinguishes different dimensions of performance. Therefore, PERF is a second-order construct that reflects FC, FG and firm FP. These dimensions have been examined previously in entrepreneurship studies, for example, FC by Kiyabo and Isaga (2020) and Tajeddini *et al.* (2023), FG by Lechner and Dowling (2003) and Reijonen *et al.* (2015) and FP by Falahat *et al.* (2021) and Emami *et al.* (2021). The constructs tested in this study are based on previous studies (Hughes and Morgan, 2007; Kusa *et al.*, 2021). All items have been measured with a seven-point Likert scale, where 1 stands for "fully disagree" and 7 stands for "fully agree". Table 2 provides basic information about the variables used in the model, including the number of indicators from which individual variables were built and the most important descriptive statistics.

The indicators used to build the constructs along with their basic statistical measures are listed in Appendix 1.

3.3 Data analysis

This study uses SEM and fsQCA methodologies to examine target relationships. In recent years, these methods have gained traction in the analysis of causal relationships in

Table 1	Sample characteristics	
Characteristic	*Range*	*%*
Firm age	0–10	27.30
	10–20	33.40
	20–30	27.30
	Over 30	12.00
Firm size	Small	88.70
	Medium	11.30
Family firm	Yes	66.70
	No	33.30
Member of formal local network	Yes	18.70
	No	81.30
Active in industrial cluster	Yes	24.70
	No	75.30
Source: Authors' own creation		

Table 2	Characteristics of variables				
Variable	*Abbreviation*	*No. of items*	*Mean*	*Median*	*SD*
Risk-taking	R	3	3.89	4.00	1.36
Innovativeness	IN	4	4.85	5.00	1.32
Proactiveness	PR	4	4.62	4.63	1.20
Knowledge management	KM	4	4.17	4.00	1.47
Firm performance	*PERF*	*12*	*3.90*	*3.83*	*0.97*
Firm competitiveness	FC	4	4.22	4.25	0.93
Firm growth	FG	4	3.89	4.00	1.28
Financial performance	FP	4	3.59	3.50	1.16
Source: Authors' own creation					

entrepreneurship research (Palacios-Marques *et al.*, 2017; Kraus *et al.*, 2018; Cucino *et al.*, 2021; Kusa *et al.*, 2022; Ricciardi *et al.*, 2022; Ruiz-Palomino *et al.*, 2022; Suder *et al.*, 2022; Erena *et al.*, 2023) and still are being intensively developed (Hair *et al.*, 2022; Pappas and Woodside, 2021).

SEM allows testing hypotheses that are characterised by high degrees of the complexities of relationships among their variables (Jöreskog, 1978; Konarski, 2009). This technique is a combination of factor analysis and multiple regression analysis; its advantage lies in the possibility of using the structural relationships among the measured variables and the latent structures for analysis. The PLS-SEM method (which is used in this study) is a type of SEM in which a predictive approach is considered rather than the confirmatory approach (Hair *et al.*, 2022). This enables maximisation of the explained variance of endogenic constructs and consequently the creation of a model that offers forecasting capabilities (Gefen *et al.*, 2011). Unlike other SEM methods, PLS-SEM is not as rigorous in terms of the number of cases that can be analysed (Reinartz *et al.*, 2009) and the characteristics of the indicators that are used to build the constructs (Ali *et al.*, 2018). PLS-SEM is a method that can be successfully used to verify models taking into account mediating effects (Nitzl *et al.*, 2016). In addition, this econometric tool can be used when using high-order constructs (Sarstedt *et al.*, 2019). Due to the fact that this study focused on determining the variables that had a significant impact on the results, the exploratory nature of the study and a relatively small sample size, the PLS-SEM was used for analysis.

fsQCA is a data analysis method that belongs to the category of configural comparative methods. It represents a hybrid approach, combining elements of qualitative case-oriented analysis with a quantitative focus on a specific subset of a population (Ragin, 2008; Schneider and Wagemann, 2012). QCA, which serves as a precursor to fsQCA and is its equivalent for dichotomous variables, was originally devised as a method to assess causal relationships. Its primary objective was to compare the cases under scrutiny, thereby uncovering causal connections between various combinations of conditions and anticipated outcomes. Using logical inference (which incorporates fuzzy set theory, among other techniques), this methodology allows the identification of which specific combinations of conditions lead to a particular outcome. As explained by Rihoux and Ragin (2009), the key advantages of fsQCA over regression-based analyses (including SEM) are its ability to handle asymmetric relationships, account for equifinality and manage the intricacies of causation. One notable strength of QCA methods lies in their applicability to small and medium-sized samples, as highlighted by Fiss (2011). It is worth noting that there are no known limitations to using these methods with larger samples, as indicated by Vis (2012). It is important to emphasise that fsQCA does not involve significance testing. Consequently, the findings cannot be generalised to broader research populations, even if the sample is considered representative.

