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ABSTRACT

The present paper was aimed at analyzing the influence of governance on firm's propensity for technological innovation, considering knowledge hiding as mediator. Gathering data from a sample of companies in the wine industry, a structural equation modeling was performed to test the hypotheses formulated. The results showed that the governance influences firm's propensity to implement technological innovation, and the mediating effect of knowledge hiding was demonstrated as well.

Il presente lavoro si propone di analizzare l'influenza della governance sulla propensione dell'impresa all'innovazione tecnologica, considerando la conoscenza nascosta come mediatore. Raccogliendo dati da un campione di aziende del settore vitivinicolo, è stata eseguita una modellazione di equazioni strutturali per testare le ipotesi formulate. I risultati hanno mostrato che la governance influenza la propensione dell'impresa a implementare l'innovazione tecnologica, ed è stato anche dimostrato l'effetto mediatore dell'occultamento della conoscenza.

Keywords: Governance, innovation, knowledge hiding, structural equation modelling

1 – Introduction

Over time, the concept of technology has been considered in many ways. Strictly speaking, technology refers to specific physical tools, but in a broader sense, it describes entire social processes (namely, intangible tools). Although there are analytical advantages in both narrow and broad visions, the concept's different uses invariably cause theoretical and empirical confusion. However, important and common questions arise such as: how can technologies be managed in the company? And again, what kind of knowledge transfer is activated by making investments in technological innovation?

Scholars of the past have tried to answer mainly the first question, by working implicitly with the indirectly percep-

tible aspects of physical tools or the knowledge contained in technology. However, much still needs to be analyzed regarding the second question. Conceptualizing technology as the physical representation of knowledge provides a useful basis for understanding technological change and its determinants (Baban, Baban & Rangone, 2021). Any useful technological device is in part evidence of hypotheses based on knowledge or information that has led to its creation.

The information embedded in technology varies depending on its source or the type of application. For example, science is a source of information, although scientific knowledge is rarely sufficient for the much more particular needs involved in the construction of a technological device. Other sources of knowledge include information from controlled experiments, information from trial and error, and information that falls under the categories of creativity, perceptiveness, and inspiration. This informative view of technology implies that it is an output that derives from a consciously undertaken process. Such an idea highlights the role of research in generating technologies (Baum, Lööf, Nabavi, & Stephan, 2017; Mohnen, 2019) and the importance of the knowledge transfer (Chini, 2004; Küchler, 2019). From there, technologies can be distinguished, albeit imperfectly, from the amount of information contained in them. More concretely, research and development activities play an important role in creating technology. The notions of invention and innovation are closely linked to the concept of technology. A useful distinction is associating novelty, invention, and utility with innovation. The characteristic of novelty appears in the writings of most scholars who deal with this subject. Kuznets (1980), for example, refers to the inventive step as a new combination of available knowledge. Other authors also supported this thesis (Sato & Suzawa, 1983; Rosegger, 1980). Following this perspective, human capital and its contributions have been observed and analyzed from different perspectives. A first interpretation focuses on the different types of qualities and skills, and thus the degree of importance that an individual has in the company (Cerinsek & Dolinsek, 2009; Spencer & Spencer, 1993). A second interpretation is based on the creativity (Barley, 1996) that human capital can express and confer in the company even if sometimes it seems to coincide more with a system that can be defined as "functional castes" (Florida, 2002). Nowadays, the environment in which organizations operate is completely different from the past. It is more dynamic and competitive. Global networks are expanding and interdependencies are growing (Bennet & Bennet, 2004). In the changing environment, knowledge and innovation are thriving and are seen to be among the key drivers of success (Baban *et al*., 2021; Egbu, 2004; Lengnick-Hall & Griffith, 2011; Urbancová, 2013). This involves more analyses of the second question, namely what kind of knowledge transfer is activated and how it happens by making investments in technological innovation.

