

The impact of knowledge risk management on sustainability

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Abstract

Purpose – The purpose of this study is to examine the effect of knowledge risk management (KRM) on organizational sustainability and the role of innovativeness and agility in this relationship.

Design/methodology/approach – The study presents the results of a quantitative survey performed among 179 professionals from knowledge-intensive organizations dealing with knowledge risks and their management in organizations. Data included in this study are from both private and public organizations located all over the world and were collected through an online survey.

Findings – The results have confirmed that innovativeness and agility positively impact the sustainability of organizations; agility also positively impacts organizational innovativeness. The partial influence of KRM on both innovativeness and agility of organizations has been confirmed as well.

Research limitations/implications – The paper findings contribute in different ways to the ongoing debates in the literature. First, they contribute to the general study of risk management by showing empirically its role in organizations in the given case of organizational sustainability. Second, by emphasizing the risks related to knowledge, this study contributes to emerging efforts highlighting the particular role of knowledge for sustained organizational development. Third, by linking KRM and organizational sustainability, this paper contributes empirically to building knowledge in this very recent field of study. This understanding is also useful for future development in the field of KM as a whole.

Originality/value – The paper lays the ground for both a deeper and more nuanced understanding of knowledge risks in organizations in general and regarding sustainability in particular. As such, the paper offers new food for thought for researchers dealing with the topics of knowledge risks, knowledge management and organizational risk management in general.

Keywords Knowledge risk, Sustainability, Knowledge risk management, Knowledge management, Innovativeness, Agility, Structural equation modelling

Paper type Research paper

1. Introduction

Knowledge has become a vital resource in a knowledge-based economy, and a variety of previous studies have shown that knowledge and its proper management can bring positive outcomes to organizations (Choy *et al.*, 2006; Edvardsson and Durst, 2013; Massingham and Massingham, 2014). Moreover, it is not sufficient to simply process knowledge to achieve a strategic advantage; but it is necessary to manage it including both the upsides and the downsides of knowledge resources (Stam, 2009). As it appears, knowledge may bring not only positive outcomes but may also be related to certain organizational threats, such as knowledge attrition (Avasthi and Dey, 2015), knowledge leakage (Durst *et al.*, 2015; Parker, 2012; Inkpen *et al.*, 2019; Khoza, 2019), knowledge waste (Durst and Zieba, 2017; Ferenhof *et al.*, 2015) or lost reputation (Durst and Zieba, 2017). Due to the above, organizations should be encouraged to include risks related to knowledge in their risk management, especially taking into account that those risks apply to various kinds of organizations and industries.

Despite the potential importance of knowledge risks and their consequences, little research on knowledge risk management (KRM) has been conducted so far. Research on risk

management, in general, has examined organizations from sectors such as banking, insurance or utilities, which have been obliged to manage their risks in accordance with official regulations (Callahan and Soileau, 2017); supply chains/logistics (Cucchiella and Gastaldi, 2006; Juttner *et al.*, 2003; Manuj and Mentzer, 2008; Choy *et al.*, 2006), new product development (Salavati *et al.*, 2016) or project management (see Project Management Institute website on risk management). There are only a few publications related directly to KRM so far. For example, in a study by Jafari *et al.* (2011), the authors have developed a model for risk management of knowledge loss in a project-based organization in Iran. This study concentrated on one of the knowledge risks only, namely, knowledge loss. In another study by Akhavan *et al.* (2019), the authors have examined the relationship between knowledge risk components, the importance of each component, and the final ranking of components based on a knowledge map. There is also a group of studies devoted to one of the most common knowledge risks, namely, knowledge hiding (Agarwal *et al.*, 2022; Anand *et al.*, 2020; Banagou *et al.*, 2021; Butt, 2021; Pereira and Mohiya, 2021; Sukumaran and Lanke, 2021), however, those papers, mostly concentrate on factors that can influence knowledge hiding in organizations and the consequences of this phenomenon. Similarly, two other knowledge risks have been examined, namely, unlearning and forgetting, but these studies have in common that they examine simply antecedents and consequences of organizational unlearning and forgetting (Klammer and Gueldenberg, 2019, 2020; Kluge *et al.*, 2019; Kmiecik, 2021), and not the complex nature of KRM with all its elements. Against the background of the connectivity of knowledge risks, a one-sided consideration of individual risks is not only insufficient but also negligent (Zieba and Durst, 2018).

So far, there have been attempts in the literature to define and classify knowledge risks, for example, the ones made by Durst and Ferenhof (2016) or by Durst and Zieba (2019). In these works, one can also find certain suggestions concerning the management and ways of handling these knowledge risks.

Until now, there are only a few studies examining knowledge risks and their management in organizations. For example, there is a study showing empirical evidence of the influence of knowledge risks on organizational performance (Durst *et al.*, 2019). Another research of qualitative nature has been conducted by Zieba (2020) among 13 companies from the knowledge-intensive business services (KIBS) sector. In this study, the types of risks in KIBS firms have been identified, along with the ways of handling them. There are also some theoretical and managerial studies presenting KRM from various perspectives, e.g. corporate finance for family firms (Hill, 2020), state-owned enterprises (Kumar, 2020) or blockchain technology (Ilbiz, 2020).

In the conceptual paper by Durst and Zieba (2020), the possible impact of various knowledge risks on business sustainability has been presented, together with potential ways to manage and overcome these risks. Based on this paper, one can clearly state that “the plethora of knowledge risks that may potentially endanger the sustainability of an organization makes their identification a problematic issue, not to mention ways to reduce or eliminate their impact”. Therefore, there is a need for more research in the field of KRM and the examination of its link with organizational outcomes. Still, it is not known how KRM influences the sustainability of organizations and what is the role of agility and innovativeness in this relation. Previous studies related to knowledge risks mentioned above present either only selected risks without the holistic perspective of covering all the potentially identified knowledge risks or they cover KRM from a theoretical or managerial perspective. So far, only knowledge risks have been defined and identified in selected organizations, together with ways of handling them. Although the link between KRM and organizational performance has been confirmed (Durst *et al.*, 2019), it is still unknown how KRM influences the sustainability, innovativeness and agility of organizations. The aforementioned situation requires improvement in the authors’ opinion. Knowledge risks can

influence organizations significantly, not only by limiting their development or stopping the achievement of competitive advantage but also by hindering their efforts towards sustainability (Durst and Zieba, 2020). It is believed that organizations would benefit from research that shows whether knowledge risks and their management influence their operations and outcomes, especially regarding sustainability, innovativeness and agility. Those three concepts are being considered important for organizations – innovativeness contributes to better customer satisfaction (Stock, 2011; Truong *et al.*, 2020) and also impacts business performance (Hult *et al.*, 2004), while agility is claimed to be an important contemporary management approach (Jacobs, 2012; Fuller and Russ-Eft, 2010; Nafei, 2016).