In this research, two deliberate approaches were used in parallel: SEM and fsQCA. These two methods offer distinct but complementary ways to explore relationships, and their simultaneous application allows for a more profound comprehension of them and broadens the view on the dependencies and relationships. For this reason, many researchers have recently used them simultaneously in their analyses (Hernández-Perlines *et al.*, 2021; Rasoolimanesh *et al.*, 2021; Saha *et al.*, 2022; Kusa *et al.*, 2023).

4. Results

4.1 Results of partial least squares structural equation modelling analysis

As recommended by Hair *et al.* (2022), the SEM analysis was performed in two stages. In the first part, the measurement model was validated, in which the correctness of the constructs in the model and the degree of matching of the model to the data were evaluated. In the second part, the research hypotheses proposed in the theoretical model

were verified using the structural model. All independent variables in the SEM analysis were treated as reflective constructs, and PERF has been operationalised as a second-order construct. SmartPLS software (V.4.0.9.3) was used in this study (Ringle *et al.*, 2022).

4.1.1 Measurement model evaluation. The measurement model allows us to assess whether the considered constructs are correctly measured using selected indicators (Klarner *et al.*, 2013). For the external model, the outer loading of the individual indicators was assessed and the occurrence of the collinearity problem was verified. Furthermore, the reliability and convergent validity of the constructs were examined. The results of these analyses are given in Figure 2. In addition, the discriminant validity of the constructs was assessed, and the results of this analysis are presented in Table 3.

The evaluation of the measurement model includes the verification of outer loadings for each latent variable (both for first-order and second-order constructs). According to Kock (2014), the acceptability threshold for this measure is 0.7. However, following the indications of Hair *et al.* (2022), it is considered that a given indicator can be left if λ is greater than 0.5. All outers loading shown in Figure 2 meet this condition. The variance inflation factor (VIF) values are less than 3 or close to 3, which shows that there is no
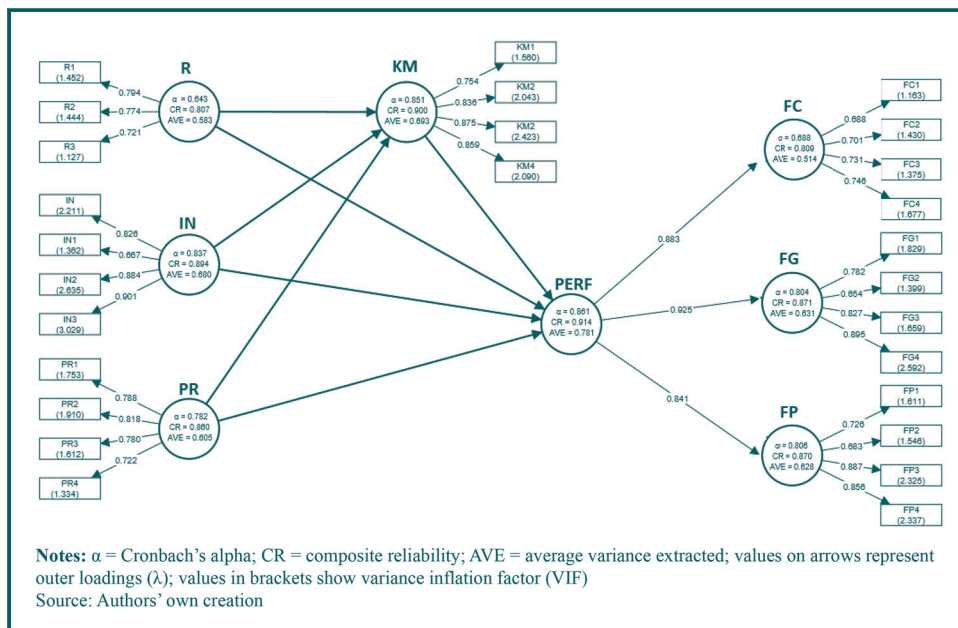
Figure 2 Measurement model results

Notes: α = Cronbach's alpha; CR = composite reliability; AVE = average variance extracted; values on arrows represent outer loadings (λ); values in brackets show variance inflation factor (VIF)
Source: Authors' own creation

Table 3 Assessment of discriminant validity of the constructs – the Fornell–Larcker and Henseler (HTMT) criterion

| Construct | Fornell–Larcker criterion | | | | | Henseler (HTMT) criterion | | | |
	R	*IN*	*PR*	*KM*	*PERF*	*R*	*IN*	*PR*	*KM*
R	*0.764*								
IN	0.319	*0.825*				0.435			
PR	0.376	0.614	*0.778*			0.529	0.760		
KM	0.305	0.471	0.473	*0.832*		0.412	0.560	0.574	
PERF	0.398	0.534	0.553	0.536	*0.884*	0.523	0.607	0.655	0.611

Note: Elements in bold on diagonal show square roots of AVE
Source: Authors' own creation

problem of collinearity of the indicators for individual constructs (Diamantopoulos *et al.,* 2012).