In the wine industry, technological progress is profoundly changing strategies, processes and innovation management, and organizations in this sector are increasingly called upon to embrace change through innovation, especially in terms of sustainability, in order to stay competitive in the market (Marco-Lajara, Zaragoza-Sáez, Martínez-Falcó, & Sánchez-García, 2023; Sánchez-García., Martínez-Falcó, Alcon-Vila, & Marco-Lajara, 2023). The role played by governance is essential for the success of entrepreneurial projects and for developing these organisations (Nazzaro, Stanco, Uliano, Lerro, & Marotta, 2022; Spraul & Höfert, 2021; Verdi, 2019). For these reasons, it is important to establish the existence of a relationship between corporate governance and firms' propensity for innovation, as well as to identify factors that could have a negative impact on this relationship. Since the literature on this topic is still scarce (Nazzaro *et al*., 2022), the present study aims to investigate the influence of corporate governance on the propensity to technological innovation of a sample of Italian wine companies,

considering as a mediating variable knowledge hiding, i.e. the voluntary concealment of knowledge that is required by co-workers. By effectively preventing the transfer of knowledge, knowledge hiding is considered a highly risky behaviour for organisations of all types and sizes, especially those that intend to pursue a path of innovation and development (Phillips, Rothbard, & Dumas, 2009; Farooq & Durst, 2023).

Using structural equation modelling, this study demonstrates the existence of a positive correlation between governance structure and firms' propensity to innovate, confirming the mediating role of knowledge hiding as well.

The paper proceeds, in the following section, with the review of the literature that supported the development of the hypotheses. Section 3 is devoted to the methodology employed, while in the fourth section, the results of the analysis are presented. The paper closes with the discussion and conclusions (Section 5).

2 – Theoretical background and hypotheses development

According to Rong and Liu (2021), the underpinning theories of the present study are the theory of upper echelons by Hambrick and Mason (1984), knowledge management and innovation. In particular, the upper echelons theory states that the characteristics and behaviours of the top management can influence the performance of the organization (Rong & Liu, 2021), knowledge hiding concerns knowledge management theory (Rong & Liu, 2021), while innovation theory concerns firms' innovation behaviors and performance (Rong & Liu, 2021).

2.1 – *Governance and firm's propensity for technological innovation*

As regards the connection between governance and innovation, Zahra (1996) analysed the moderating impact of technological opportunities on the corporate governance. Lacetera (2001) evidenced the connection between the corporate governance and the governance of innovation in the pharmaceutical industry. By using Tobin's q models of investments, furthermore, O'Connor and Rafferty (2012) suggested that poor governance reduces innovative activity.

More recently, through the analysis of the literature and empirical evidence, the corporate governance has been considered as a pivotal means to reduce the *techno-corporate gap* of a company (Rangone, 2020) by understanding the need to invest in technological innovation. In order to achieve this aim, the executives and the related governance bodies must be aligned to manage the change both at the organizational and strategic level. This can be achieved through a technological reconversion, new business models or easier through strategic partnerships (Rangone, 2022).

In such a context, therefore, the governance provides the initial stimulus for technological change, managers become the key to its planning and the employed human resources become the operational tool for its implementation (Rangone, 2020).

Basing on the above, the following hypothesis is drawn:

> **Hypothesis 1 (H1).** *Governance is positively related to firm's propensity for technological innovation.*

However, specific factors can intervene to incentive or destabilize the correct implementation.

More recently, Nguyen, Malik and Budhwar (2022) highlighted that, due to organizational crises (leading to shutdowns, mergers, downsizing, or restructuring to minimize survival costs), employees tend to experience a loss or lack of resources, and they are more likely to engage in knowledge hiding to maintain their resources and competitive advantage. Knowledge hiding often causes significant adverse consequences, limiting the original purposes of the governance in terms of achievement of the technological innovation or even aggravating the corporate situation.

