7th European Conference on Industrial Engineering and Operations Management
Augsburg, Germany, July 16-18, 2024
Publisher: IEOM Society International, USA DOI: 10.46254/EU07.20240209
Published: July 16, 2024

Innovative Approaches to Knowledge Management: The Role of Novices in Knowledge-Intensive Maintenance Environments

Hamid Roham and Jorge F.S. Gomes
Lisbon School of Economics and Management, University of Lisbon
Portugal
Hamid.roham@outlook.com, jorgegomes@iseg.ulisboa.pt

Abstract

In knowledge-intensive industries, effective management and sharing of knowledge within maintenance departments are critical for operational success. This paper presents an innovative approach to knowledge management (KM) and knowledge sharing (KS) by harnessing the untapped potential of novices within maintenance departments. In this study, novices were empowered to transition from passive participants to active facilitators of KS by undertaking the task of training experienced colleagues, aiming to bridge the gap between passive knowledge absorption and active participation. The study also investigates the impact of individual factors and organizational factors on KS within maintenance departments of a knowledge-intensive industry, considering the moderating effect of "training by novices." The study used a questionnaire to assess various dimensions of KM and KS, administered to maintenance department personnel. Concurrently, novices played a pivotal role in developing extensive training materials over a one-year period, supported by collaborative sessions with seasoned experts. The program's impact was evaluated through a combination of closed-ended and open-ended questions, exploring participants' experiences and perceptions. Findings revealed a transformation in KM and KS dynamics, highlighting the effectiveness of engaging novices as facilitators in driving KS within the maintenance department. This study provides empirical insights into the role of novices in enhancing KM and KS practices and offers recommendations for organizations seeking to harness the untapped potential of their workforce in driving innovation and efficiency. Furthermore, the study proposes a conceptual model that illustrates how training by novices moderates the impact of influencing factors on KS within maintenance departments of knowledge-intensive industries. The study contributes to the evolving discourse on knowledge dynamics within industries, advocating for inclusive strategies that harness the diverse expertise of all personnel in driving organizational innovation and efficiency.

Keywords
Knowledge management, knowledge sharing, industrial maintenance, knowledge-intensive companies, novices.

1. Introduction
In the ever-evolving landscape of knowledge-intensive industries, where knowledge and expertise are central to organizational competitiveness, to effectively manage and share knowledge within maintenance departments is widely acknowledged. KM is a process that involves creating, generating, capturing, storing, sharing, and using knowledge to support and improve individual performance (Ismail and Yusof, 2010). KS stands out as the most vital process among all KM initiatives. KS occurs when members of an organization exchange information, ideas, suggestions, and expertise among themselves (Bartol and Srivastava, 2002). The literature underscores the pivotal role of KM and KS in fostering innovation, improving operational efficiency, and ensuring adaptability in the face of industry dynamism. Organizations are increasingly acknowledging the necessity to transcend conventional paradigms, adopting more inclusive strategies to leverage the diverse knowledge resources within their workforce. Maintenance stands as one of the pivotal departments within knowledge-intensive industries. Maintenance is defined as "the combination of all of technical, administrative and managerial actions performed during life cycle of an item intended to retain it in, or restore it to, a state in which it can perform the required function" (Márquez, 2007).

Traditional models of KM and KS have historically favored top-down approaches, often neglecting the potential contributions of personnel at various levels, particularly novices. While novices have traditionally been seen as passive knowledge consumers, recent studies advocate for a fundamental reassessment of their potential contributions (Gomes and Roham, 2023). The idea behind such proposal suggests that novices, with their fresh perspectives and unbridled curiosity, can actively participate and even facilitate the intricate processes of KM and KS. In fact, although the existing literature emphasizes the challenges faced by novices, such as the limited access to tacit knowledge, the fact is that such challenges also underscore the need for innovative strategies that empower novices not only to absorb knowledge but also to actively engage in its creation and dissemination.
This paper contributes to the existing literature by presenting a program focused on engaging novices as facilitators in KM and KS initiatives within maintenance departments. By recognizing and harnessing the unique qualities of novices, the study aims to bridge theoretical concepts with practical implementation, exploring the tangible implications of such an approach in real organizational settings. Furthermore, this study introduces a conceptual model that elucidates how training by novices moderates the relationship between individual factors and organizational factors with KS within maintenance departments of knowledge-intensive industries.