In response to the above, this paper aims to examine the effect of KRM on sustainability in different types of organizations, as the connection between KRM and sustainability has not been empirically established in the literature so far (Durst and Zieba, 2020). At the same time, those two concepts are of growing importance for contemporary organizations, as recent studies show (Akhavan *et al.*, 2019; Kiron *et al.*, 2017; Nawaz and Koç, 2018; Temel and Durst, 2020). Society as a whole is also expected to benefit from more rigorous research on the link between KRM and sustainability considering the detrimental consequences of the pandemic not only for sustainable development but also for the sustainability of countries, regions and the whole planet facing climate change.

The paper aims to answer the following research questions:

- RQ1.* How does KRM impact the innovativeness and agility of organizations? And what does that mean for organizational sustainability?
- RQ2.* What is the role of innovativeness and agility in the relationship between KRM and sustainability?

The paper contributes to the state of the art in the following ways. First of all, the paper discusses an area of risk management (i.e. KRM); therefore, it contributes to the development of this field. Secondly, it also explains the links between several key concepts from the organizational perspective, namely, KRM, sustainability, innovativeness and agility. Finally, the paper confirms the necessity to reorient the view of knowledge, not only as a key valuable resource that needs to be shared but also as a potential hazard that needs to be protected for the sake of organizational benefits. Finally, linking the concepts of KRM and sustainability significantly strengthens our understanding of these relevant issues.

The paper develops as follows. Firstly, an overview of KRM is provided, originating from the fields of knowledge management (KM) and risk management. Secondly, the concept of sustainability is introduced together with the concepts of innovativeness and agility. This part also includes the formulation of hypotheses. Thirdly, the methodology is explained and afterwards, the analysis and results are presented. The paper ends with a discussion and conclusions.

2. Theoretical background and hypotheses development

2.1 Theory

To plan and execute a study, it is necessary to sketch the theoretical lens for its design and analysis. This has to be done by the selection of an appropriate theory, justification of its relevance for the study, analysis of the key constructs of this theory and the way it contributes to the study. The authors have selected the knowledge-based view (KBV) theory of the firm (Kogut and Zander, 1992; Grant, 1996; Spender, 1996), according to which knowledge is the most important resource and factor of production. Organizations achieve various performance levels due to the differences in their stock of knowledge and capabilities of using it, and they may achieve competitive advantage thanks to the processes of knowledge creation, transfer and development (Foss, 2005, pp. 81–118).

Looking through the lenses of this theory, organizations need to pay attention to knowledge, as it is potentially their key resource and should be managed well. As Grant (2002, p. 135) stated, the KBV of the firm is “a set of ideas about the existence and nature of the firm that emphasizes the role of knowledge”, hence, when an organization considers its knowledge risks in any way, it emphasizes the importance of knowledge for its operations. Following Grant’s argumentation, it could also be stated that organizations must adjust their strategies and design them with regard to different types of knowledge (namely, explicit and tacit); this is also highlighted in KRM. Organizations should also analyse different types of knowledge based on the available knowledge typologies. The most common one is the already mentioned division into tacit and explicit knowledge as proposed by Polanyi (Spender, 1996). However, also other types of knowledge can be analysed with regard to the risks they constitute for organizations, e.g. “knowledge about” and “knowledge of acquaintance” or the types of knowledge from Greek epistemology proposed by James (1950) and described in detail in Spender (1996). Kogut and Zander’s (1992) categorization of organizational knowledge into information (i.e. knowing what something means) and know-how (i.e. knowing how to do something) can be useful too, as it indicates different qualities of knowledge in terms of its relevance. The situation is similar for knowledge risks (risks in general), whose significance is strongly influenced by the probability of occurrence and its severity.

The authors of this paper enrich the KBV of the firm with the concept of “knowledge at risk”, defined as “the appearance of situations that lead to actual knowledge loss and sub-optimal performance of an organization” (Williams and Durst, 2018, p. 462). This concept, together with the KBV theory, has influenced the design and execution of the study.

2.2 Knowledge risk management

KRM is a novel approach devoted to the management of a variety of risks associated with the knowledge that might be faced by organizations. KRM can be defined as “a systematic activity devoted to the application of a variety of tools and techniques required to detect, examine and react to risks related to the production, usage, and detainment of knowledge” (Durst and Zieba, 2020, p. 3).

Knowledge and its management have been the subject of interest for both researchers and practitioners for several decades now (Cardoso *et al.*, 2012; López-Nicolás and Meroño-Cerdán, 2011). At the origin of KM, the concept laid the philosophy that knowledge and its proper management can be a source of benefits for organizations, such as competitiveness and economic performance (Andreeva and Kianto, 2012; Darroch, 2005), innovation output (Cantner *et al.*, 2011; Huang and Li, 2009; Roxas *et al.*, 2013) growth (Salojärvi *et al.*, 2005) or innovation and market performance (Hussinki *et al.*, 2017). Martínez-Martínez *et al.* (2019), for example, have shown that the process of creating and updating the environmental knowledge of organizations supports business performance in the hospitality sector and it is believed to be true also for other sectors. Past research (Dost *et al.*, 2016) has also shown how companies use different types of knowledge. Firms that develop innovation seem to prefer a combination of new and existing knowledge, whereas firms that adopt the innovation developed by other companies seem to rely on the existing knowledge. In another study, Ramadan *et al.* (2017) have shown the role of different KM processes on intellectual capital and the development of social capital.

Therefore, it is of no surprise that organizations started paying more attention to KM and the introduction of such practices. However, as recent studies have shown (Durst and Zieba, 2019; Zieba and Durst, 2018), knowledge may not only bring positive outcomes in organizations but also certain problems and threats. Among such, there are knowledge leakage (Durst and Ferenhof, 2014; Parker, 2012), knowledge hiding (Fong, 2018; Kumar Jha and Varkkey, 2018; Wang *et al.*, 2018), knowledge loss (Massingham, 2018; Wensley and Navarro, 2015) or knowledge spillover (Feinberg and Gupta, 2004), just to name a few.

