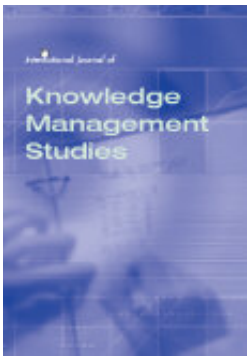

International Journal of Knowledge Management Studies

ISSN online: 1743-8276 - ISSN print: 1743-8268
https://www.inderscience.com/ijkms

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DOI: 10.1504/IJKMS.2025.10070942

Article History:

Received:	01 December 2023
Last revised:	04 September 2024
Accepted:	11 December 2024
Published online:	06 May 2025

What do we actually hide: conceptual and measurement challenges of knowledge hiding research

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Abstract: Since the knowledge hiding concept was identified a decade ago, significant progress has been made in deciphering the antecedents and consequences of this detrimental behaviour of individuals in organisations. Previous knowledge hiding studies focused very little attention on what type of knowledge [knowledge (informing), codified/explicit knowledge, or tacit knowledge] was hidden when investigating the claimed concept. Starting with a systematic literature review that identifies 'non-sharing' publications followed by a thorough examination of existing empirical research on knowledge hiding, this conceptual paper revisits the concept of 'knowledge' and its nature. It concludes that 'knowledge hiding' has not yet been adequately investigated and that the knowledge hiding concept has often been confused with information hiding. Therefore, the authors call for a broadened view to encompass different knowledge types in future research and for further development of more reliable and valid measurement instruments with defined context to sufficiently measure knowledge hiding.

Keywords: knowledge hiding; information hiding; non-sharing behaviour; systematic literature review; artefact; codified knowledge; knowledge management; KM.

Reference to this paper should be made as follows: Yang, K., Ribiere, V. and Bennet, A. (2025) 'What do we actually hide: conceptual and measurement challenges of knowledge hiding research', *Int. J. Knowledge Management Studies*, Vol. 16, No. 1, pp.1–26.

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1 Introduction

Research on knowledge sharing has illuminated the undesirable side of knowledge dynamics within organisations – the non-sharing behaviours. The most representative non-sharing behaviours include knowledge withholding, knowledge hoarding, and knowledge hiding, as identified in recent studies (Connelly et al., 2012; Das et al., 2018; Evans et al., 2015; Peng, 2013; Webster et al., 2008), with knowledge hiding attracting the most research attention. The reason why knowledge hiding became an emerging and increasingly focused research topic in the field during the past several decades could be attributed to the fact that it is usually interpreted as malicious conduct by the knowledge seeker and therefore induces harmful effects to both individual employees and the organisation. For example, knowledge hiding not only results in harmed interpersonal relationships (Connelly and Zweig, 2015), reduced individual creative performance (Bogilovic et al., 2017; Butt, 2019; Černe et al., 2014; Connelly and Zweig, 2015; Malik et al., 2019; Rhee and Choi, 2017) and decreased innovative work behaviour (Cai and Wen, 2018; Černe et al., 2017), but also jeopardises team viability (Wang et al., 2019b), team creativity (Bari et al., 2019; Bogilovic et al., 2017; Fong et al., 2018; Peng et al., 2019), and project team performance (Zhang and Min, 2019) while encouraging organisational deviance (Singh, 2019).

With due respect to the significance researchers have attached to knowledge hiding, this conceptual paper, differing from most existing studies aiming to unravel the antecedents, consequences, or contextual conditions of knowledge hiding, is dedicated to a largely neglected aspect in those studies, that is, the clarification of the knowledge hiding concept itself. To achieve this end, it begins with an exploration of what kind of knowledge is hidden in the form of a thorough examination of the knowledge hiding literature identified through a systematic literature review. Then, a reflection on the nature of knowledge is followed up to elaborate on the authors' suspicion and argument

on the knowledge hiding concept. Arguing that the terminology of 'knowledge hiding' may be misleading, this paper dissects the current understanding of knowledge in the workplace and challenges the appropriateness of the term 'knowledge hiding'. It proposes that 'information hiding' is often a more accurate description, with 'knowledge' pertaining to a capacity for action that is inherently difficult to conceal. The authors further suggest that what is often hidden is not knowledge per se but rather codified knowledge artefacts. At the end of the paper, the authors raise the cases that largely represent the essence of the concept and identify future avenues of knowledge hiding research.

By clarifying the gap between what knowledge is actually being hidden at work and what knowledge is being investigated in extant 'knowledge hiding' studies, this paper will shed light on future knowledge hiding research and provide a valuable reference for organisation management devoted to limiting knowledge hiding behaviour in work settings.

2 A systematic literature review

Recognising the emerging 'knowledge non-sharing' research stream, the authors conducted a systematic literature review (SLR) in February 2022 based on three well-recognised academic journal databases – Scopus, Web of Science, and ProQuest – to capture the research landscape. The choice of the three databases is consistent with the previous Silva de Garcia et al. (2020) study. Using 'knowledge hid*' OR 'knowledge hoard*' OR 'knowledge conceal*' OR 'knowledge withhold*' as the search terms, 1,024 articles were retrieved from the three databases. Specific queries adopted to search for relevant publications in the three databases respectively are listed in Table 1. After removing duplicates and screening full texts, then further excluding those not written in English and irrelevant (including those that were not related to knowledge management or management or pertinent to these subject areas but in which knowledge withholding, knowledge hoarding, and knowledge hiding were not investigated as the main research variables), 279 publications were retained and constituted the final dataset for subsequent analysis. Notably, research on knowledge hiding dominated this stream, with 246 out of the total 279 publications representing 88% of the whole. The remaining 33 articles dealt with knowledge hoarding or knowledge withholding. Figure 1 presents the share of the three constructs in the SLR dataset.