In summary, this study lays the groundwork for a comprehensive exploration of the transformative potential inherent in engaging novices as active contributors to KM and KS. As organizations navigate the complexities of knowledge-intensive industries, understanding and leveraging the diverse expertise within their workforce emerges as a strategic imperative for sustained innovation and operational excellence.

2. Literature review

2.1 Introduction

An organization's performance is intricately tied to the utilization of its resources and the contextual characteristics of its environment Liebowitz and Frank (2016), and these resources encompass four fundamental types: human, material, financial, and knowledge. Bennet and Bennet (2004) define knowledge as the capacity, whether in its potential or actual form to undertake effective actions in diverse and uncertain situations. The relevance and importance of knowledge is becoming increasingly critical in business as we transit from an industrial era into an information and knowledge era (Schwartz, 2005). KM is an attempt to spread useful knowledge in the organization (McInerney and Koenig, 2011) and could simply be defined as ”doing what is needed to get the most out of knowledge resources“ (Becerra-Fernandez and Sabherwal, 2014).

Knowledge-intensive industries are characterized by sectors in which the generation, application, and management of specialized knowledge play a central role in organizational activities and competitiveness. The contemporary landscape of knowledge-intensive industries underscores the pivotal role played by KM and KS in sustaining operational success. As organizations grapple with the complexities of managing and disseminating knowledge, the importance of effective KM and KS has become increasingly evident. A significant challenge faced by knowledge-intensive firms arises when employees possessing substantial knowledge depart from the organization (Rybo Molin and DAHLBERG, 2018).

Researchers in the past decades have introduced several KM processes, encompassing activities associated with both tacit and explicit knowledge. These processes include discovering, capturing, sharing, and applying knowledge to enhance organizational effectiveness in a cost-effective manner (Wong et al., 2015). The dissemination of knowledge involves the communication of explicit or tacit knowledge to other individuals. Knowledge transfer and sharing within the entire organization occur through activities such as attending seminars, workshops, and assigning mentors to new recruits, as outlined by Wong et al. (2015).

The success of KM initiatives is intricately tied to and is contingent upon KS (Wang and Noe (2010). It can be posited that KS constitutes a critical component of KM. The increasing focus on KS in both research and practice is attributed to its potential benefits for individuals and organizations, as highlighted by Yi (2009). When individuals provide any part of their knowledge to others, they are involved in KS (Bartol and Srivastava, 2002). KS represents a social activity that occurs within a system where knowledge represents a resource that has a value (Rolfsen, 2013).

Attaining a competitive advantage necessitates more than relying on staffing and training systems that emphasize the selection or acquisition of specific knowledge, skills, abilities, or competencies among employees (Brown and Duguid, 1991). Organizations must also address the crucial aspect of transferring expertise and knowledge from experienced experts to novices who require this knowledge (Hinds et al. (2001).

Organizations must prioritize and enhance the utilization of knowledge-based resources already present within the organization (Damodaran and Olphert, 2000). Among knowledge-centered activities, KS stands out as a

fundamental means through which employees can actively contribute to knowledge application, foster innovation, and ultimately contribute to the organization's competitive advantage (Jackson et al., 2006). Effective KS among employees, both within and across teams, enables organizations to exploit and capitalize on their knowledge-based resources (Cabrera and Cabrera, 2005). Extensive research has showed a positive correlation between KS and various beneficial outcomes, including reductions in production costs, accelerated completion of new product development projects, improved team performance, enhanced firm innovation capabilities, and overall firm performance metrics such as sales growth and revenue from new products and services (Mesmer-Magnus and DeChurch, 2009).