The concept of KRM has only recently gained increased attention, as knowledge has traditionally been perceived by organizations as an asset (Bollinger and Smith, 2001; Thomas, 1992) rather than a threat (Bratianu, 2018; Durst and Zieba, 2017). Knowledge risk itself can be considered as “a measure of the probability and severity of adverse effects of any activities engaging or related somehow with the knowledge that can affect the functioning of an organization on any level” (Durst and Zieba, 2019, p. 2). The authors of the present study follow Martínez-Martínez *et al.* (2015), who stressed that “there is a need for knowledge management frameworks [...], particularly in those organizations having to operate in a changing environment” (p. 281). As the environment has become highly volatile and, thus, even more uncertain (a good example is a COVID-19 pandemic), there is a need for formulating new approaches towards KM, and the authors of this paper argue that these approaches should integrate KRM as well.

2.3 Sustainability

In recent years, organizational sustainability has been gaining more and more attention in the literature (García-Rosell and Mäkinen, 2013; Johnston, 2014; Kornilaki *et al.*, 2019). Making sustainable choices should be natural for both organizations and their customers in a variety of areas (Gössling, 2017). The concept has long been related to the triple bottom line, aiming to synchronize the social, environmental and financial outcomes of a business (Hall *et al.*, 2010; Gupta and Kumar, 2013). Johnson (2017) described sustainability as a way of acting that balances the three aspects of social, economic and environmental development. From a business point of view, sustainability would imply that a firm's prosperity should not be the outcome of a harmed environment and/or disregarded and exploited human beings (Tsvetkova *et al.*, 2020).

Organizational sustainability is supposed to be crucial for supporting sustainable development, the latter referring to a development “that meets the needs of the present without compromising the ability of future generations to meet their own needs” (WCED, 1987, p. 43). Sustainable business development has become a part of all types of organizations; both large (Isaksson and Steimle, 2009) and small ones (Tsvetkova *et al.*, 2020). Companies are encouraged to use their social capital to increase their capacities for the creation, sharing and management of knowledge, which can help them in their organizational sustainability and overall sustainable economic development (Bueno *et al.*, 2004; Bhatti *et al.*, 2020).

Being, on the one hand, exposed to global climate change and its severe consequences (Wallace-Wells, 2020) and, on the other hand, exposed to several additional challenges such as rapid digitalization, one has to admit that sustainable development and creating and maintaining sustainable organizations have put organizations under considerable pressure (Deep Sharma *et al.*, 2021). Thus, it can be argued that recent developments call for even greater efforts both at the organizational and societal levels to make sure that past, promising activities regarding sustainable development are not put on hold. That is why it is of utmost importance for organizations to understand whether the efforts made to organizational sustainability also pay off, i.e. whether they contribute to different types of organizational outputs.

Organizations may find several guidelines on how sustainability initiatives can be implemented in their activities and strategies (Baumgartner and Rauter, 2017), on how they can help them in being more successful than the less-sustainable organizations (Eccles *et al.*, 2012) or on how to improve their corporate value (Soyka, 2012). According to Chow and Chen (2012), organizations willing to perform sustainably need to implement social, economic and environmental development in their operations. Moreover, these three aspects of development need to be integrated and perceived as an entity and organizations need to balance them in a reasonable way (Van Kleef and Roome, 2007). El-Kassar and Singh (2019) have shown the impact of drivers of green innovation and their

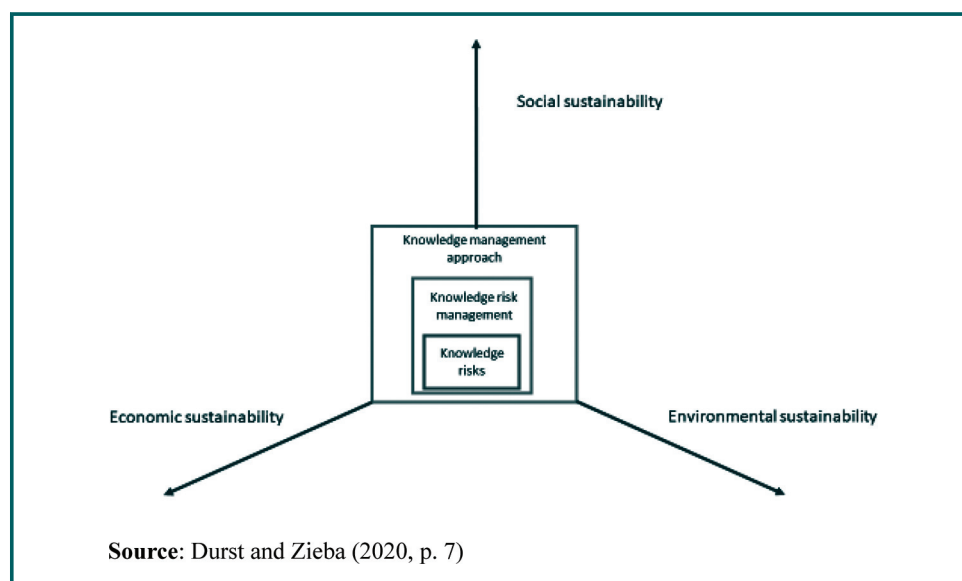
influence on competitive advantage, and environmental and organizational performance. Among other things, the authors demonstrate that green product innovation influences competitive advantage through environmental performance. Furthermore, green process innovation impacts competitive advantage through both environmental and organizational performance. The authors have also shown that the existence of established human resources practices ensures a more balanced competitive advantage through a combination of better environmental and organizational performance. This, in turn, also reveals that there is a trade-off between improving one dimension of sustainability (environmental performance) and another one (economic growth).

Considering the importance of KRM described in the previous section, an organization to be sustainable is also expected to consider its knowledge. In other words, if organizations want to become and remain sustainable, they need to make an analysis of the potential knowledge risks they are endangered with and determine which sustainability dimension(s) is (are) endangered. For this purpose, they need to consider both the upsides and downsides of knowledge, thus, integrating KRM into their KM approach (Figure 1).

2.4 Innovativeness

Innovation and innovativeness have been valid and broadly discussed concepts in the literature for the past few decades. Innovation can be measured by a certain degree of novelty in the attributes of a product or service (Carmona-Lavado *et al.*, 2013), as well as processes and methods, while the innovativeness of an organization can be considered as an organization's ability to develop and implement new processes or products to the organization, even if these processes or products may already be common among their competitors (both local and foreign) (Luk *et al.*, 2008). A key feature of being innovative companies is being persistent in transferring ideas into "successful reality" (Bessant and Tidd, 2007, p. 26), which means that companies need to initiate a continuous and systematic process devoted to innovation management. To be able to do that, organizations need to scan and interpret the environment, looking for the opportunity to act both proactively and innovatively (Wei and Wang, 2011).