To assess the reliability of the constructs, the following measures were used: Cronbach alpha and composite reliability. According to Kock and Lynn (2012), the acceptable threshold for these indicators is 0.7; for seven out of the eight constructs, the values of these indicators are above this threshold, indicating that the indicators perform well in constructing the constructs. For one variable, namely, RT, Cronbach's alpha values are slightly below the acceptable threshold. But Hair *et al.* (2022) state that the acceptable range for Cronbach's alpha is 0.6–0.9. Moreover, the values of that construct obtained with the CR measure (Netemeyer *et al.,* 2003), which is a similar indicator to Cronbach's alpha are, therefore, well above the acceptable thresholds. It proves that all constructs are internally consistent. The convergence validity test was based on the traditional measure, that is, average variance extracted (Fornell and Larcker, 1981), for which the acceptability threshold is 0.5. For all the constructs considered, this condition is met.

Analyses of individual measures lead to the conclusion that all indicators of constructs (latent variables) remain in further analysis and will be used in structural model to test our hypotheses.

To assess to what extent individual constructs are independent and represent different latent variables, two discriminant validity criteria were used, namely, the Fornell–Larcker criterion (Fornell and Larcker, 1981) and the Henseler criterion (Henseler *et al.,* 2015). In the first criterion, the discriminant validity assessment consists of comparing the square root of the AVE for each variable with the correlation coefficients of this variable with the other variables. If the root of AVE is greater than the correlation coefficient, the discriminant validity is confirmed. In turn, Henseler *et al.* (2015) pointed out that the lack of discriminatory validity is better detected by means of a heterotrait–monotrait relationship (HTMT), whose values must be below 0.85. For the constructs considered, both criteria are met (see Table 3).

To assess the degree of fit of the data to the model, the SRMR measure (i.e. the standardised root mean squared residual (Henseler *et al.,* 2015) was determined. According to Hu and Bentler (1999), the match level should be considered high if the SRMR value is below 0.08. In our analysis, a value of 0.072 was obtained, confirming the appropriate fit of empirical data to the model.

As a complement to the analysis of the measurement model, the model's explanatory power and in-sample predictive power were evaluated (Shmueli and Koppius, 2011; Rigdon, 2012) by counting measures R^2 and f^2, respectively. In particular, R^2 allows one to assess the degree of explanation of the variance of endogenous variables. In turn, the effect size measure (f^2) evaluates the impact of individual exogenous variables on the variability of endogenous variables (Cohen, 1988). Table 4 shows the values of the above measures for the relationships specified in the model.

Table 4 Measures of model's explanatory power			
Endogenous variable	*Exogenous variable*	R^2	f^2
KM	R	0.288	0.017
	IN		0.063
	PR		0.057
PERF	R	0.462	0,040
	IN		0.052
	PR		0.054
	KM		0.103
Source: Authors' own creation			

Table 4 shows that the three dimensions of EO together explain almost 29% of the variance of KM. In turn, these dimensions, together with KM, explain more than 46% of the variance of PERF. In the context of social research, such a level of explanation should be considered average (Falk and Miller, 1992; Hair *et al.*, 2022).

Interpreting the value of f^2 leads to the following conclusions. For KM as an endogenous variable, no effect size was obtained for RT→KM ($f^2 < 0.02$). For the IN and PR variables, this effect is significant but small ($0.02 < f^2 < 0.15$). For all relationships in which the result variable is PERF, the size effect is also small (but significant). The lowest value was obtained for R ($f^2 = 0.04$) and the highest for KM ($f^2 = 0.103$). On the basis of the effect size analysis, it can be concluded that variable R does not explain the variance of variable KM.

4.1.2 Structural model – hypothesis testing. To assess the significance of paths coefficients, on the basis of which it is possible to verify the hypotheses, the bootstrapping procedure with 5,000 iterations was used (Streukens and Leroi-Werelds, 2016). A two-sided test with a standard 5% significance level was used. Figure 3 and Table 5 present the results of this analysis for direct relations, while Table 6 presents the results for mediation effects (indirect relations).