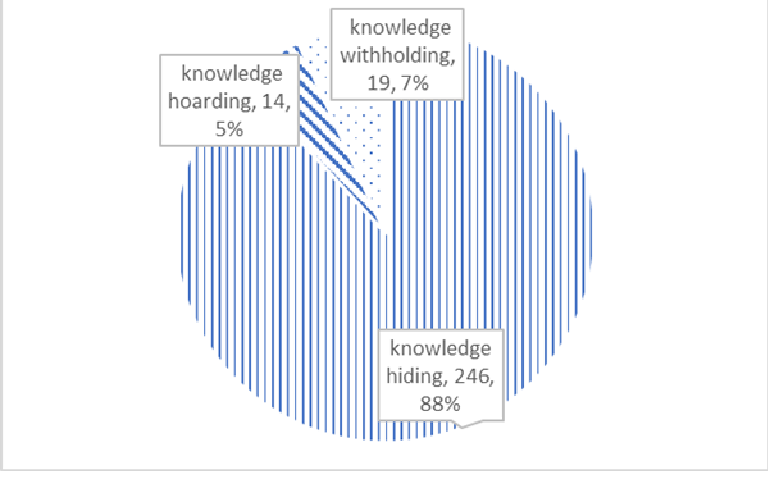
Defined by Connelly et al. (2012) as "an intentional attempt by an individual to withhold or conceal knowledge that has been requested by another person" (p.65), knowledge hiding is a multi-dimensional construct that manifests in three different strategies adopted by the knowledge holder when requested for a specific piece of knowledge – playing dumb, evasive hiding, and rationalised hiding. Playing dumb occurs when an individual professes to be unaware of the relevant knowledge requested by a coworker and is unable to provide aid while ignorance is feigned. A typical example is that the knowledge hider makes a false remark such as, "I am not knowledgeable of what you are asking for". Evasive hiding involves instances whereby an individual provides irrelevant knowledge instead of what has been requested, or promises to provide comprehensive knowledge sometime in the future, but actually has no intention to follow through with such a promise. To some extent, both of these two dimensions involve

deception. However, rationalised hiding does not necessarily involve deceiving the knowledge seeker. Since this seminal study has identified knowledge hiding as an existing organisational behaviour haunting the work environment, proliferating succeeding studies further confirmed its existence and prevalence across organisations in diverse cultures, including both leading (e.g., the USA and China) and emerging (e.g., Pakistan and India) economies (Bhattacharya and Sharma, 2019; Feng and Wang, 2019; Ghasemaghaei and Turel, 2021; Jahanzeb et al., 2019; Jiang et al., 2019; Khalid et al., 2021; Peng, 2013; Peng et al., 2019, 2021; Pradhan et al., 2020).

Table 1 Queries used to retrieve non-sharing publications in three databases

Database	*Query*	*Result*
Scopus	TITLE-ABS-KEY ((‘knowledge hid*’ OR ‘knowledge hoard*’ OR ‘knowledge conceal*’ OR ‘knowledge withhold*’) AND NOT (‘data mining’ OR ‘algorithm’ OR ‘items’ OR ‘machine learning’)) AND (EXCLUDE (SUBJAREA, ‘COMP’) OR EXCLUDE (SUBJAREA, ‘ENGI’) OR EXCLUDE (SUBJAREA, ‘ECON’) OR EXCLUDE (SUBJAREA, ‘MEDI’) OR EXCLUDE (SUBJAREA, ‘BIOC’) OR EXCLUDE (SUBJAREA, ‘ENVI’) OR EXCLUDE (SUBJAREA, ‘MATH’) OR EXCLUDE (SUBJAREA, ‘EART’) OR EXCLUDE (SUBJAREA, ‘NURS’) OR EXCLUDE (SUBJAREA, ‘PHYS’)) AND (LIMIT-TO (DOCTYPE, ‘ar’) OR LIMIT-TO (DOCTYPE, ‘cp’)) AND (LIMIT-TO (LANGUAGE, ‘English’))	256
Web of Science	TI = (knowledge hid* OR knowledge hoard* OR knowledge conceal* OR knowledge withhold*) and articles (document types) and articles (document types) and business economics or psychology or information science library science or social sciences other topics or behavioural sciences or education educational research (research areas) and English (languages)	326
ProQuest	(‘knowledge hid*’ OR ‘knowledge hoard*’ OR ‘knowledge conceal*’ OR ‘knowledge withhold*’) AND NOT (‘data mining’ OR ‘algorithm’ OR ‘items’ OR ‘machine learning’)	442
Total		1,024

Figure 1 Focus of retained publications (see online version for colours)



3 Two concerns about the 'knowledge hiding' concept

Looking closely at the knowledge hiding definition, the authors noticed two implicit and somewhat conspicuous aspects. The involvement of intent is the first issue. Knowledge is the 'know how' and intent is the power to focus the knowledge and maintain direction toward a sense of the anticipated future (Bennet, 2018). Since it can also be unconscious, there are situations where even the perpetrator themselves are not aware of their intent. According to Connelly et al.'s (2012) definition, the conduct of 'hiding' indicates the knowledge holder's intention since the request for the specific piece of knowledge is explicitly made by another individual. Otherwise, the behaviour should be categorised as 'knowledge hoarding', where no request is made by the one who demands the knowledge, and therefore, the need for the knowledge could remain unknown to the knowledge holder (Oliveira et al., 2021).

While intention can be an outcome of the planning process, it can also emerge in an instant (Bennet, 2018). The use of the word 'intentional' is problematic as it would infer holding back some important information that would help the receiver create knowledge (that is, create the capacity, potential or actual – for the present or future – to take effective action). Since people are complex adaptive systems operating in an organisational/team setting that itself is a complex adaptive system, it is hard to prove or determine the existence of a person's intention in their conduct unless they clearly state it.

The recent proposition of emotion-based knowledge hiding echoes the unconscious and instant nature of intention. Rezwan and Takahashi (2021) proposed that knowledge hiding could be a behaviour driven by individual emotion occurring under a specific circumstance with regard to one's personal goals. While knowledge hiding can be instrumental ('consciously derived from the emotion felt in the situation'), emotion-based knowledge hiding "is unconscious and derived from the feelings of the moment" [Rezwan and Takahashi, (2021), p.16]. This proposition also highlights the questionability of the involvement of an 'intention' in knowledge hiding behaviour. It is biased to assume the seeming 'hiding' behaviour bears the actor's intent without addressing the environment that could probably motivate the suspected knowledge holder to withhold what they know when requested. It would be more appropriate to say that the 'response' of an individual has the characteristics of playing dumb, evasive hiding, or rationalised hiding, but we cannot say that is an individual's 'intention'. It may 'appear' intentional as this behaviour is repeated. In this sense, if the concept is tenable, knowledge hiding should be investigated from the knowledge holders' perspective [as Connelly et al. (2012), who identified the concept, did], where a claim of intent seems self-evident. Otherwise, when studied from the knowledge seeker's stance, 'perceived knowledge hiding' (Wang et al., 2019b) or 'knowledge hiding perception' (Zakariya and Bashir, 2021; Zhai et al., 2020) will be more accurate terms that can be used to represent the concept since it is the knowledge seeker's assumption that the knowledge holder's intention is present and is being demonstrated through their behaviour.