Figure 1 Integrated KM approach with KRM and the three dimensions of sustainability



Innovativeness of an organization can be defined in a variety of ways, but in general, it relates to the development of new products or services and can be measured, for example, as the number of innovations adopted by organizations (Subramanian and Nilakanta, 1996). When one considers innovativeness as originating from the scanning and interpreting of the environment, it can be assumed that in the face of growing challenges related to climate change and global warming, organizations will need to detect new opportunities and needs to improve their operations regarding environmental issues. There are some fragmented studies that show the influence of innovativeness on different aspects of sustainability. For example, Kuščer *et al.* (2017) has stressed the close link between innovation and sustainable tourism. A study by Matinaro and Liu (2017) has proved that lacking innovativeness has a negative impact on societal change towards sustainability (Matinaro and Liu, 2017). According to Gualandris and Kalchschmidt (2014), innovativeness has a positive effect on sustainable process management. In another study, it has been found that non-technological innovation contributes to better environmental performance (González-Blanco *et al.*, 2018). Taking all the above into account, it is, therefore, justified to assume that the innovativeness of organizations will influence their sustainability. Hence, it is proposed that:

H1. Innovativeness positively impacts the sustainability of organizations.

If organizations aim at being innovative, they need to be prepared to take some risks (Das and Joshi, 2007). Without trial and error, it is difficult to create new products, services, methods or processes; the same refers to improving existing offerings. At the same time, the level of risk-taking cannot be too high, as it may result in high levels of failure (Alvarez, 2007). According to the study of Kreiser *et al.* (2013), companies are advised to moderate levels of risk-taking, as it potentially brings the best benefits for organizations. Therefore, it can be stated that companies are advised to take some risks, as it helps them in being more successful in manifesting behaviours leading to improvement and development of their products, services, etc. (Gilley *et al.*, 2002). However, these risks need to be analysed and undertaken with care. For this purpose, organizations are advised to implement KRM, which allows them to identify, analyse and respond to risks related to organizational knowledge and the processes related to it, such as knowledge generation, use, storage or retention (Durst *et al.*, 2019). Thanks to the application of KRM, organizations can identify their knowledge-related risks more efficiently, and they can, on the one hand, reduce the risk of failure and, on the other hand, make wiser decisions concerning the introduced innovations. For example, if an organization detects knowledge hiding and makes some steps to counteract it, e.g. by changing organizational culture into a knowledge-sharing one, then these measures might lead to a better knowledge flow between employees and some potential innovative ideas generated. Similar is the case with risks related to knowledge gaps. If an organization analyses the possessed knowledge and the required one for company operations (present and future ones), it may take some steps to obtain the missing knowledge (either from internal or external sources [e.g. partners, clients, suppliers, etc.]) and this newly absorbed knowledge may constitute the basis for future innovations. Therefore, we postulate that:

H2. Knowledge risk management positively impacts the innovativeness of organizations.

2.5 Agility

The concept of agility has been discussed in the literature for some time already; however, there is still a certain lack of understanding of agile concepts in the academic debate (Vidgen and Wang, 2009). Kamhawi (2012), for example, defined agility as the ability of organizations to constantly detect competitive opportunities and threats and respond through innovative actions, e.g. new products/services/processes or improved products/services/processes. In the opinion of Lu and Ramamurthy (2011), “agility is a firm’s ability to

cope with rapid, relentless, and uncertain changes and thrive in a competitive environment of continually and unpredictably changing opportunities" (p. 932). Other authors, [Tallon and Pinsonneault \(2011\)](#), added the role of speed in detecting and responding to environmental threats and opportunities. Among the key capabilities for building strategic agility, there are strategic sensitivity, resource fluidity and leadership unity ([Morton, 2018](#)). All these suggestions can be summarized in a statement by [Brueller et al. \(2014, p. 39\)](#) that organizations should "make sense quickly, make decisions nimbly, and redeploy resources rapidly".

Agility is a multidimensional construct ([Sarker and Sarker, 2009](#)) and other aspects of agility are: it is a continuous ability, as the changes are happening all the time; and it is linked with knowledge and learning (especially the ones in the process of change) ([Conboy, 2009](#)).

Agility can be influenced by a variety of factors. For example, in a study by [Chakravarty et al. \(2013\)](#), it has been confirmed that information technology (IT) competencies build organizational agility, regardless of the nature of agile capabilities. Another study by [Liang et al. \(2017\)](#) has also examined the link between IT alignment and organizational agility and offered some new insights – it seems that IT intellectual alignment impedes agility while social alignment facilitates agility.

[Weill et al. \(2002\)](#), on the other hand, have listed elements that contribute to agility, such as customer base, brand, core competence, infrastructure and employees' ability to change. The literature has also examined different types of agility. For example, [Carmeli et al. \(2021\)](#) have indicated the importance of inter-organizational learning agility for the buyer-supplier relationship. A different angle of agility has been examined by [Fourné et al. \(2014\)](#), who considered strategic agility via the lenses of multinational enterprises and identified three different dynamic capabilities, namely, sensing local opportunities, enacting global complementarities and appropriating local value.

Agile organizations take advantage of both extant knowledge and continued learning to be in the position of delivering products that are in strong demand ([Jyothi and Rao, 2011](#)). Moreover, agility is especially important during rough times, when some additional capabilities are needed by organizations ([Mohrman and Worley, 2009](#)). As organizations are facing growing pressure from their different stakeholders to be sustainable ([Silva et al., 2019](#)), they are also encouraged to act in an agile way to meet the new demands resulting from the unstable environment. Various agility capabilities, e.g. responsiveness, competency (with strategic vision, high rate of new products introduction, knowledgeable, competent and empowered people, internal and external cooperation, integration, etc.), flexibility (product, organization and people) and quickness (e.g. quick new products time to market or fast operation time) ([Sherehiy et al., 2007](#)) allow organizations to achieve Business Sustainability 3.0, as defined by [Dyllick and Muff \(2016\)](#). In this concept, organizations have changed their perspective from the ones seeking to reduce the negative impacts of their operations to the ones working on positive operations that are vital for society and the entire world ([Dyllick and Muff, 2016](#)). As there is an expected link between agility and reacting and adapting to environmental changes, one can also expect that there is a positive relationship between agility and organizational sustainability. Based on that, one would argue that being an agile organization can support the efforts towards sustainability. Hence, the following hypothesis is posed:

H3. Agility positively impacts the sustainability of an organization.