For six (out of seven) direct relationships tested in the model, the path coefficients are statistically significant (*p*-value < 0.05). In particular, the significant impact of all dimensions of EO on the company's performance was confirmed. For all these dimensions, this impact
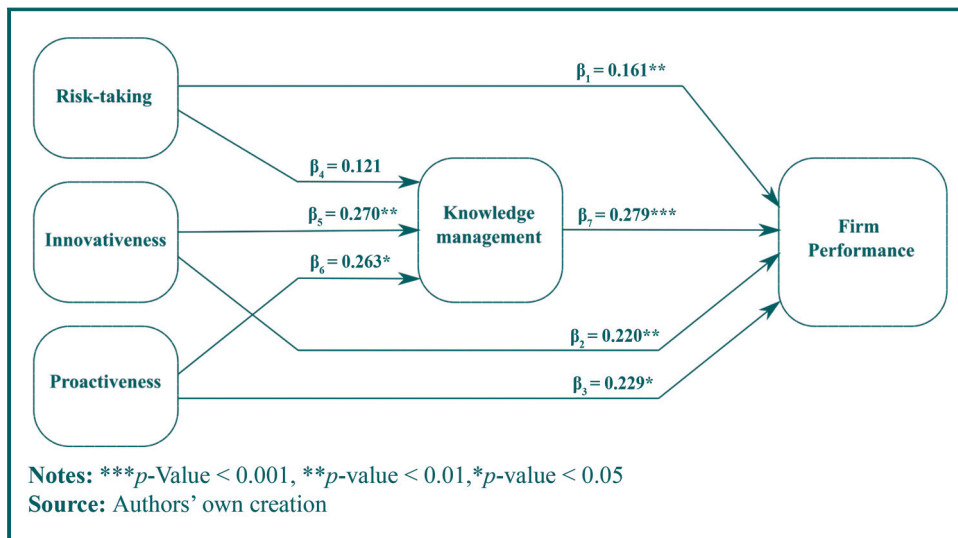
Figure 3 Structural model

Notes: ***p-Value < 0.001, **p-value < 0.01, *p-value < 0.05
Source: Authors' own creation

Table 5 Results of PLS-SEM analysis for direct effects

Hypothesis	Path	Original sample (β)	Sample mean (M)	Bootstrapping t-statistics	p-values	Results
H1	R → PERF	0.161	0.160	2.694	0.007	Confirmed
H2	IN → PERF	0.220	0.222	2.667	0.008	Confirmed
H3	PR → PERF	0.229	0.223	2.434	0.015	Confirmed
H4	R → KM	0.121	0.119	1.453	0.146	Not confirmed
H5	IN → KM	0.270	0.268	2.674	0.008	Confirmed
H6	PR → KM	0.263	0.266	2.561	0.010	Confirmed
H7	KM → PERF	0.279	0.284	3.387	0.001	Confirmed

Source: Authors' own creation

Table 6 Results of PLS-SEM analysis for indirect (mediating) effects

Hypothesis	Path	Original sample (O)	Sample mean (M)	Bootstrapping t-statistics	p-values	Results
H8	R → KM → PERF	0.034	0.035	1.227	0.220	Not confirmed
H9	IN → KM → PERF	0.075	0.075	2.222	0.026	Confirmed
H10	PR → KM → PERF	0.073	0.078	1.739	0.082	Not confirmed

Source: Authors' own creation

is positive; it is greater for IN and PR ($\beta_2 = 0.220$ and $\beta_3 = 0.229$) and slightly less for RT ($\beta_1 = 0.161$). However, the results of the analysis revealed that KM has the greatest positive impact on PERF; for the relationship KM → PERF, the value of the path coefficient is $\beta_7 = 0.279$ (p-value < 0.001). In light of the above results, all hypotheses have been confirmed regarding the direct impact on performance (i.e. hypotheses *H1, H2, H3* and *H7*).

From the structural model (cf. Figure 3) we conclude that two dimensions of EO, namely, IN and PR, have a significant positive impact on KM. The strength of their impact on KM is similar, that is, $\beta_5 = 0.270$ and $\beta_6 = 0.263$, respectively. For the relationship RT → KM the path factor is also positive ($\beta_4 = 0.121$), but it is not statistically significant (p-value $= 0.146 > 0.05$). On this basis, it can be concluded that hypotheses *H5* and *H6* have been confirmed and hypothesis *H4* has not been confirmed. The results obtained for direct relations are consistent with the previously conducted size-effect analysis.

The results of the examination of the mediating role of KM are presented in Table 6; they lead to the following conclusions. The intermediate path coefficient for the relationship RT → KM → PERF is statistically insignificant ($\beta_8 = 0.034$, p-value $= 0.22 > 0.05$); thus, KM is not a mediator of the influence of RT on PERF, so the hypothesis *H8* is not confirmed. In the case of IN, KM mediates its impact on PERF; the coefficient for this intermediate relationship is $\beta_9 = 0.075$ and the p-value $= 0.026$. Therefore, *H9* that KM is a mediator of the influence of IN on PERF is confirmed. Since the direct impact of IN on PERF is also positive and statistically significant, we are dealing with partial mediation. In turn, the results of the analysis for the third intermediate relation, that is, the PR→KM→PERF path, are ambiguous; despite the results of the previous stage (which showed that PR has a significant and positive effect on KM and in the same way that KM affects PERF), an intermediate path factor of 0.073 (not much less than for IN) is statistically insignificant (p-value $= 0.082 > 0.05$). Thus, the mediating role of KM in the relationship between PR and PERF has not been demonstrated.

4.2 Results of fuzzy-set qualitative comparative analysis

In the fsQCA analysis, we considered models in which the configurations of four conditions, i.e. RT, IN, PR and KM, lead to a high or low level of PERF. In this analysis, the values of the variables were calculated as the average of each indicator value.