Following this logic, the labels of the three dimensions of knowledge hiding should be rephrased if taken from a knowledge seeker's perspective – a 'playing dumb' heading would be a statement/response whereby 'the response appears to consciously pretend ignorance of the relevant knowledge'. An 'evasive hiding' heading would be where 'disinformation or misinformation is provided, with a promise of support but the

appearance of no intention to actually provide this support'. A 'rationalised hiding' heading might be where 'a justification for failing to provide the requested knowledge is provided, generally citing the inability to do so or shifting the blame to another party'. Then, 'an intentional attempt' would be changed into 'what appears to be an intentional attempt' as this behaviour is repeated. However, such rephrasing of terms raises the issue of how does a knowledge seeker know that what the (potential) knowledge holder is saying is untrue? Apparently, this complicates the matter further because it involves judgement on the knowledge seeker's level of intelligence or their personal recognition of attitude that may not be in play.

Secondly, the knowledge hiding concept is susceptible to suspicion when taking the essence and nature of knowledge into account, which is an aspect that has rarely engaged researchers' attention. Previous reviews on knowledge hiding (Oliveira et al., 2021; Xiao and Cooke, 2019) have concluded predictors across organisational levels that motivated individual employees to engage in this behaviour, detrimental outcomes resulted from it, theories that were drawn on when examining knowledge hiding phenomenon, relevant journal publications, and the discipline background and geographical distribution of the researchers. Acknowledging these efforts, this paper zooms in on a largely neglected aspect, that is, the 'knowledge' hidden under the phenomenon [see Shrivastava et al. (2021) for an exception that juxtaposed the nature of knowledge against the SECI model (Nonaka, 1994)]. For a possible answer to the question *what knowledge gets hidden*, more specifically, to have an accurate understanding as to what was concealed by knowledge holders, as investigated in the knowledge hiding literature, the authors scrutinised the empirical articles [219 out of the 246 knowledge hiding relevant publications (89%)] identified via the systematic literature review and synthesised several potential issues, as will be detailed in the following sections.

Before moving forward, the authors need to clarify that the current paper discusses the 'knowledge hiding' concept based on all relevant studies retrieved with the systematic literature review and focuses on issues identified throughout the review – the intentionality of knowledge hiding behaviour and the knowledge that gets hidden investigated in previous studies. While not possibly mentioning all relevant publications one by one, the authors endeavour to fully share whatever is relevant to the topic and insightful for future studies.

4 What types of knowledge get hidden?

In Connelly et al.'s (2012) research, the interchangeable use of the terms 'knowledge' and 'information' frequently occurred either in presenting and categorising the three dimensions of knowledge hiding or in the phrasing of the measurement they developed for the study, as exhibited in Table 2. In either the seminal paper on knowledge hiding or the researchers' subsequent studies on this topic, the researchers made it clear that they let participants define what 'knowledge' is based on their personal understanding instead of identifying what specific knowledge was requested from them (Connelly et al., 2012; Connelly and Zweig, 2015; Škerlavaj et al., 2018). This practice was found to have been employed by succeeding studies since their research (e.g., Weng et al., 2020). The three-dimensional 12-item scale they developed to measure knowledge hiding has been well acknowledged with their definition by later research on this topic. Alaydi et al. (2021) found that over two thirds of the relevant studies on knowledge

hiding utilised Connelly et al.'s (2012) scale. Either the original scale or its adapted versions (e.g., Ahmad et al., 2021; Jiang et al., 2019; Khan et al., 2021; Moh'd et al., 2021; Mohsin et al., 2021; Xu and Jiesen, 2022; Wang et al., 2019b) have been proved to possess good internal consistency and validated by numerous studies. Leaving the term 'knowledge' undefined to the respondents assisted the research process because it maintained the research at a manageable level and saved the researchers' efforts to distinguish different types of knowledge. However, the convenience it brought can not counterbalance the possible deficiencies when we take the nature of knowledge into account. The deviation between the researchers' intended knowledge content and the free interpretation of 'knowledge' on the respondents' side can result in research bias.

Table 2 Knowledge hiding measurement

Evasive hiding	Agreed to help him/her but never really intended to
	Agreed to help him/her but instead gave him/her *information* different from what s/he wanted
	Told him/her that I would help him/her out later but stalled as much as possible
	Offered him/her some other *information* instead of what he/she really wanted
Playing dumb	Pretended that I did not know the *information*
	Said that I did not know, even though I did
	Pretended I did not know what s/he was talking about
	Said that I was not very knowledgeable about the topic
Rationalised hiding	Explained that I would like to tell him/her, but was not supposed
	Explained that the *information* is confidential and only available to people on a particular project
	Told him/her that my boss would not let anyone share this knowledge
	Said that I would not answer his/her questions

Source: Connelly et al. (2012)

Some researchers flashed back to existing definition(s) of 'knowledge' in their review of the literature on knowledge hiding or knowledge management in a broader sense (see Arshad and Ismail, 2018; Semerci, 2019; Rong and Liu, 2021 for examples). However, they did not endeavour to explain to their subjects what the concept 'knowledge' accurately referred to in the realistic working environment when conducting field studies. Instead, they investigated 'knowledge hiding' as a holistic concept. More often, leaving the question 'what is knowledge' unanswered while using 'information' and 'knowledge' interchangeably and employing the measurement developed by Connelly et al. (2012) to investigate knowledge hiding is a typical practice prevalently found in the knowledge hiding literature. In addition to Connelly et al.'s (2012) knowledge hiding instrument, the one developed by Serenko and Bontis (2016) (as presented in Table 3) that inclined to consider knowledge as 'information' or 'facts' enjoyed wide recognition as well in the research field (e.g., Donate et al., 2022; Karim, 2020; Koay and Lim, 2022; Malik et al., 2019; Zakariya and Bashir, 2021). Furthermore, the blunt interchanging of 'information hiding' and 'knowledge hiding' (Mangla et al., 2021; Labafi, 2017; Mohsin et al., 2021) and the adoption of information theory in the study (Mangla et al., 2021) represented

more extreme cases that not only potentially confused the respondents but also blurred the concept itself. In most of these studies, either quantitative or qualitative, researchers generally considered 'knowledge hiding' as a holistic term without discussing the nature of knowledge, i.e., what is being withheld. Despite the assumed consensus on what knowledge is, the extant literature manifested diverse research practices. Some exceptions in the literature, as elaborated later in the following paragraphs, made additional effort beyond merely borrowing the knowledge hiding concept as it was put forward and the original measurement. These exceptions considered the content or the types of knowledge or refined the research procedures or instructions presented to respondents.