Observing the use of the concepts in the business literature, [Hanna and Santos Bernardes \(2009\)](#) concluded that agility is viewed as a "concept coined to address competitiveness in the current fast-paced and unpredictable industrial environment" (p. 42). These authors further constituted an imprecise usage of related terms in the literature and, to overcome this problem, they proposed a conceptual differentiation of the terms flexibility, agility and responsiveness. Accordingly, "agility refers to the system's capability to rapidly reconfigure

in the face of unpredictable changes, while responsiveness is the system's actual and purposeful change in behaviour or outcome caused by a stimulus" (p. 43). Similarly, [Crocitto and Youssef \(2003\)](#) highlighted the necessity for agility to be a systematic organizational value and a sort of strategy supported by organizational leaders. The role of leadership and its unity has also been indicated by [Doz and Kosonen \(2008\)](#), who indicated that as one of the three key dimensions for strategic agility, alongside resource fluidity and strategic sensitivity. According to the study conducted by [Shin et al. \(2015\)](#) among Korean small- and medium-sized enterprises (SMEs), the strategic intent of such companies towards agility had a positive influence on their operational performance and customer retention; however, no positive influence on financial performance was found.

Recent research has stressed the relationship between agility and both innovation and performance. [Ravichandran \(2018\)](#), for example, showed how an organization's innovation capability influences the level of agility. This is not the only possible direction of influence. Agility can be useful in creating innovation models and helping organizations in boosting their innovative performance ([Wilson and Doz, 2011](#)). When organizations are agile, they are prepared to undertake quick actions and undertake new initiatives with high speed. To be agile, they also need to examine the environment to check for some new developments and current demands. Additionally, they also need to have appropriate resources, e.g. employees that are competent and skilled to undertake new endeavours ([Sherehiy et al., 2007](#)). Being so equipped and prepared for new challenges, organizations are more probable to come up with innovative solutions. In other words, as agility relates to detecting opportunities and rapid changes ([Lu and Ramamurthy, 2011](#); [Tallon and Pinsonneault, 2011](#)), as well as responding to them through various innovative actions ([Kamhawi, 2012](#)), it can be assumed that there is also a reverse influence, meaning that:

H4. Agility positively impacts the innovativeness of an organization.

As mentioned above, KRM relates to the systematic application of tools and techniques to identify, analyse and respond to various risks connected with broadly defined organizational knowledge ([Durst et al., 2016](#)). Therefore, the implementation of KRM can facilitate organizational agility in the sense that it makes organizations cautious about risk analysis and orientates it towards systematic activities. This, in turn, can help organizations in scanning the environment and identifying opportunities and threats, hence, being more agile.

In other words, taking into account the dynamic nature of agility, one can state that KRM might prove useful to balance out the differences between actions undertaken in predictable environments versus those undertaken in unpredictable environments. Moreover, KRM can support organizations in the process of selecting the best approach, taking into account particular circumstances. Via the constant identification, selection, analysis, control and implementation of countermeasures of risks, organizations might become more agile, i.e. have better knowledge to make the right decisions in a shorter amount of time. Without KRM, this would be more difficult and related to a higher failure rate.

Therefore, it is proposed that:

H5. KRM positively impacts the agility of organizations.

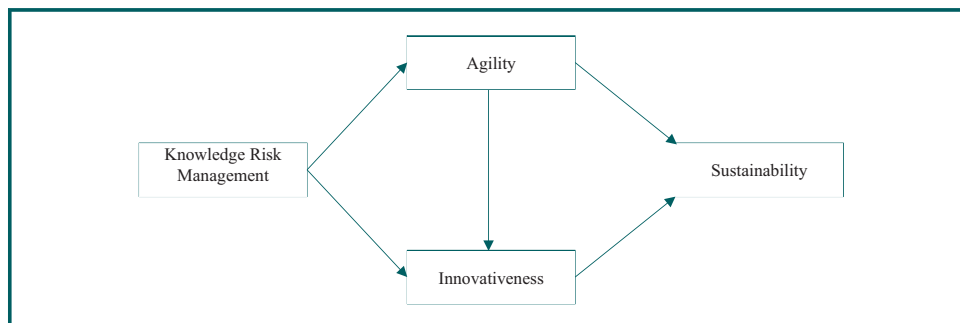
Based on the literature review and the formulated hypotheses, the following conceptual model is proposed ([Figure 2](#)).

In the following section, the methods used in the research will be presented, and the hypotheses will be tested.

3. Method

Taking into account the early stage of development of the examined field, exploratory research was considered suitable for the study since the investigated issue had not been

Figure 2 Conceptual model of the study



sufficiently explored and there was the need to gather preliminary data to define potential relations and suggest hypotheses (Shields and Rangarajan, 2013).

3.1 Sample and data collection

The data for the presented study was collected between September 2017 and January 2018 in the form of an online questionnaire using the QuestionPro software. The questionnaire consisted of 23 mainly closed-ended questions and was divided into four sections. As the topic in focus has not previously been addressed, it was not possible to rely on the existing questionnaires. Thus, new items were developed or existing ones from related areas (such as risk management) were amended. Apart from the sections related to knowledge risks and their management, supplementary demographic data were collected, such as the year of foundation, type of organization, location or number of employees.

After the construction of the questionnaire, it was pretested to check the order of questions, their comprehensibility and appropriateness to be answered in a certain period (max. 30 min). The pre-test also described a means to moderate the weaknesses of self-administered surveys (Saunders *et al.*, 2012). Thereby, the questionnaire was carefully pretested with two management professors and two respondents from companies.

To access possible participants, convenience sampling was used, i.e. possible respondents were informed about the survey through LinkedIn, Facebook and Twitter. Additionally, Company Lists were used. The snowball effect has also been used, as some respondents were recommending the survey to their colleagues. The authors decided not to limit the survey to one or several countries, as there is a growing difficulty in conducting quantitative studies. There is an increasing problem with establishing access to study participants and a general low response rate of quantitative studies (Bell *et al.*, 2018) and business representatives are less and less willing to spend their time on surveys. Despite the limitations of convenience sampling, this method is widely adopted in social research and is especially recommended for exploratory studies (Leiner, 2017). As the research in the area of KRM is still very limited, this study can be treated as an exploratory one. Moreover, convenience sampling is a common technique in research devoted to KM (Ali *et al.*, 2018; Chong *et al.*, 2011).

To make sure that the participants were knowledgeable about the topic of the study, the first two questions concerned risk management and KRM in organizations. The respondents were asked whether their organizations do risk management and whether it considers knowledge risks as well. The assumption was that non-knowledgeable respondents would quit the survey if they did not have knowledge of these two aspects of their organization. Finally, as the focus of this study was on knowledge-intensive industries, we filtered responses from organizations that do not assess their organization as knowledge-intensive



(one of the questions was about the perception of the own organization as knowledge-intensive). This led to the exclusion of 10 data entries resulting in a final sample of 179 knowledge-intensive organizations. Out of the 179 companies, 79 organizations (44.1%) are large ones with more than 250 employees. Some other characteristics of the sample are presented in Table 1.