2.2 – *The mediating effect of knowledge hiding*

That knowledge is a key resource for creating value in organisations and maintaining competitive advantage is widely acknowledged in the literature (Avila, 2022; Durst & Wilhelm, 2012; Løwendahl, Revang, & Fosstenløkken, 2001; Malik & Malik, 2008; Möller & Svahn, 2006; Runar & Oskarsson, 2011). For knowledge management to be successful, knowledge must be created, protected, shared and transferred appropriately within the organization (Inkinen, 2016; Palacios Marqués & José Garrigós Simón, 2006; Singh, Gupta, Busso, & Kamboj, 2021). According to the social exchange theory (Blau, 1968), social interaction favors knowledge exchange (Liang, Liu, & Wu, 2008), but knowledge scarcity characterizing modern working environments leads individuals to ignore knowledge requests for fear of losing the power position that comes with knowledge advantage (Yuan, Yang, Cheng, & Wei, 2021). As a result, knowledge hiding is widespread in organizations of all types and sizes (Yuan *et al*., 2021). Knowledge hiding refers to "an intentional attempt by an individual to withhold or conceal knowledge that has been requested by another person" (Connelly, Zweig, Webster, & Trougakos, 2012, p. 65), and belongs to the category of "human knowledge risks" as it originates from the relationships between organizational members and concerns the social, behavioral and psychological aspects of individuals (Durst & Zieba, 2019). Knowledge hiding is therefore proving to be potentially very damaging in relation to various aspects of organizations' operations (Xiao & Cooke, 2019¸ Durst & Zieba, 2017), particularly due to the fact that people do not become "knowledge hiders" by accident, but only on purpose (Connelly & Zweig, 2014), even if they have a governance role within the organization (Arain, Bhatti, Ashraf, & Fang, 2020; Butt, 2021; Butt & Ahmad, 2019).

Knowledge concealment behaviour could influence the relationship between firms and technological innovation, and this has also been studied in the literature. Chen *et al*. (2023) analyzing the link between the psychological capital of entrepreneurial teams and the innovation performance of startups, found that knowledge hiding has a mediating effect on this relationship. Rong and Liu (2021) demonstrated the negative impact of knowledge knowledge hiding by the top management team (TMT) on the firm's ability to manage innovation knowledge. In another study, employing a multilevel linear model, the effect of knowledge hiding on knowledge innovative behaviors were investigated, finding that knowledge hiding has a significant negative impact on these behaviors (Zhang & Wang, 2021), while Labafi (2017) conducted a qualitative study on a sample of software companies, demonstrating that knowledge hiding can be a barrier to innovation as it prevents the sharing and transfer of knowledge which is essential for this type of organisation. Černe, Hernaus, Dysvik and Škerlavaj (2017) also demonstrated a negative correlation between knowledge hiding and innovative work behaviors, suggesting a solution based on multiple job design antecedents.

According to what has been found in the reference literature, the following hypotheses are formulated:

Hypothesis 2 (H2). *Governance influences knowledge hiding behaviors.*

Hypothesis 3 (H3). *Knowledge hiding mediates the relationship between governance and firm's propensity for technological innovation.*

2.3 – *Conceptual framework*

The hypotheses formulated in this study are represented in the following conceptual framework (Figure 1). According to the framework, governance (GOV) is the independent variable, firm's propensity for technological innovation (ITP) is the dependent variable, and knowledge hiding (KH) is the mediator.

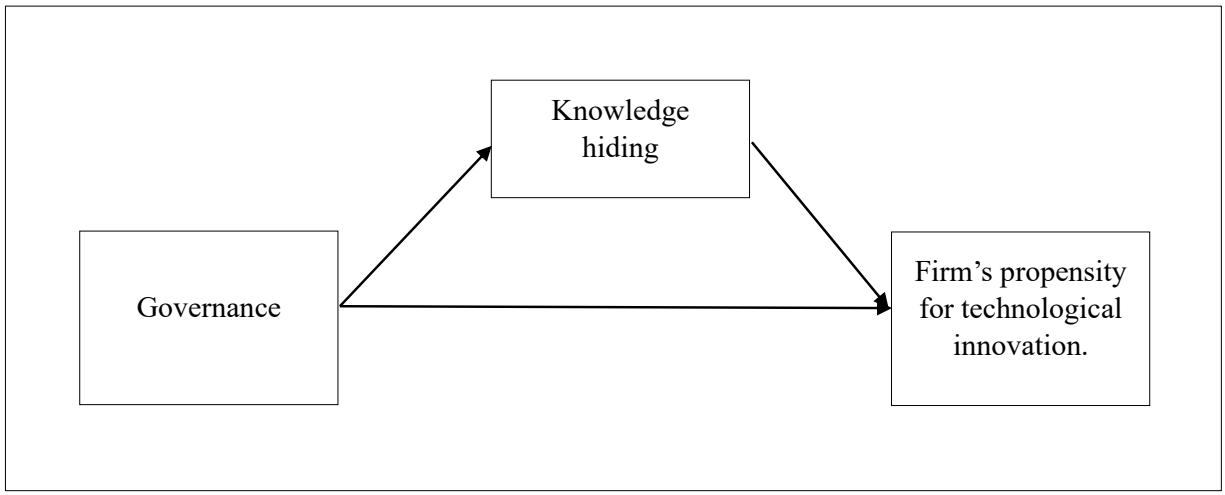

Figure 1. Conceptual framework of the study (*Source: Authors' conceptualization)*

3 – Methodology

3.1 – *Sampling and data collection*

Given the proposed research framework, a structured questionnaire (Weller, 1998) was administered to a sample of companies in the wine sector belonging to the "Confederazione Italiana Agricoltori" in the Italian region of Abruzzo. The sample was selected in view of the challenges that these companies are facing in managing technological innovation and the central role that governance plays in these organizations.