On the one hand, few studies cited definition(s) of knowledge when reflecting on the knowledge hiding construct or defined knowledge to the research subjects. More delicately, the researchers provided definitions or examples of knowledge and asked their respondents about specific incidents based on the provided knowledge. For example, Wang et al. (2019a) acknowledged that knowledge encompasses task information, ideas, know-how, and expertise relevant to performing tasks. They investigated knowledge hiding in terms of the extent to which the respondents (sales representatives) hid customer information and relationships from their coworkers. Duan et al. (2022) adapted pre-existing measurements and investigated explicit and tacit knowledge hiding. However, they also included both knowledge and information in their questionnaire and reported nothing about how to make sure the participants understood what they referred to as explicit and tacit knowledge. Similarly, Hernaus et al. (2019) addressed this typology in their research by clarifying that examples of explicit knowledge were published work and academic information, while tacit knowledge included work-in-progress and research ideas, etc. Their participants were asked to report how often they have declined requests from colleagues for the two types of knowledge; however, the questionnaire items used the term 'information', as in "I agreed to help him/her but instead gave him/her information different from what he/she wanted" (p.604). Nguyen et al. (2022) referred to knowledge as information, skills, and experiences and also categorised it as explicit or tacit. They, therefore, included 'experience' in their questionnaire as one additional manifestation of knowledge as compared to many other research.

The inclusion of experience and expertise as one type of (tacit) knowledge when investigating knowledge hiding has been observed by several researchers. Studies that employed Peng's (2012) measurement (as shown in Table 3) or its updated version, where an item reads "do not transform personal knowledge and experience into organisational knowledge" [Peng, (2013), p.415], are typical examples of this practice (e.g., El-Kassar et al., 2022; Fatima et al., 2021; Ghani et al., 2020; Guo et al., 2021; Khalid et al., 2018; Muhammad and Sarwar, 2021; Nadeem et al., 2020; Pradhan et al., 2020; Qin et al., 2021; Rubbab et al., 2022; Sarwar et al., 2021). In addition to experience, this scale also involves innovative solutions and achievements as knowledge, a same concern to Rhee and Choi (2017) and hence also a part of their scale (also seen in Table 3) that is adopted by later research (e.g., Abdillah et al., 2020; Good et al., 2022; Kim, 2021). Compared with Connelly et al.'s (2012) measurement that addressed knowledge in a relatively sketchy way by alternating the terms 'knowledge' and 'information' in general, these scales appeared to be more specific and concrete in terms of clarifying, to various degrees, knowledge content to the respondents.

Table 3 Other widely used knowledge hiding measurements

Serenko and Bontis (2016)	My fellow colleagues often communicate only part of the whole story to me.
	My fellow colleagues often twist the *facts* to suit their needs when communicating with me.
	My fellow colleagues often leave out *pertinent information* or facts when communicating with me.
Peng (2013)	Withhold helpful information or knowledge from others
	Try to hide innovative achievements
	Do not transform personal knowledge and *experience* into organisational knowledge
Rhee and Choi (2017)	I agreed to help him/her but never really intended to.
	I pretended that I did not know the information.
	I said that I did not know even though I did.
	I tried to hide *innovative solutions and achievement.*

Table 4 Specific knowledge content addressed by previous knowledge hiding studies

Knowledge content		*Relevant studies*
Information	Customer information and relationships	Wang et al. (2019a)
	'Information hiding' was used	Mangla et al. (2021), Labafi (2017) and Mohsin et al. (2021)
	Information or facts as knowledge	Donate et al. (2022), Good et al. (2022), Karim (2020), Koay and Lim (2022), Malik et al. (2019), Serenko and Bontis (2016) and Zakariya and Bashir (2021)
Explicit and tacit knowledge		Duan et al. (2022), Hernaus et al. (2019) and Nguyen et al. (2022)
Experience and expertise	Experience	Bogilović et al. (2017), Good et al. (2022) and Nguyen et al. (2022)
	Experience and expertise as (tacit) knowledge	El-Kassar et al. (2022), Fatima et al. (2021), Ghani et al. (2020), Guo et al. (2021), Khalid et al. (2018), Muhammad and Sarwar (2021), Nadeem et al. (2020), Peng (2012), Pradhan et al. (2020), (Qin et al., 2021), Rubbab et al. (2022) and Sarwar et al. (2021)
	Expertise	Arain et al. (2021a, 2021b) and Garg and Anand (2020)
Innovative solutions and achievements		Abdillah et al. (2020), El-Kassar et al. (2022), Fatima et al. (2021), Ghani et al. (2020), Good et al. (2022), Guo et al. (2021), Khalid et al. (2018), Kim (2021), Muhammad and Sarwar (2021), Nadeem et al. (2020), Peng (2012), Pradhan et al. (2020), Qin et al. (2021), Rhee and Choi (2017), Rubbab et al. (2022) and Sarwar et al. (2021)
how to do something/help learn something		Semerci (2019)
operational and strategic knowledge		Ado et al. (2021)

On the other hand, other than adopting a questionnaire acknowledging experience and innovative solutions as knowledge, several researchers, when examining knowledge hiding behaviour, expanded their efforts to instruct the respondents on what could be identified as knowledge. For example, Good et al. (2022) described knowledge to their respondents as "certain facts, experience, information, and technology that can be earned through education, learning, mastery, and experience" (p.7). Bogilović et al. (2017) asked their participants to recall a recent episode that occurred during work where knowledge was requested but they rejected the request or did not share their knowledge or experience or give all necessary information. Conversely, Arain et al. (2021a, 2021b) and Garg and Anand (2020) investigated knowledge hiding from the knowledge seeker's perspective and asked their subjects to think about an episode where they requested knowledge but got declined, consequently not obtaining the requested knowledge. In a similar vein, Semerci (2019) clarified for their respondents that knowledge hiding scenarios included those where they did not show their coworker how to do something or did not help them learn something important. Ado et al. (2021) took a different path in their research where they provided their interviewers with the criteria of classifying knowledge as operational or strategic, and then the researchers discussed and categorised knowledge from the transcripts about the interviewers' perception and description of 'knowledge control' (used by the researchers as a synonymous term to knowledge hiding) instances. The studies that addressed specific knowledge content that have been considered and investigated are exhibited in Table 4.

Despite these additional efforts, the most common cases across the literature are those where the term 'information' was used whenever knowledge was referred to, or 'knowledge' and 'information' were mixed in the scale adopted by quantitative studies or in interview questions asked by researchers conducting qualitative studies. Bearing in mind that complexity and implicitness are inherent attributes of knowledge and that such knowledge attributes are important predictors of knowledge hiding behaviours in organisations (Connelly et al., 2012; Labafi, 2017; Sulistiawan et al., 2022; Yuan et al., 2020), it is apparent that most extant research on knowledge hiding failed to address the core characteristic of knowledge when claiming they were investigating the antecedents, outcomes, or contextual conditions of knowledge hiding behaviour. It is, therefore, rational for us to believe that the result of hiding the mentioned 'knowledge' could be very diverse or even biased, given the differences in knowledge and information.