This fsQCA examination was performed in accordance with the recommendations of Pappas and Woodside (2021) and used the fsQCA 4.0 software (Ragin & Sean, 2022; Ragin, 2018). In particular, in our analysis, we calibrated the data, verified the presence of necessary conditions, built a truth table and prepared it for logical minimisation and determined combinations of conditions sufficient for the considered result.

4.2.1 Data calibration. Data calibration is the process of encoding variables to values in the range of 0 to 1. For calibration, we used the "calibration" command in fsQCA 4.0, which is based on the logistic function (Ragin, 2008). In this procedure, we used the percentiles 0.95, 0.5 and 0.05 as the cut-off thresholds (Fiss, 2011); they are presented in Table 7. The results of the calibration process are shown in Figure 4.

Table 7 Calibration thresholds for conditions and outcome

Variable	Full member (0.95)	Cross-over point (0.5)	Full non-member (0.05)
R	6.15	4.00	1.37
IN	7.00	5.00	2.50
PR	6.61	4.63	2.75
KM	6.86	4.00	1.64
PERF	5.50	3.83	2.48

Source: Authors' own creation

Figure 4 Results of data calibration

Source: Authors' own creation
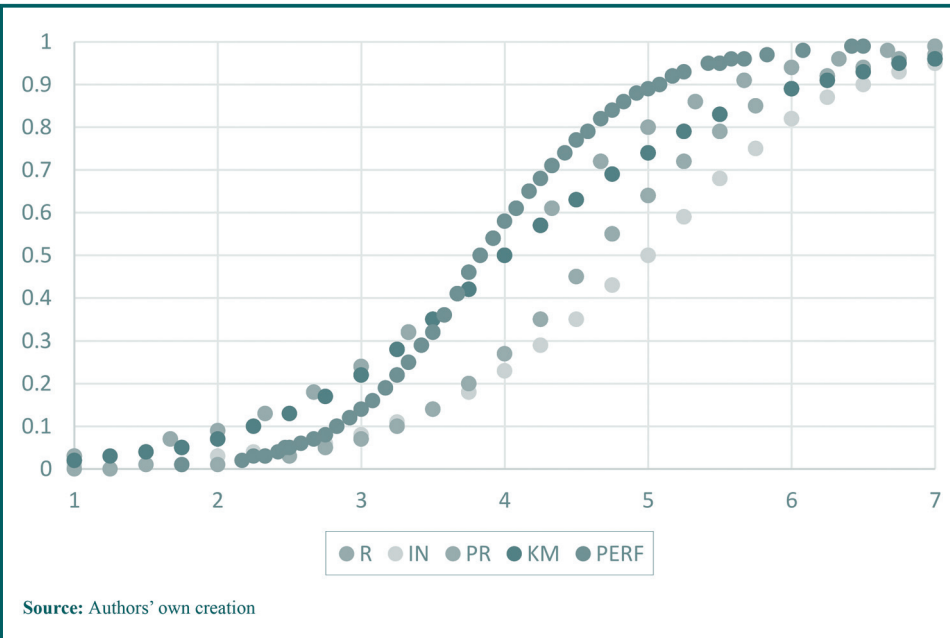
4.2.2 Analysis of necessary conditions. To verify whether in the set of four conditions under consideration there are those, without which it is impossible to achieve the appropriate outcome (presence of PERF or absence of PERF), an analysis of necessary conditions was performed. Table 8 shows the results of this analysis, in particular, the values of consistency and coverage for each condition.

Table 8 Analysis of necessary conditions

	PERF		~PERF	
Condition	Consistency	Coverage	Consistency	Coverage
R	0.726	0.727	0.578	0.584
~R	0.585	0.579	0.729	0.728
IN	0.780	0.777	0.527	0.529
~IN	0.528	0.525	0.778	0.781
PR	0.785	0.781	0.519	0.521
~PR	0.519	0.517	0.782	0.785
KM	0.806	0.772	0.577	0.557
~KM	0.538	0.558	0.764	0.799

Source: Authors' own creation

Following Schneider and Wagemann (2012), the condition is necessary if the consistency measure is greater than 0.9. Based on the results in Table 8, we conclude that no condition is necessary to achieve a high PERF level, nor to obtain a low PERF level.

4.2.3 Building a truth table. Building a truth table aims to show all possible configurations of conditions and assess their representation in the analysed data and the strength of the association with the considered outcome (Ragin, 2008). Since we consider four conditions, the truth tables contain $2^4 = 16$ rows. The truth table for the presence of PERF is presented in Appendix 2, and for the absence of PERF in Appendix 3.

Based on the truth tables, those configurations that significantly lead to the result considered (i.e. PERF or ∼PERF) were selected; the selection criteria for choosing the configurations were the number of cases belonging to a given configuration and the value of raw consistency (Schneider and Wagemann, 2012). According to the guidelines provided by Pappas and Woodside (2021), we assumed the frequency cut-off at Level 2 (for both analyses) and the consistency cut-off for PERF at 0.83 and for ∼PERF at 0.82. In the truth tables, those configurations that were taken into account at the next stage of the analysis are marked in bold.