In total, 623 responses were collected. The responses constitute an international sample, having a predominance in Latin America, which accounted for 49.6% (countries involved are Brazil, Colombia, Cuba, Mexico, Paraguay, Peru, Uruguay and Venezuela), followed by Europe with 25.9% (countries involved: Austria, Belgium, Czech Republic, Denmark, England, Finland, France, Germany, Greece, Iceland, Italy, Liechtenstein, Luxembourg, The Netherlands, Poland, Romania, Scotland, Spain, Sweden). In addition, participants from Australia, Bahrain, Bangladesh, China, India, Iran, Kazakhstan, Malaysia, Pakistan, Saudi Arabia, Turkey, the UAE and the USA participated in the survey. This focus on the world considered the still underdeveloped empirical basis on the topic of KRM in companies. Moreover, it is argued that all organizations, regardless of where they are located, should have installed risk management in a way.

3.2 Measures

The major constructs in this study include KRM, agility, innovativeness and organizational sustainability.

KRM draws upon two survey questions that asked respondents about their KRM activities. Consequently, the participants were asked whether the organization does KRM and, if yes, what knowledge risks are addressed in their KRM. The latter question consisted of a list of 16 different knowledge risks, which was derived from previous research on knowledge risks (Durst and Zieba, 2017; Durst and Zieba, 2019). The following knowledge risks were examined: knowledge loss, knowledge leakage, knowledge spillover, knowledge outsourcing risks, risks related to knowledge gaps, relational risks, risk of using disinformation or unreliable information, risk of improper applying knowledge, risks related to unlearning, risks related to forgetting, knowledge waste, knowledge hiding, knowledge hoarding, risks related to social media, risks related to cyber-crime and risks related to digitalization. To create the variable, the scores of all knowledge risks were summed to create an index that measures in sum the extent of knowledge risks addressed in the KRM ranging from 0 to 16.

To measure innovativeness and organizational sustainability, the authors asked the respondents to compare their respective organizations to those of their key competitors. Using a seven-point Likert scale, it was measured whether the organization is more innovative and more sustainable in comparison with its key competitors. Agility uses two

Table 1 Sample characteristics

Characteristic	Dimension	No.	(%)
Firm size	Micro (<10 employees)	18	10.1
	Small (<50)	20	11.2
	Medium (<250)	28	15.6
	Large	79	44.1
	Missing	34	19.0
Type of firm	Family business	21	11.7
	Non-family business	28	15.6
	Part of a corporate group	27	5.1
	Public organization	79	44.1
	Semi-public organization	13	7.3
	Missing	11	6.1



questions that ask whether the organization is more agile and has better reactivity to changes in the external environment compared to its key competitors on a seven-point Likert scale. To create the variable, an average score was calculated. Thus, this study used the so-called subjective measures to measure the above-mentioned examples of organizational performance; more precisely – subjective self-report measures were used in the study. Notwithstanding the criticism of this approach, there is clear evidence that this criticism is unjustified (Richard *et al.*, 2009; Vij and Bedi, 2015).

Following previous research on risk management, this study controlled for organizational characteristics that could influence the relationship between KRM and organizational performance. As organizational performance is the outcome of applying a broad and differentiated knowledge base (Zollo and Winter, 2002), firm size (in terms of the logarithm of the number of employees) was included in the model. Additionally, the authors controlled for the age of an organization (i.e. its level of maturity with regard to both KM and risk management) as it may influence an organization's attitude to both KM and risk management (Hoffmann *et al.*, 2013). Therefore, this study incorporated age (in terms of the logarithm of the number of years since its foundation) as a second control variable.

3.3 Statistical method

To test the hypothesized relationship between KRM and organizational sustainability, a structural equation modelling (SEM) approach was applied using the AMOS software, version 23. SEM is viewed as an appropriate technique to study multiple correlated independent and dependent variables (Wei *et al.*, 2008). To evaluate model fitness, we followed the suggestion of Hu and Bentler (1999) and used a multi-index presentation format including the standardized root mean squared residual (SRMR), the Tucker–Lewis Index (TLI), the comparative fit index (CFI) and the root mean square error of approximation (RMSEA). For a good model fit, Hu and Bentler (1999) suggest an SRMR below 0.08, an RMSEA below 0.06, a TLI above 0.95 and a CFI above 0.95.

4. Results

Table 2 reports the means, standard deviations and correlations among the major study variables.

Regarding our controls, firm size and firm age are highly correlated with each other ($r = 0.426$, $p < 0.01$). Additionally, firm age is highly negatively correlated with managing knowledge risks ($r = -0.188$, $p < 0.05$), while firm size is positively correlated with the number of knowledge risks addressed in the risk management ($r = -0.160$, $p < 0.05$).

Turning to our variables of interest, the table reports a significant positive correlation between the number of knowledge risks addressed and whether the organization uses KRM

Table 2 Means, standard deviations and correlations among variables

Variable	Mean	SD	1	2	3	4	5	6	7	8
1. Firm age ^a	2.77	1.40	1.00							
2. Firm size ^a	4.60	3.36	0.426**	1.00						
3. Manage knowledge risks ^b	1.13	1.14	-0.188*	-0.068	1.00					
4. Number of knowledge risks addressed	3.82	4.17	0.071	0.160*	0.281**	1.00				
5. Agility	3.96	1.87	-0.075	-0.092	-0.061	0.337**	1.00			
6. Responsiveness	4.10	1.43	-0.075	-0.064	-0.077	0.141	0.571**	1.00		
7. Innovativeness	4.19	1.79	-0.035	-0.062	0.336**	0.694**	0.435**	0.471**	1.00	
8. Sustainability	3.93	1.73	-0.076	-0.007	-0.075	0.279**	0.780**	0.478**	0.712**	1.00

Notes: n = 179; correlation coefficient is significant at * $p < 0.05$ (two-tailed), ** $p < 0.01$ (two-tailed); ^aFirm size is calculated by the natural log of the total number of employees; firm age is calculated by the natural log of years since firm foundation; ^bDummy-code

at all ($r = 0.281$, $p < 0.01$). Additionally, the number of knowledge risks addressed is highly correlated with agility ($r = 0.283$, $p < 0.01$), innovativeness ($r = 0.356$, $p < 0.01$) and sustainability ($r = 0.279$, $p < 0.01$).

Agility, innovativeness and sustainability are significantly positively correlated with each other (coefficients ranging from 0.654, $p < 0.01$ to 0.730, $p < 0.01$).

The path diagram in Figure 3 illustrates the entire structural model.