As presented in Table 4, the limited number of extant empirical studies that highlighted the content of knowledge provide sound evidence for Shrivastava et al.'s (2021) assertion that "most empirical works on knowledge hiding have tended to operationalise knowledge only as an 'explicit' object specifically requested for by another colleague" (p.646). To address the researchers' concern and to better explicate that knowledge hiding is not sufficiently investigated in the extant literature, reflecting on what 'knowledge' is, what its nature indicates, and in what sense it is related to while different from information becomes essential and inescapable.

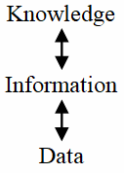
5 The emergent nature of knowledge

Knowledge is a flowing, living concept. Just as beliefs, it is inherent to the human, who is a complex adaptive system that is in continuous interaction with its environment, throughout life never long in stasis, rather expanding or declining. Early western

philosophers defined knowledge as 'justified true belief', which is a foundational definition still active in the literature of today. To justify a belief is true, you must act on it and see the results, and if those results are what you believed to be true, then indeed it is a 'justified' true belief, or knowledge. A more current refinement of this is that forwarded by Bennet et al. (2018), with knowledge described as the capacity (potential or actual) to take effective action. The 'potential' capacity is significant because it expands the importance of learning in the present to enable 'effective' decisions and actions in the future, which is the intent of education and research, and the intent of sharing thought in the writing of articles such as this one. The 'actual' capacity can be measured in terms of effectiveness (the expected result) from 0 to 100%, which provides the value of knowledge. Thus, the value is based on use, determined by how well the results of decisions and actions based on that knowledge meet human expectations. Since humans and the organisations of which they are a part are complex adaptive systems, knowledge is context-sensitive and situation-dependent, ever-shifting and changing in step with the humans and organisations using it in an often volatile and always complex environment. As early as 2005, in a study engaging 34 thought leaders spanning four continents – many of whom are recognised today as early leaders in the Knowledge Management movement – 84 per cent of the respondents tied knowledge directly to action or use and recognised that knowledge is context-sensitive and situation-dependent (Bennet, 2005; Bennet and Bennet, 2014).

Knowledge is built on and created with information. Embracing the foundational work developed by Tom Stonier, a theoretical biologist writing from the viewpoint of the evolution of information systems, information is any organised or non-random pattern, a basic property of the universe as fundamental as matter and energy (Stonier, 1990, 1992, 1997). By organisation, Stonier means the existence of non-random patterns of particles and energy fields, which are the sub-units comprising any system. In the material world, then, organisation is a physical phenomenon that can be observed in space and time. In our virtual reality, through language, information can be discovered, stored, searched, organised, combined, and used (as knowledge) to take effective action. Knowledge, information, and data are often oversimply considered hierarchically related, as shown in Figure 2.

Figure 2 Hierarchy of knowledge, information, and data

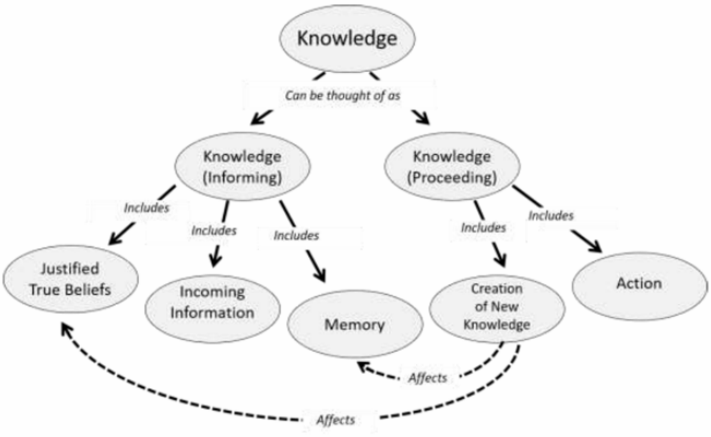


Source: Baker and Badamshina (2002, p.6)

In our exploration of 'knowledge hiding', it will be useful to understand some metaknowledge about knowledge. Building on the differentiation between Ryle's (1949) 'knowing that' and 'knowing how', knowledge can be thought about in terms of knowledge (informing) and knowledge (proceeding). Knowledge (informing) represents the information or content part of knowledge. While this is generically information (organised patterns), knowledge (informing) is information that may represent

understanding, meaning, insights, expectations, intuition, theories, and principles that contribute or conduce to effective action. It is considered as information if we see it separately; and it is only regarded as knowledge when used as part of the knowledge process (Bennet et al., 2018). Note that the same information may be considered information in one situation and knowledge in another situation. However, when information (informing) has been successfully used as a part of knowledge in the past, it is considered a knowledge artefact, which communicates its past usefulness.

Figure 3 Knowledge (informing) and knowledge (proceeding)



Source: Bennet et al. (2018)

Knowledge (proceeding) represents the process and action part of knowledge. This includes the process of selecting and associating or applying the relevant information or knowledge (informing), from which specific actions can be identified and implemented that will make for the intended outcome. Considering knowledge as a process is not a novel trend. Instead, it has an origin that can be traced to decades before. For example, Kolb (1984), in his theory of experiential learning, forwards that knowledge retrieval, creation and application require engaging knowledge as a process rather than a product. Bohm (1980, p.64) concurs, reminding that 'the actuality of knowledge is a living process that is taking place right now' and that we are an active part of this process. In Figure 3, 'justified true belief' represents the theories, values and beliefs that are generally developed over time and often tacit, which can be knowledge (informing), same as incoming information and one's memory, and affected by the creation of new knowledge, a form of knowledge (proceeding) as one's action.

Knowledge (proceeding) is often 'knowledge' hidden in plain sight, residing largely in the unconscious. For example, a chef may provide his exact recipe, yet a non-chef following this recipe exactly does not achieve the same result (taste). This is because there are nuances (the deep knowledge of the expert) that have been unconsciously embedded through experience (as embodied tacit knowledge). Another example would be an expert machinist – even on an assembly line – who can out-produce everyone else while sustaining the highest quality. Another example is a senior executive making strategic decisions – who often cannot tell you exactly how he knows what he knows, but even as situations and contexts change, his knowledge (proceeding) – the way he/she

connects knowledge (informing) and acts on it – achieves the desired results, or, in a complex decision environment, at least heads the organisation in the right direction.