The questionnaire was administered online, through a link created with the Microsoft Forms application, and the data collection took place between January 2023 and February 2023. A disclosure accompanied the questionnaire with information on the purposes of the survey, the guarantee of anonymity, and that the collected data would only be used for research purposes. The sample size was determined using simple random sampling, and the sampling ratio was set at 27%. The questionnaire focused on the following constructs: (1) governance (GOV); (2) knowledge hiding (KH) and the firm's propensity for innovation (ITP). Data was also collected on the demographic characteristics of the participants.

3.2 – *Measures*

GOV (GOV1, GOV2) was measured using a scale by Bosch-Sijtsema and Postma (2010) and Inkpen and Tsang (2005). In this regard, key aspects are related to the firm size of the company and the corporate form. Lacetera (2001), O'Connor and Rafferty (2012), Zahra (1996) provided the base for the identification of the items related to ITP (ITP1, ITP2, ITP3). From this perspective, some sample items inspired by the literature are: "the governance structure is preponderant factor of influence for the purpose of a digital transformation of the company"; "The adoption of new technological systems has a significant impact on the reformulation of business processes and operations". KH was measured using 3 items (KH1, KH2, KH3) provided by Nguyen *et al*. (2022). Some sample items were: "I am not always willing to share my personal knowledge and experience to others"; "I willfully withhold useful information or knowledge from others because I believe they can use it for their own benefit and to my detriment".

3.3 – *Data Analysis Technique*

The hypotheses have been tested and the conceptual model has been validated using Structural Equation Modelling (SEM) technique (Hayes, 2017), using STATA software.

4 – Research findings

In this section, the findings regarding the demographics of respondents and the formulated hypotheses are presented. From the demographic profiles (Table 1), it emerged that the respondents were 61.90% women and 38.10% men, mostly (61.90%) aged between 41 and 50. 54.76% have a degree, while only the 2.38% have PhDs.

With reference to length of service, 52.38% have been working for more than 15 years, while the smallest part of the respondents (9.52) have been working for a maximum of 15 years, and the majority, with the qualification of employee (54.76%), mostly in cooperatives (73.8%). Most of the companies in which respondents work are located in central Italy (61.90%) and the majority are multinationals (64.29%).

Table 1 – Respondents' profile.

Characteristics	Categories	Frequencies	%
Gender	Female	26	61.90
	Male	16	38.10
Age	22–30	1	2.38
	31–40	5	11.90
	41–50	26	61.90
	>50	10	23.81
Education	Degree	23	54.76
	Diploma	15	35.71
	Doctorate	1	2.38

	Master's degree	3	7.14
Length of service (Years)	11–15	4	9.52
	1–5	12	28.57
	6–10	4	9.52
	>15	22	52.38
Working position	Employee	23	54.76
	Manager	19	45.24
Company form	Capital company	5	11.90
	Company of people	3	7.14
	Cooperative Society	31	73.8
	Sole proprietorship	3	7.14
Geographic Location	Center of Italy	26	61.90
	Southern Italy	16	38.10
Market location	Local company	12	28.57
	Multinational corp.	27	64.29
	National company	3	7.14

Table 2 below shows the main descriptive statistics of the items investigated. The majority of respondents agreed that governance is a preponderant factor of influence for the purpose of a digital transformation of the firm (40.48%). The respondents believe that it is useful to hire "innovation manager" for the implementation of technological innovation programs (50%), while 45.24% of them agree with the belief that the adoption of new technological systems has a significant impact on the reformulation of business processes and operations, and 42.86% believe that makes it possible to create added value compared to competitors. As for knowledge hiding behaviors, 47.62% of the respondents declared that they are not inclined to hide knowledge from colleagues, nor that they do not share knowledge for fear that colleagues will use it to their detriment (57.14%), nor that they cannot to transform personal knowledge into organizational knowledge (21.43%).