4.2.4 Logical minimisation and sufficient conditions. The conditions sufficient for the outcomes were obtained by performing the logical minimisation process (Fiss, 2011). The results of the minimising algorithm are shown in Table 9. Of the three types of solution obtained with fsQCA 4.0, an intermediate solution was presented (Rihoux and Ragin, 2009). The assessment of the correctness of the solutions obtained was based on consistency and coverage measures. All the solutions obtained – both individually and collectively – meet the acceptability thresholds adopted in the literature (Rihoux & Ragin, 2009) for these measures, that is, 0.75 for consistency and 0.25 for coverage (see Table 9).

The final result of fsQCA indicates four sufficient conditions (four solutions) that led to high company performance (see Table 9) in the examined companies. Three solutions (i.e. S1, S2 and S3) are combinations of two of the three EO dimensions; thus, each pair of the considered dimensions of EO is a sufficient condition for a high outcome. This confirms the results of the SEM analysis regarding the impact of EO on performance. In solution S4, one of the two main conditions is KM; it occurs jointly with innovation. Therefore, this combination (S4) confirms the relevance of the indirect path IN→KM→PERF that was identified with SEM analysis.

The asymmetric nature of the fsQCA enables us to determine combinations of factors that lead to a low outcome. Three combinations of conditions were obtained; they are P1, P2 and P3. Solution P1 indicates that the absence of PR leads to a low PERF. The next two solutions are combinations of the absence of KM with the absence of IN (solution P2) and

Table 9	Combinations leading to presence or absence of firm performance						
	Sets/solutions Presence of PERF				Sets/solutions Absence of PERF		
Conditions	S1	S2	S3	S4	P1	P2	P3
Risk-taking (R)	●	●					○
Innovativeness (IN)	●		●	●		○	
Proactiveness (PR)		●	●		○		
Knowledge management (KM)				●		○	○
Consistency	0.848	0.853	0.848	0.858	0.785	0.876	0.873
Raw coverage	0.622	0.626	0.686	0.679	0.782	0.653	0.616
Solution consistency	0.787				0.762		
Solution coverage	0.819				0.844		
Frequency cut-off	2				2		
Consistency cut-off	0.83				0.82		

Notes: ● – present condition; ○ – absent condition
Source: Authors' own creation

the absence of KM with the absence of R (solution P3). Thus, in these solutions, the role of KM in shaping PERF becomes relevant. Although KM did not play an important role in influencing the presence of PERF (it was present in only one of the four solutions), the solutions for ∼PERF show that a low level of KM with low IN or RT leads to low performance.

5. Discussion

Our study contributes to the KM literature in several noteworthy ways. Firstly, we depart from the observation that KM positively impacts PERF found in numerous studies (Ha *et al.*, 2021; Latif *et al.*, 2021; Mbaidin, 2022), including those focused on SMEs (Abu Bakar *et al.*, 2014; Mokhtarzadedeh *et al.*, 2022) and find support for this relationship in our results. However, the examination of KM mediation of the EO-PERF relationship brings more granular results. Our hypotheses predicted a mediating role of KM in the relationships between the dimensions of EO (RT, IN and PR) and PERF. Interestingly, only one mediation path has been confirmed as significant, namely IN → KM → PERF. This observation contributes to the body of research on the impact of EO on PERF that, in light of previous studies, is ambiguous (see, e.g. Rauch *et al.*, 2009; Renko *et al.*, 2009; Wales, 2016). In particular, it supports the position that this relationship is complex (e.g. Andersen, 2009) and can be mediated by other factors (Real *et al.*, 2014). In our study, the impact of one dimension of EO (i.e. IN) on performance is mediated by KM. This finding is in line with research showing the mediating role of knowledge-related factors (see, e.g. Chaithanapat *et al.*, 2022; Bagorogoza and Nakasule, 2022), including the mediating role of KM in the relationship between EO and performance (Adam *et al.*, 2022). Moreover, the results of SEM are in line with those of fsQCA; that is, KM accompanied by IN leads to PERF, whereas the absence of KM (accompanied by the absence of R or IN) leads to the absence of PERF. The mediating role of KM between IN and PERF indicates that KM is essential for generating performance from innovation. This complements prior findings of Hock-Doepgen *et al.* (2021) who suggested that KM is beneficial to innovation, while we show the opposite directionality of their relationship. Hence, the nexus of innovation and KM seen from the perspective of PERF requires a systematic set of KM processes. At the same time, KM is not essential to generate performance from risky activities or proactive attitudes, which do not necessarily relate to systematic knowledge processes. Concurrently, two other mediation paths examined in this study, namely RT → KM → PERF and PR → KM → PERF are not significant in the sample examined. It confirms that the role of KM varies depending on the EO dimension. However, the findings of this study are contrary to those of Nasution *et al.* (2021) who showed that KM processes play a mediating role with respect to the impact of RT and PR on e-commerce adoption, while IN does not play such a role; in our sample only impact of IN is mediated.