6 The dilemma

That knowledge is 'justified true belief' or 'the capacity (potential or actual) to take effective action' (Bennet et al., 2018) provides a dilemma for the terminology 'knowledge hiding', or, at least, leans the concept of knowledge hiding toward the 'potential' part of our understanding. In order to 'hide' knowledge in the present, it would be necessary to 'hide' the 'effective action' or 'justified true belief', that is, the results of related decisions or actions. This is, then, more an issue of 'controlling' than 'hiding'; examples are the use of legal ownership approaches such as copyrights, patents, trademarks, etc., and non-disclosure agreements from employees, as well as holding processes and formulas close for drugs, cleaning fluids, etc., whatever is offering a competitive advantage.

The interesting point of knowledge hiding related to 'potential' is that knowledge is context-sensitive and situation-dependent. It follows the imperfect and/or incomplete nature of knowledge. That is, any small variation of the elements in the context or situation requires knowledge expansion, which in turn prompts new decisions and actions to realise the intended outcome (reducing the effectiveness of the 'potential' knowledge you have hidden). Further, in a complex environment – and all people and organisations are complex adaptive systems – it is impossible to know or even identify all the elements of a system impacting a challenge or situation, and since a system cannot exist long in stasis, there are always changes happening both within a system and in the environment in which it exists. Thus, knowledge is always partial (imperfect and/or incomplete). In other words, knowledge is the best we can create at the moment of decision for the present situation. Still further, intelligent activity involves engagement in the external reality, and the choices we make and actions we take affect the larger energy field within which we interact. Knowledge develops with use and expands when shared. Thus, through our actions, we partake in the expansion of the field, which in turn commands new ways of thinking – new knowledge – for us to be effective. When knowledge is 'ingested', when we become our knowledge and cease learning, it loses effectiveness over time; that is, it becomes a knowledge artefact. Think about a professor who continues to solely teach his theories to 20 years of students, even though newer findings occurred that would better serve those students!

With the concepts of knowledge (informing), knowledge (proceeding), and knowledge artefact taken into account, any focus on 'knowledge hiding' would deal with the knowledge (informing) part of knowledge. No matter what the researchers of the previous studies addressed as the manifestation of knowledge, i.e., explicit/tacit knowledge (in the form of work-in-progress and research ideas, as addressed by previous research), experience, expertise, innovative solutions and achievements, simple facts, or even ways to do something, they all represented the past usefulness of such knowledge, and hence more fitted into knowledge (informing), or knowledge artefact. No matter what knowledge is requested, it is only the medium, i.e., the information via which the knowledge gets communicated and transferred, that can be withheld. In other words, knowledge can only be hidden when it is purposefully not articulated and shared with

others (the knowledge holder intentionally not telling or not showing how a task is performed). Therefore, it is only the knowledge holder who can determine if any hiding of knowledge exists, where the hidden knowledge represents what the holder believes is useful based on its previous effectiveness when actioning in a particular context. This is knowledge (proceeding) to the knowledge holder which takes the form of knowledge (informing) if it gets communicated to the knowledge seeker, or is considered a knowledge artefact when repeatedly applied to new contexts. With that said, the 'knowledge hiding' concept and the extant knowledge hiding research actually mainly considered knowledge (informing) hiding or knowledge artefact hiding.

Further, the knowledge holder might withhold their knowledge with intentionality out of the consideration of protecting their knowledge as a valuable resource since the sharing of it will consume their time and energy, which are particularly demanded when the knowledge seeker's cognitive capacity to absorb the requested knowledge is not satisfying. Research that revealed emotional exhaustion positively related to knowledge hiding and vice versa represents examples drawing on the conservation of resource theory and provides evidence for the concern that resource protection consideration affects knowledge hiding (see Ain et al., 2024; Yao et al., 2020 for examples).

Moreover, even though the two dimensions of knowledge in practice, i.e., explicit knowledge and tacit knowledge, are well acknowledged in the field, our literature review found that tacit knowledge has not yet been fully addressed in the extant knowledge hiding research and measurement. The actions we take are based on both explicit and tacit knowledge. Our conscious actions are the tip of the iceberg, so to speak. Thus, there is so much to being human that is indeed 'hidden' in the unconscious, with even the actor not necessarily having access to it, just a knowing and doing. While explicit knowledge can be articulated or externalised through language, tacit knowledge can be acquired in the absence of language (Nonaka, 1994). Since it commonly stays in the holder's unconscious and, therefore, its existence remains unknown, tacit knowledge can only be learned to some extent through observation or other forms of shared experience in the socialisation process (Nonaka, 1994). To have the mind replicate the same neuronal firings as if they were taking an action (which can be shared through mirror neurons, tacit to tacit, even unconsciously), there has to be a resonance between the actor and the receiver. "While this internalisation of another's situation can be automatic, the representation of another's situation is constructed and experienced on one's own self in accordance with cognitive and emotional preferences, memory, cultural knowledge, and neuropsychological predispositions – the 'smoke' around the mirrors" (Immordino-Yang, (2008), p.158]. Clearly, learning from other's actions requires a great deal more involved than watching.

The unawareness of the existence of the demanded knowledge or the incapability to communicate it produces the result of not sharing knowledge. However, since it involves no intention of the holder, given that the holder themselves fail to realise their possession of it or are not able to voice it to others even with a strong desire to do so, this 'not sharing' incidence does not fit into the 'knowledge hiding' context, which is defined as an 'intentional' behaviour. The lack of tacit knowledge addressed in the extant knowledge hiding measurement appears to be a gap to be filled. One possible amendment that can be made to supplement the existing measurement is to clarify that the knowledge holder intentionally (the intentionality needs to be ascertained by the holder) does not showcase the requested knowledge, e.g., how to perform a specific task (Semerci, 2019), by using 'playing dumb', 'evasive hiding', and 'rationalised hiding' strategies to respond

to requests made by the knowledge seeker for engaging in shared experience and thus preventing any opportunity for the occurrence of resonance.