Results show that SRMR (< 0.08), RMSEA (< 0.06), CFI (> 0.95) and TLI (> 0.95) report a good model fit and, therefore, we conclude that our structural model provides a good fit for our data.

Turning to our hypothesis, we proposed that innovativeness positively influences the sustainability of an organization ($H1$). As can be seen, innovativeness has a significant positive effect on sustainability ($r = 0.41$, $p < 0.01$), and thus, $H1$ is supported. $H2$ proposed that innovativeness is further positively influenced by the management of knowledge risks. Results show mixed support for this hypothesis, as the mere management of knowledge risks does not have any positive effect on the innovativeness of an organization. However, it is the number of knowledge risks addressed that positively influences the innovativeness of an organization ($r = 0.16$, $p < 0.05$).

Turning to the concept of agility, we proposed that agility positively influences not only the sustainability of an organization ($H3$) but also the innovativeness ($H4$). The results illustrate a significant positive effect of agility on sustainability ($r = 0.46$, $p < 0.01$). Therefore, support for $H3$ was found. Additionally, innovativeness is significantly influenced by the agility of an organization ($r = 0.61$, $p < 0.01$), thereby supporting $H4$.

Finally, we proposed that the agility of an organization is positively influenced by the KRM of an organization ($H5$). However, our results show mixed support for this hypothesis. While the mere existence of KRM negatively affects the agility of an organization ($r = -0.17$, $p < 0.05$), the more knowledge risks addressed in the KRM, the better the agility of an organization ($r = 0.33$, $p < 0.01$). The results of the tests are summarized in Table 3.

5. Discussion

The presented results indicate that KRM can support the efforts of organizations regarding organizational sustainability. More precisely, it has been found that KRM contributes to organizational sustainability by positively influencing both agility and innovativeness.

Figure 3 Structural model of KRM, agility, innovativeness and sustainability

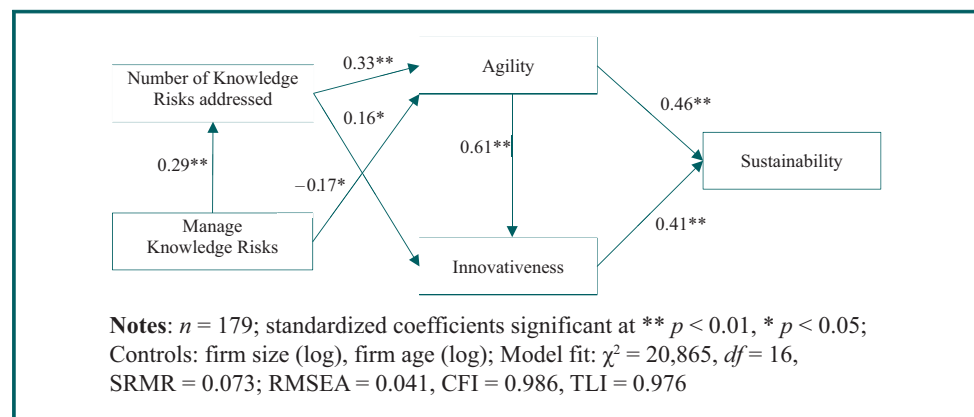


Table 3 Summary of hypothesis testing

Hypotheses	Confirmed
H1. Innovativeness positively impacts the sustainability of an organization	✓
H2. KRM positively impacts the innovativeness of an organization	~
H3. Agility positively impacts the sustainability of an organization	✓
H4. Agility positively impacts the innovativeness of an organization	✓
H5. KRM positively impacts the agility of an organization	~

Notes: ✓ = confirmed; ~ = partially confirmed; × = rejected

If innovativeness and agility are considered separately, the present study confirms the positive impact of innovativeness on the sustainability of organizations (Ahmed, 2017). The findings of the present study advance the current understanding by demonstrating that this impact seems to be present both in private and public organizations. This finding is not surprising as innovativeness is needed in all types of organizations to address sustainability and its different dimensions (Matinaro and Liu, 2017). Society at large, but also external challenges, ask organizations in general not only for new and different products and services but also for new methods and processes to remain successful (private organizations) or able to serve citizens (public organizations).

The findings suggest that being agile seems to be even more important for organizational sustainability. This might be explained by the increasing uncertainty that organizations of all kinds have to cope with. The pandemic and its consequences are a good example of the relevance of agility as it underlines that a wait-and-see approach is no longer enough; on the contrary, it can spell the end of the company (Durst *et al.*, 2021a). Having a decent and continued understanding of the risks an organization is exposed to at a certain point in time and being aware of countermeasures to address the material risks increases the likelihood of making immediate and decisive decisions too (Smith and Riley, 2012). Being agile can support organizations in meeting this requirement (Overby *et al.*, 2005). This also underlines that agility should become a key ability of all types of organizations (Gothelf, 2014). Furthermore, agility supports organizations to quickly adapt to new circumstances (Hanna and Santos Bernardes, 2009), which then can be translated into new or improved products and services as well as new and improved processes and methods (Ravichandran, 2018). At the same time, the negative relationship between KRM and agility indicates that the mere existence of risk management not only has no influence on sustainability but even has a negative impact if it is not practised systematically (in the sense of comprehensively).

The findings also clarify that the mere existence of KRM is not sufficient or even hampers organizational innovativeness and sustainability. A positive effect of KRM on organizational sustainability is only present when several different knowledge risks are addressed. This seems plausible as only when several different risks, which are also interrelated, are involved in KRM, organizations can better assess which effects on organizational sustainability are possible and based on this understanding, initiate proper measures and actions; which underlines once more that an isolated view of (knowledge) risks is inadequate.

The paper also points out the importance of knowledge risks and their relation with the KBV of the firm. Various types of knowledge bring various knowledge risks. For example, tacit knowledge hidden in employees' minds is threatened to be lost when an employee retires or leaves the company, while explicit knowledge in physical form may be endangered by theft or computer failure. These different types of knowledge are related to transferability, where tacit knowledge can be identified as knowing how and explicit knowledge with knowing about and capacity for aggregation, depending on the additivity between different elements of knowledge (Grant, 1996). Another key construct of KM is appropriability, which refers "to the ability of the owner of a resource to receive a return equal to the value created

by that resource" (Grant, 1996, p. 111). Knowledge in both forms, i.e. tacit and explicit, constitutes a problem with appropriability for various reasons, and this should also be considered in the management of knowledge risks, e.g. how to motivate employees to share their knowledge with others and not hide or hoard it. Another construct of knowledge, specialization in knowledge acquisition, requires individuals to concentrate on a certain area of knowledge to acquire, store and process due to brain limitations. This construct also brings knowledge risks, as highly educated and experienced specialists are expensive to hire and retain, especially for smaller organizations. Therefore, organizations must carefully rethink their approaches to hiring and outsourcing policies to fill possible knowledge gaps. Finally, if one considers the last construct of knowledge indicated by Grant (1996), i.e. knowledge requirements of production, it stresses an additional emphasis on the importance of knowledge and knowledge risks analysis – as knowledge is both input and output in organizations, thus, it needs to be well-protected and managed.