Secondly, our results indicate that IN and PR positively impact KM, while RT does not. This observation confirms the results of previous studies in this field (see, e.g. Iqbal and Malik, 2019; Mostafiz *et al.*, 2021; Adam *et al.*, 2022). However, the observation that R does not impact KM is in contradiction to this line of reasoning, especially to the results presented by Nasution *et al.* (2021), who found that RT and PR are significantly associated with KM processes, while IN is not. One explanation relates to the complexity of the relationship between RT and KM, as EO can positively moderate the relationship between knowledge application and performance (Ha *et al.*, 2021). Thus, since knowledge can help minimise a risk, KM is not affected by risk. Another way of looking at this result is that risk taking is relevant for external KM but remains in a different relationship when internal KM is involved (Hock-Doepgen *et al.*, 2021). This opens the way for a more granular examination of the relationship between RT and KM.

Thirdly, we have examined separately the direct association between each of the EO dimensions and PERF. Our results support previous literature in that there is a positive impact (Sanders and Hambrick, 2007; Ghotnian *et al.*, 2013). We contribute to the debate

on contextual factors (Naldi *et al.*, 2020) that may play a role in shaping this relationship by examining a low technology set of small firms. The positive impact of IN on performance in our study is also in line with prior literature (Prahalad and Krishnan, 2008; Isichei *et al.*, 2020; Li *et al.*, 2023). As performance was a second-order construct that consists of FC, FG and FP, the results are relevant to the discussion about the influence of innovation on FP (Martínez-Ferrero and Frías-Aceituno, 2015; Pätäri *et al.*, 2012). Similarly, our results regarding the positive impact of PR on PERF confirm previous observations in this regard (Lumpkin and Dess, 1996; Rauch *et al.*, 2009; Tang *et al.*, 2014; Liem *et al.*, 2019; Isichei *et al.*, 2020), especially those from low-tech SMEs (Lomberg *et al.* (2017) as this study examined sample representing such enterprises.

6. Conclusions

This study examined the mediating role of KM in the context of EO and its impact on PERF. The study findings show that KM partially mediates the IN–PERF relationship and that KM accompanied by IN is a core condition that leads to PERF. Moreover, the absence of KM (accompanied by the absence of RT or IN) leads to the absence of PERF. In addition, the results show that all the variables examined (RT, IN, PR and KM) positively impact PERF. These findings add value to the KM and EO literature by deepening our understanding of the role of the KM and EO dimensions (and their interactions) in improving PERF. As the above relationships were observed in the sample consisting of small and medium-sized furniture manufacturers, they also contribute to the SME literature by adding evidence regarding the role of KM and the dimensions of EO in this type of enterprises.

The results of our study have vast theoretical ramifications. Firstly, by contributing to the debate on the mediating factors that link EO to PERF, we position KM in a pivotal role. However, this role can effectively be played only when innovation processes are in focus. This opens ways for the scrutiny of the importance of KM for various types of innovation (incremental, disruptive and open) in a more granular way. We believe that our result regarding RT and mediating role of KM in generating performance deserves further attention, as it seems counterintuitive; even for risky activities, such as experimentation with new technologies or business models, KM can be expected to help. Secondly, we provide evidence that EO is useful (nice to have) but not necessary (must have) in achieving high performance. This contributes to the debate on business orientations relevance, which may appear as overstated in light of these results and opens ways to more comprehensive scrutiny that involves additional factors. Thirdly, we contribute to the debate on the relationship between KM and PERF, by strengthening existing evidence of its positive impact on performance.

The results of this study have meaningful managerial implications. The findings confirm the role of KM in enhancing entrepreneurial performance in traditional industries, such as furniture. They indicate that KM and IN are keys to performance not only in high-tech industries but also in low-tech industries. The results encourage entrepreneurs to develop entrepreneurial behaviours and KM in their firms, as all examined variables (RT, IN, PR and KM) showed a positive impact on PERF. Our results encourage managers to implement, develop and exploit KM systems in their firms in view of generating higher performance.

When generalising the findings of this study, some limitations should be considered; they are sourced in the sample, the selection of the variables, as well as their operationalisation. The number of enterprises in the sample was 150 which limited the statistical analysis of the data. Moreover, the sample represents only SMEs and one industry (furniture). In addition, all the enterprises examined were located in one country; the socio-economic characteristics along with the high position of Polish furniture manufacturers in the international market can limit the generalisability of the results obtained. Thus, similar research in other industries and locations is recommended to confirm the findings in other contexts. Second, the proposed research model test only selected relationships among several variables that may be relevant to the objectives of this study. However, other

linkages and other variables can be matching when considering performance in the entrepreneurial and knowledge-based perspective; in this study, the inclusion of more variables was impossible due to the sample size. Consequently, studies examining similar models are recommended as an extension of this study. Finally, other operationalisation of variables can result in different results. Thus, when comparing the findings of this examination with other studies, we should be aware of the way we conceptualise such complex variables as organisational entrepreneurship, KM and PERF.