7 Knowledge hiding and information hiding

As our systematic literature review unveiled, the existing knowledge hiding research only addressed the hiding of knowledge (informing) or knowledge artefact, or 'codified knowledge' (as used in the ISO 30401 KM standard) if we want to refer to it with a more common and practical term in the knowledge management context. This dimension of knowledge is more about the information aspect of knowledge and is not broad enough to encompass the knowledge acquired through shared experience, such as experiences and best practices, representing a gap to be filled. The distinction between knowledge hiding and information hiding needs to be clarified since, as elaborated earlier, knowledge is different from information as a higher-level existence. If we look back at the information hiding literature, we can find that 'information hiding', interchangeably used with 'data hiding' (e.g., Gupta et al., 2014), were originally frequently used terms in discussions about communication security where preserving confidentiality and protecting copyrights are the primary concerns and steganography through digital watermarking and fingerprinting are the common relevant terminologies/techniques (Petitcolas et al., 1999; Thampi, 2008). Even though 'information' is also a term commonly used in the context of knowledge management, a search on Google Scholar by the authors using the term 'information hiding' did not locate a single publication relevant to knowledge management. Whereas 'information hoarding' seems more relevant in that the search result surfaced several articles on 'knowledge hoarding', showing the interchangeable use of 'knowledge' and 'information' in the field.

The 'hoarding' phenomenon has sparked a lot of discussions and controversies across various fields. Initially, hoarding began as a way of securing and protecting valuables in prehistory and then evolved into a sinful act in literature. Moving into the nineteenth century, it was recognised as an eccentricity and then a unique mental illness by social and behavioural scientists (Penzel, 2014), with hoarders are those who are obsessive with collecting things and have difficulties discarding possessions (Penzel, 2014), exhibiting heightened emotional attachment to objects (Kellett and Holden, 2014). Empirical research has found that concerns about memory, control over possessions, and responsibility toward possessions significantly predicted the severity of hoarding (Steketee et al., 2003). Possessions, the objects being kept, have been identified as something associated with security in the cognitive-behavioural model of hoarding (Frost and Hartl, 1996). In neurobiological and neuropsychological studies, hoarding disorder is often related to various impairments, i.e., decision-making impairment, attention-sustaining impairment, and memory impairment (Slyne and Tolin, 2014). The clear identification of hoarding as a pathology indicates the necessity of treatment and remedy. Put in the knowledge management context, the possession of interest in the hoarding phenomenon is knowledge, which is accumulated through time, while hoarders are those who keep such possessions in fear of losing power once it gets shared with others (Bilginoğlu, 2019). Since it brings detrimental consequences to organisations, knowledge hoarding is also an issue requiring managerial attention and 'therapy' in the field.

A closer look at 'information hoarding' literature reveals that the existing studies on this topic are more about the discussions of hoarding disorganised or random items such as databases, videos, images, and digital documents (Oravec, 2018) or emails, photographs, files, and software (Sweeten et al., 2018). Such randomness of the items hoarded is consistent with the habitual and accumulative nature of the defined hoarding behaviour. Based on these findings, we can conclude that 'information hiding' and 'information hoarding' are terms rarely addressed in the context of knowledge management.

Compared with 'information', the term 'codified knowledge' appears to be more specifically pertinent to the knowledge management context. The codifiablity of specific knowledge serves as one of the criteria determining whether it is mainly tacit or explicit. Tacit knowledge is developed and acquired through action and experience and is difficult to fully articulate, while explicit knowledge can be more precisely articulated and more easily codified. Whereas general knowledge can be more easily and meaningfully codified and exchanged, for its context is commonly shared, the codification of specific knowledge requires describing and defining the context (Zack, 1999). Some researchers used the term 'codified knowledge', as in 'tacit and codified knowledge' (Edmondson et al., 2003; Johnson et al., 2002; Martinez-Brawley and Zorita, 2007; Saviotti, 1998), somewhat indicating its equality to explicit knowledge.

Even though they bear some resemblance, information and codified knowledge differ when seen from the perspective of the two parties involved in the knowledge exchange, i.e., the knowledge holder and the knowledge seeker. While information seems more neutral in that it can be transferred by the holder and received by the seeker as it is, the wording 'codified' concerns also, to some extent, the holder's capability to communicate what they know. However, when it comes to the hiding of information or codified knowledge, this difference does not matter anymore, as whatever terms are used in this context, it is always the knowledge holder's hiding behaviour that interests both academics and practitioners considering, in particular, the consequences it brings about. The distinction between information, or (codified/explicit) knowledge, and tacit knowledge is especially critical when considering the SECI model's application to knowledge and information exchange. The model assumes a fluid exchange and transformation of knowledge, but when employees choose to hide knowledge or information, they essentially create blockages in the knowledge spiral.

Socialisation is impacted as the relational and trust-building component critical for the sharing of tacit knowledge is diminished. For instance, when an employee engages in 'playing dumb' as a form of information hiding, they disrupt the natural transfer and evolution of tacit knowledge that occurs through social interaction. Externalisation suffers when employees engage in 'rationalised hiding', offering excuses instead of sharing their 'uncodified' or 'experiential' knowledge. This prevents the articulation of valuable insights that could otherwise contribute to the organisation's explicit knowledge base. Combination is thrown off when employees practice information hiding by only providing partial information or distorting it, which can be understood as 'evasive hiding'. This manipulation of explicit knowledge prevents the effective systemisation of accurate and comprehensive information. Internalisation is jeopardised by knowledge hiding because it relies on the availability of explicit knowledge to be transformed into tacit knowledge through individual learning and experience. When employees withhold information, especially the codified aspects of their knowledge, it obstructs others from

fully internalising what they need to know, effectively slowing down the learning process.

Considering the above discussion, the lack of tacit knowledge addressed in the extant knowledge hiding measurement comes out as a conspicuous limitation. The existing knowledge hiding measurements (i.e., questionnaires) focused more on the explicit aspect of knowledge (or codified knowledge) and failed to address the contextual factors of knowledge, which is particularly significant when talking about its tacit component. Yet the initial knowledge hiding research regarding the tacit and explicit knowledge category has evidenced that situational factors exerted different impacts on the relationship between the antecedents and the hiding of tacit knowledge and that between the antecedents and the hiding of explicit knowledge. Hernaus et al. (2019), for example, suggest that academics hide more tacit than explicit knowledge and that the detrimental relationship between personal competitiveness and evasive hiding of explicit knowledge can be mitigated by task interdependence and social support, which, however, did not work for the association between personal competitiveness and evasive hiding of tacit knowledge. This research finding indicates that different organisation strategies and implementations are demanded in practice to deal with the hiding behaviour of different knowledge. Conversely, the interchangeable use of knowledge and information in most of the existing measurements and in defining the knowledge request scenarios might lead to confounding research findings and, further, confusion in strategy crafting within organisations. This fact provides legitimacy to our proposition that more reliable and valid measurements are needed to distinctly address different dimensions of knowledge.