To sum it up, the present paper not only offers a new perspective on organizational sustainability, i.e. the perspective of knowledge risks but also approaches KM from a broader (more holistic) perspective. Based on the conducted study, it can be stated that the notion of KRM is predestined for the underlying notion of the concept of sustainability. The paper also advances the concept of organizational sustainability by adding a different way of thinking, one that considers knowledge not only as a valuable resource for organizations but also as a potential hazard that has to be integrated into the organizations' risk management.

6. Implications for research and practice

The paper's findings contribute in different ways to the ongoing debates in the literature. Firstly, it contributes to the general study of risk management by showing empirically its relevance for organizations (Tse *et al.*, 2019). In the given case, empirical evidence is provided about the relevance of risk management for organizational sustainability. Secondly, by emphasizing risks related to knowledge, this study contributes to emerging efforts highlighting the particular role of knowledge in organizations for sustainable business development (Massingham and Massingham, 2014; Durst *et al.*, 2019) in times of uncertainty in particular (Ratten, 2020; Durst *et al.*, 2021b). Thirdly, the paper also makes researchers and practitioners aware of the plethora of knowledge risks, which still is a new topic in the literature and business practice. Fourthly, by linking KRM and organizational sustainability, this paper contributes empirically to building knowledge in this very recent field of study (Durst and Zieba, 2020). This understanding is deemed useful for the further development of the fields of KM and sustainability. Fifth, the paper complements existing KM research by adding the perspective of negative phenomena brought by knowledge. In the past, knowledge had primarily been perceived as something positive that can bring only benefits to organizations. Thus, this paper contributes to the KBV theory of the firm in which knowledge is perceived as a key sustainable competitive resource (Kogut and Zander, 1992) by also presenting its potential drawbacks and risks related to knowledge. The paper constitutes a further development of the KBV theory by adding an element of risk related to the key organizational resources. Organizations must not only consider knowledge as beneficial and contributing to their competitive advantage or sustainable development but also potentially risky, especially when critical knowledge is mishandled or not protected enough. Finally, the paper proves the significance of knowledge and KRM as a potential missing link in the strategic approach including risk management, leading to sustained competitive advantage and superior business performance.

The study's findings have also practical implications. For practitioners, e.g. decision makers, in both public and private organizations, it is important to understand the link between KRM and organizational sustainability against the background of scarce resources to make the best possible use of them. It is also important that practitioners understand that

KRM can only show its benefits in general and regarding sustainability when different knowledge risks are covered, and the interconnection of these risks is considered. The study further implies that practitioners should also understand the relevance of innovativeness and agility for supporting and maintaining organizational sustainability, especially in turbulent times. Being both agile and innovative appear to be two relevant abilities for becoming and remaining sustainable, irrespective of the type of organization.

Considering the possible downsides of knowledge may as well increase the likelihood of improved decisions. For example, the awareness of the consequences of the use of outdated knowledge (one of the knowledge risks) may support organizations in their efforts in constant knowledge update and the use of updated knowledge for making better decisions. Developing and improving soft skills, such as being agile and innovative, should also be high on the list of organizational priorities. The impact of those skills on organizational sustainability has been confirmed in this study, making them even more important. Moreover, against the underdeveloped state of research that links KRM and organizational sustainability and the lack of empirical evidence on these relations, this paper contributes to the current body of knowledge by offering the missing link between KRM and organizational sustainability in the context of agility and innovativeness.

The study also has practical implications at a higher level. As the world has become even more uncertain and unpredictable, there is an immediate need for basic education of all citizens on risk management in general and its link to sustainability in particular, to be better prepared for future crises and their implications on organizations (the society as large). For example, we can observe an intensified phenomenon of hacker and cyber-attacks at the individual, organizational and national levels (Tawalbeh *et al.*, 2020; Tam *et al.*, 2021), which is an example of a knowledge risk that both individuals and organizations need not only to become aware of but also be prepared to actively act against it. This is especially crucial in case of valuable knowledge that is a source of competitive advantage and may be at risk to be lost or stolen. As the pandemic has led to a further reduction in available resources, they must be used with even greater caution by society and its members. For example, many organizations have faced severe consequences of interrupted supply chains and have needed to reorganize their production and distribution since the COVID-19 outbreak (Zeiringer *et al.*, 2022).

7. Limitations and future research avenues

As with every research, this study has some limitations which can be viewed as starting points for future research. Firstly, the study was performed with the use of personal contacts of the researchers and expanded within broader networks. This limitation results from the fact that it is increasingly difficult to research companies or professionals working in them. Secondly, this study uses a diversified sample consisting of respondents from both various countries and types of organizations; thus, different contexts (organizational, cultural, etc.) have not been considered. However, this study did not consider different cultural or organizational influences on the relationships under investigation, and rather it aimed to establish the generality of the findings among different cultural settings (Kohn, 1987). However, due to the dominant share of participants from the Americas in this study, the results are likely to be biased. Hence, to strengthen the cross-cultural validity of the results, future research should transfer the research design to specific cultural contexts to provide more insights concerning intercultural differences. Moreover, the study was based on a cross-sectional approach; thus, changes over time could not be controlled but seem relevant in the given context. Thirdly, this study used single-item measures to assess the sustainability, innovativeness, responsiveness and agility of organizations. Single-item measures are typically perceived to have low reliability (Oshagbemi, 1999), especially in cross-cultural contexts. Hence, future research could integrate multiple-item measurements

to provide more comprehensive information (Oshagbemi, 1999) to estimate measurement properties (McIver and Carmines, 1981). Future research is also invited to study the link between KRM and sustainability beyond organizational boundaries considering that all organizations are embedded in different forms of cooperation, which, in turn, increase the risk potential. More importantly, as the risks are not only multiple but also interrelated, there is a need for common KRM solutions at a higher level, encompassing a variety of different local and international actors; representing another promising research avenue. Finally, further studies could also relate to the development of the KBV of the organization from the perspective of knowledge at risk. It could be examined, for example, what kind of peculiar knowledge risks are related to tacit and explicit knowledge and how the key constructs related with this theory (e.g. transferability, appropriability) pointed out by Grant (1996) could contribute to the development of the KRM.

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