Table 2 – Descriptive statistics.

Variables	Responses	Frequencies	%
GOV1	Absolutely agree	11	26.19
	Agree	17	40.48
	Disagree	4	9.52
	Quite agree	10	23.81
	Total		100%

GOV2	I don't know, the option has never been evaluated	2	4.76
	No, the hiring of innovation managers is not considered useful	7	16.62
	No, the set-up is complete and does not require additional managers	1	2.38
	Yes, it is considered useful to hire innovation managers	11	26.19
	Yes, the structure is complete, but the hiring of innovation managers is still considered useful	21	50.00
	Total		100%
ITP1	Absolutely agree	11	26.19
	Agree	19	45.24
	Disagree	2	4.76
	Quite agree	10	23.81
	Total		100%
ITP2	Absolutely agree	14	33.33
	Agree	18	42.86
	Disagree	4	9.52
	Quite agree	4	9.52
	Strongly disagree	2	4.76
	Total		100%
ITP3	Absolutely agree	7	16.67
	Agree	16	38.10
	Disagree	9	21.43
	Quite agree	8	19.05
	Strongly disagree	2	4.76
	Total		100%
KH1	Agree	2	4.76
	Disagree	20	47.62
	Quite agree	9	21.43
	Strongly disagree	11	26.19
	Total		100%
KH2	Agree	3	7.14
	Disagree	11	26.19
	Quite agree	4	9.52

	Strongly disagree	24	57.14
	Total		100%
KH3	Absolutely agree	2	4.76
	Agree	3	7.14
	Disagree	21	50.00
	Quite agree	7	16.67
	Strongly disagree	9	21.43
	Total		100%

Table 3 shows the results of the hypotheses' analysis. The Pearson chi squared results showed a significative association between GOV/ITP. On this basis, a structural equation modeling analysis was performed to study the relationship between GOV and ITP, mediated by KH. The statistical model had an acceptable fit index ($\chi 2/df$ = 17.75 p-value = 0.0014), CFI = 0.90, TLI = 0.89 and RMSEA = 0.037). The structural relationships are displayed in Figure 2.

Table 3 – Estimation structural equation model. ***LR test of model vs. saturated: chi2(4)=17.75, Prob > chi2 = 0.0014***

	Coefficient	**SE**	**Z**	**P > |Z|**	**95% Confidence Interval**	
Structural						
KH1						
GOV2	.3333333	.2499055	1.33	0.182	-.1564724	.8231391
Constant	2.095238	.7731508	2.71	0.007	.5798904	3.610586
KH2						
GOV2	.7083333	.2436965	2.91	0.004	.2306969	1.18597
Constant	1.827381	.7539416	2.42	0.015	.3496826	3.305079
KH3						
GOV2	.5	.2472448	2.02	0.043	.015409	.984591
ITP1						
KH1	-.0494981	.0681623	-0.73	0.468	-.1830937	.0840975
KH2	.1705944	.0622573	2.74	0.006	.0485724	.2926164
KH3	-.060179	.065287	-0.92	0.357	-.1881392	.0677813
Constant	3.331889	.3261923	10.21	0.000	2.692564	3.971214
var(e.KH1)	1.498866	.3270794			.977272	2.298848
var(e.KH2)	1.425312	.3110285			.929314	2.186036
var(e.KH3)	1.46712	.3201519			.9565734	2.250158
var(e.ITP1)	.2627761	.0573425			.171332	.4030262