8 Discussion

Delving into the question of what knowledge gets hidden in previous knowledge-hiding research, this paper generates several meaningful implications for both academics and practitioners in the field. On the one hand, it addresses the limitations of extant knowledge hiding research and provides directions for future studies. Knowledge hiding research has generally focused on the hiding behaviour itself rather than the individuals who engaged in it. Therefore, the wording 'intentional' in the definition makes more sense when this behaviour is investigated from a knowledge holder's perspective, considering that intent cannot be proved or determined by anyone other than the holder. In contrast, taking a knowledge seeker's perspective makes the 'intent' elusive, hence making the 'knowledge hiding' definition invalid and the three strategies to 'hide knowledge' questionable. For such scenarios, 'knowledge hiding perception' is a more appropriate term to be used. In this context, the three strategies – playing dumb, evasive hiding, and rationalised hiding – need to be correspondingly rephrased as they only represent the knowledge requestor's perception. Furthermore, what can be hidden is always information. Even though it represents the holder's 'knowledge' as it contributed to previous effectiveness, the hidden knowledge may always concern codified knowledge. Otherwise, why would it be hidden if it does not have any significance to effective action? Given that knowledge (proceeding) is hidden in plain sight and can hardly be exactly communicated, what has been investigated as knowledge hiding behaviour is more of 'knowledge informing hiding' or, more commonly, 'codified knowledge hiding' nature. Therefore, it is essential for future researchers, particularly

those who stick to the term ‘knowledge hiding’ and the exact research path, to understand the limitations of these studies and interpret the research findings with additional care.

The authors suggest a more reliable and valid measurement to be developed to address this shortcoming and forward knowledge hiding studies. The authors consider scenario-based experiments, used by a few researchers (see Yang and Ribiere (2020) for further details), effective in studying knowledge holders’ hiding behaviour. In a scenario, the context where the request for knowledge is made is well-defined and clarified for research subjects. In addition to those conventional written scenarios that provide instruction for research subjects, interactive ones with the help of up-to-date simulation technology, for example, will be more enticing and engaging. Ideally, participants will be able to experience realistic scenarios and have the opportunity to engage in shared activity with knowledge seekers. Therefore, if they avoid the activity on purpose (the purpose needs to be made salient by the knowledge holders themselves), researchers can conclude they engage in knowledge hiding.

For practitioners, on the other hand, it will be critical to avoid generalising strategies when endeavouring to contain knowledge hiding behaviour at the workplace, considering that different contexts encourage the hiding of different types of knowledge. Instead, specific efforts need to be made to identify what type of knowledge gets hidden in the given context as individuals engage in the hiding of different types of knowledge for different reasons. Additionally, previous knowledge hiding research delved into this behaviour from different perspectives, i.e., the knowledge holder’s perspective and the knowledge seeker’s, revealing different understandings and reactions of the two involved parties. When dealing with this undesirable hiding behaviour, management needs to be prudent in taking the suggestions made by those studies with different focuses. It is important to realise the ultimate knowledge sharing goal requires equal attention to both the knowledge holder as well as the knowledge seeker so that the right deployment can be achieved within the organisation, given that knowledge hiding is contagious (Lin et al., 2020).

Despite the meaningful exploration of the knowledge hiding concept and the hidden knowledge investigated in previous studies, this paper suffers some limitations that deserve future research efforts. First, although the authors clarified the rationality of deciphering the knowledge hiding behaviour from the perpetrator’s standpoint and from the target’s understanding, they did not examine the research findings from the existing studies involving the two different focal subjects, which can provide more insight into the antecedents and consequences of this behaviour. Likewise, a closer look into the studies focused on various aspects of the hidden knowledge will be able to surface similarities or distinctions in the motivations that induce the hiding behaviour of different knowledge types, which will allow for more indications to be generated for organisations to come up with practical countermeasures. In addition, this paper reviewed knowledge hiding studies with the aim of disentangling the focal aspects of knowledge in the extant research. Like any other knowledge hiding research, the current one aims to relieve and even remove obstacles on the way to the final knowledge sharing goal. Therefore, scrutinising knowledge hiding research in relation to knowledge sharing studies will enable us to command a broader view to achieve this objective.

9 Conclusions

This investigation into the nuances of knowledge hiding versus the concealment of its physical representation provides crucial insights for both scholars and practitioners. It underscores the intrinsic limitations of current research, which predominantly focuses on the act of hiding rather than on the individuals involved, advocating for a more nuanced understanding that recognises knowledge cannot truly be hidden – only its tangible expressions can. This distinction necessitates redefining 'knowledge hiding' as primarily about the withholding of codified knowledge, suggesting a shift towards terms like 'knowledge informing hiding'. Such a perspective enriches our comprehension of the dynamics at play, emphasising that what is often perceived as hidden knowledge is, in fact, the strategic concealment of information that embodies one's knowledge. For practitioners, the implications are clear: efforts to mitigate knowledge hiding must be context-specific, recognising the diversity of knowledge types and the various motivations behind their concealment. This approach necessitates a dual focus on both the knowledge holder and seeker within organisational settings to foster an environment conducive to open knowledge sharing, acknowledging that the perception of hiding can vary significantly between these groups.

Future research should delve deeper into the motivations and consequences of hiding different types of knowledge, exploring the perspectives of both the knowledge holder and the seeker. This expanded view will facilitate the development of more effective strategies to promote knowledge sharing and counteract the negative impacts of perceived knowledge hiding. By redefining our understanding of what it means to hide knowledge, we can better address the barriers to knowledge sharing and leverage organisational knowledge to its fullest potential.

Knowledge hiding is distinct from knowledge sharing and merits its own analysis, as it affects not only those directly involved but also influences bystanders, fostering a detrimental workplace culture (Skerlavaj et al., 2023; Černe et al., 2012; Jahanzeb et al., 2019; Zhao et al., 2023). Yet, it is crucial to recognise the nuanced nature of knowledge hiding. Contrary to the prevailing focus on its negative implications, certain instances of knowledge hiding may actually foster learning and development by encouraging self-driven discovery and problem solving (Yang and Ribiere, 2020). This paradox suggests that, under specific conditions, withholding knowledge can lead to innovation and personal growth. Nonetheless, distinguishing between constructive and destructive forms of knowledge hiding is essential to prevent its misuse, which could undermine collective learning and organisational progress. The literature, thus far, has underexplored the strategic aspects of knowledge hiding, indicating a need for expanded research to encompass both its positive potentials and its risks. Future studies should delve into the complex dynamics of knowledge hiding, including its impact on organisational and societal knowledge processes, to refine our understanding and guide effective management practices (Skerlavaj et al., 2023; Shrivastava et al., 2021; Cegarra-Navarro et al., 2020). Embracing a broader perspective that acknowledges the dual facets of knowledge hiding will enable a more nuanced exploration of its role in knowledge creation and dissemination.

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