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Appendix 1

Table A1	Construct items with basic statistics			
Construct	*Indicator*	*Abbreviation of item*	*Mean*	*SD*
Risk-taking (R)	We can accept a high level of risk if it offers a chance for above-average profits	R1	3.76	1.77
	The term "risk taker" is considered a positive attribute for people in our organisation	R2	3.77	1.75
	Our employees are encouraged to take reasonable risks when implementing new ideas	R3	4.15	1.84
Innovativeness (IN)	Our organisation seeks out new ways to do things	IN1	5.13	1.83
	We actively introduce improvements and innovations in our organisation	IN2	5.35	1.53
	We are innovative in the way we run our business	IN3	4.68	1.49
	Innovation is the source of our success	IN4	4.00	1.66
Proactiveness (PR)	We analyse our external environment thoroughly	PR1	4.99	1.55
	We excel in identifying opportunities and societal needs	PR2	4.72	1.50
	We strive to identify future trends	PR3	4.98	1.56
	We initiate actions to which other organisations respond	PR4	3.79	1.58
Knowledge management (KM)	Our business has implemented processes to gain knowledge from our suppliers, customers and other partners	KM1	3.71	1.83
	Our business has developed the ability to create new knowledge based on that was accessed previously	KM2	4.78	1.60
	Our business has implemented processes to distribute knowledge inside the business	KM3	4.01	1.87
	Our business has implemented processes to use knowledge to develop new products and services	KM4	4.19	1.77
Firm performance	Firm competitiveness (FC)			
	We are one of the leading companies in our market in terms of our business	FC1	4.00	1.61
	Relative to competing products, our products are more successful in terms of sales	FC2	4.06	1.21
	We have been able to attract new customers this year	FC3	4.57	1.66
	Our customers are more satisfied than our competitors' customers	FC4	4.71	1.33
	Firm growth (FG)			
	We are developing faster than our competitors	FG1	3.97	1.42
	We are strongly focused on the growth of our company (e.g. increasing turnover, employment and market share)	FG2	4.43	1.76
	We are developing much faster than expected	FG3	3.73	1.61
	Our sales are growing much faster than we expected	FG4	3.43	1.63
	Financial performance (FP)			
	Compared to our competitors, we achieve better economic results	FP1	3.67	1.21
	Our operational costs are lower than those of our competitors	FP2	3.78	1.39
	Our profitability has increased	FP3	3.72	1.58
	Our profits are much higher than we expected	FP4	3.20	1.65
Source: Authors' own creation				

Appendix 2

Table A2	Truth table for outcome PERF					
R	*IN*	*PR*	*KM*	*No. of cases*	*PERF*	*Raw consistency*
1	*1*	*1*	*1*	*23*	*1*	*0.92336*
0	*1*	*1*	*1*	*13*	*1*	*0.89883*
1	*1*	*1*	*0*	*6*	*1*	*0.88059*
1	*0*	*1*	*1*	*2*	*1*	*0.87460*
1	*1*	*0*	*1*	*4*	*1*	*0.86869*
0	*1*	*0*	*1*	*2*	*1*	*0.86607*
1	*1*	*0*	*0*	*3*	*1*	*0.85245*
1	*0*	*1*	*0*	*2*	*1*	*0.84511*
0	*1*	*1*	*0*	*3*	*1*	*0.83192*
1	0	0	1	5	0	0.80569
0	0	0	1	9	0	0.79756
0	0	1	0	6	0	0.78452
0	1	0	0	5	0	0.77117
1	0	0	0	8	0	0.74766
0	0	0	0	25	0	0.61764

Source: Authors' own creation

Appendix 3

Table A3.	Truth table for outcome ∼PERF					
R	*IN*	*PR*	*KM*	*No. of cases*	*∼PERF*	*Raw consistency*
0	*0*	*0*	*0*	*25*	*1*	*0.935255*
1	*0*	*0*	*0*	*8*	*1*	*0.926169*
0	*0*	*1*	*0*	*6*	*1*	*0.904796*
0	*1*	*0*	*0*	*5*	*1*	*0.8879*
0	*0*	*0*	*1*	*9*	*1*	*0.879885*
1	*0*	*0*	*1*	*5*	*1*	*0.877722*
1	*1*	*0*	*0*	*3*	*1*	*0.86647*
1	*0*	*1*	*0*	*2*	*1*	*0.854592*
0	*1*	*0*	*1*	*2*	*1*	*0.852872*
0	*1*	*1*	*0*	*3*	*1*	*0.839231*
1	*1*	*0*	*1*	*4*	*1*	*0.822996*
1	0	1	1	2	0	0.798889
1	1	1	0	6	0	0.773406
0	1	1	1	13	0	0.686736
1	1	1	1	23	0	0.562515

Source: Authors' own creation

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