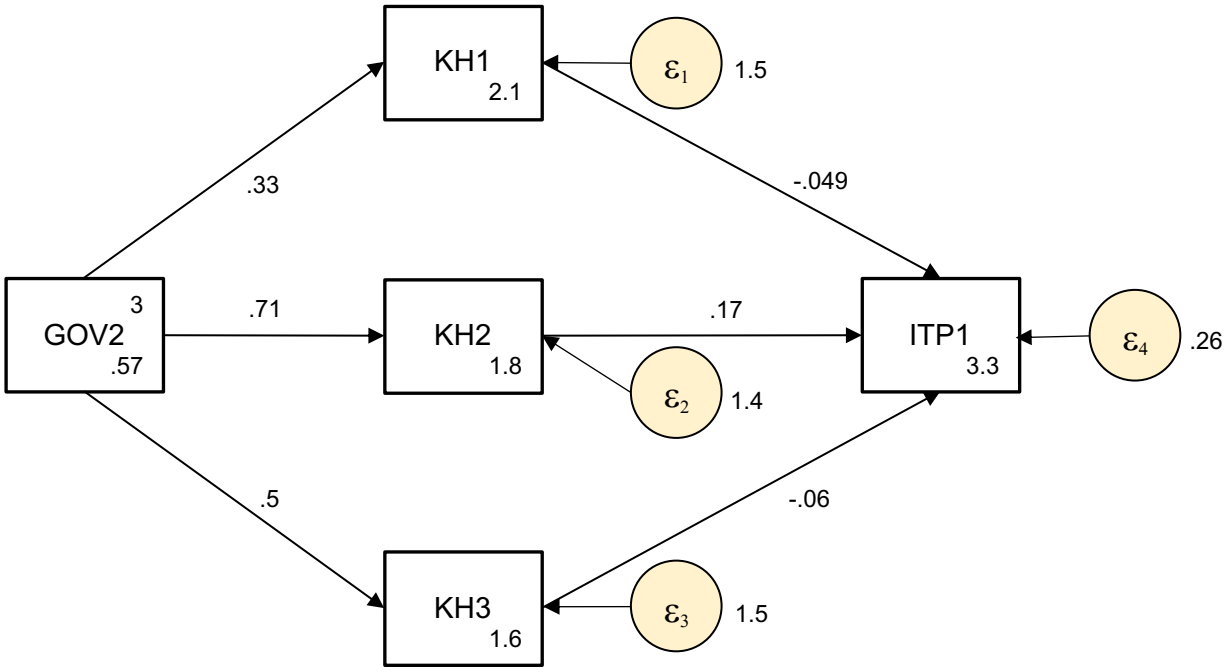

Fig. 2 – Structural equation model (*Source: Authors' elaboration)*

5 – Discussion and Conclusions

The topic of knowledge management is currently widely discussed and analysed in the academic literature. However, there are some aspects that require further investigation. In this area, and more specifically with regard to governance interventions, the reference literature is outdated in terms of innovation trends, governance and knowledge management systems in firms. Today's companies, especially those in the wine sector, can benefit not only from an enormous tradition, but also from innovative systems to support the entire production chain. From this perspective, it is necessary to understand how these links develop and what factors influence them, in a paradigm that includes governance, knowledge management and the search for innovation.

The aim of this paper was to continue what has been done in order to provide new analytical stimuli, while confirming certain postulates. The results are consistent with those of previous studies. In particular, the positive relationship between governance and firms' propensity to innovate (Hypothesis 1) was confirmed in this paper, a result that is in line with other contributions on this topic (Lacetera, 200; O'Connor & Rafferty, 2012; Rangone, 2020; Rangone, 2022; Zahra,1996). Moreover, the dataset confirms a potential criticality in innovation-related governance. It is clear from GOV 2 that it is the smaller local firms that do not consider it necessary to introduce a specific innovation management figure. This confirms what has recently been highlighted (Rangone 2020; 2022), and further defines the need to act to solve a major problem that has its roots in managerial and governance concepts that, even today, are far removed from smaller firms. The mediating role of KH was also confirmed by the results, which are consistent with other contributions in the literature (Černe *et al*., 2017. Chen *et al*., 2023; Labafi, 2017; Rong & Liu, 2021; Zhang & Wang, 2021). This study has both theoretical and practical implications. From a theoretical point of view, it attempts to contribute to the development of research on the relationship between governance and firms' propensity for technological innovation including a particular type of risk related to knowledge management as a mediator. From a practical point of view, this paper can encourage entrepreneurs to also

consider the risky side of knowledge, which in the case of KH could jeopardise the development and innovative capacity of organizations, especially in sectors such as wine-growing where technological development is significantly changing production processes.

This study is not without its limitations. Firstly, the sample is limited to a single Italian region and, secondly, only one type of knowledge risk is considered, namely knowledge hiding. Future research could extend the sample, also considering possible comparisons between the operational contexts of different countries, and other types of knowledge risks besides knowledge concealment, such as knowledge waste or forgetting or unlearning.

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