2.2 KS tools and techniques

According to Zheng (2017), the fundamental characteristics of KS encompass several key elements: 1) KS is regarded as a primary individual behavior; 2) it is characterized by voluntary and proactive behavioral engagement; 3) KS is influenced by environmental systems or procedures, such as legal and ethical standards, codes of conduct, and habitual practices; and 4) the outcome of KS results in shared possession by two or more parties. KS can occur through written correspondence or face-to-face communications, facilitated by networking with other experts, or through documenting, organizing, and capturing knowledge for others (Cummings, 2004). Some common KS tools include:

- Formal Training: Involves standardized training content for all team members and is used to share explicit knowledge verbally or visually.
- Written Reports: Used to document explicit knowledge in either hardcopy or softcopy format.
- Periodic Meetings and Workshops: Serve as traditional forums where individuals or team members convene in a designated space to engage in face-to-face discussions, facilitating the exchange of knowledge.
- Mentoring and Coaching Programs: Serve as effective management tools that support interpersonal processes and direct interactions among team members to reinforce KS.
- Face-to-Face Interaction: Involves personal communication through verbal and body language discussions.
- KS Systems: Refer to Information Technology that supports KM activities, such as video conferencing, groupware, and online communities.
- Email: One of the most widely used techniques for KS within organizations, both internally and externally.
- Cloud Computing: A modern technology providing large data centers that enable users to access data from anywhere.

2.3 Factors affecting KS

Previous research has identified over 40 factors that potentially influence KS. The most significant ones are outlined below.

Organizational culture

A frequently emphasized essential component of KS is culture. Goodman (2007) recognizes culture as a factor that promotes KS within an organization. This knowledge culture should be integrated into the routine operations of the organization, permeating every aspect of the business. The shared values, beliefs, and standards that constitute organizational culture play a crucial role in knowledge exchange (Lee and Ahn, 2007). A culture that promotes KS contributes to an efficient KM network, fostering an environment where KS is viewed as a constructive part of the organizational ethos (Al-Alawi et al., 2007). Organizational cultural elements emerge as pivotal in facilitating the exchange of valuable knowledge, emphasizing the significance of a supportive cultural foundation for effective KS (Søndergaard et al., 2007).

Enhanced reputation

Enhanced reputation appears to be a significant extrinsic motivator for KS (Kankanhalli et al., 2005). A positive reputation serves as a crucial asset for employees, earning them respect and proving vital for job security and advancement (Kankanhalli et al., 2005). Studies indicate that KS can be driven by a desire for peer recognition, as employees perceive that sharing valuable knowledge enhances their workplace reputation (O'Dell et al., 1998). The notion that sharing knowledge can bolster one's reputation within the workplace serves as a motivating factor for individuals.

Extrinsic motivation

Extrinsic motivation for behavior is grounded in the prospect of obtaining an external outcome from engaging in the activity. The outcome serves as the primary driver for participating in the behavior (Ryan and Deci, 2000). Within the context of KS, an "external outcome" refers to the perceived external benefits individuals can gain

from participating in KS. Thus, specifically, extrinsic motivation entails individuals being driven to share knowledge based on their perceptions of the external benefits they can obtain, such as tangible rewards (e.g., money, promotion, job security), reciprocal relationships (Bock et al., 2005), verbal rewards (e.g., feedback, praise; (Michailova and Husted, 2002), and enhanced reputation (Wasko and Faraj, 2005). Extrinsic motivation is considered important in motivating employees to perform in a coordinated and goal-oriented manner (Osterloh and Frey, 2000).

Anticipated reciprocal relationships
When individuals perceive that engaging in KS can enhance their interpersonal connections, they are more inclined to develop favorable attitudes toward sharing. Empirical evidence indicates a positive correlation between anticipated reciprocal relationships and attitudes toward KS. A study using the ”Theory of Reasoned Action“ explored how social capital influences organizational KS (Chow and Chan, 2008), and found that social capital, particularly social and network relations, positively influences attitudes toward KS. This conclusion aligns with prior research by (Bock et al., 2005) and (Lin, 2007), which also identified the positive impact of anticipated reciprocal relationships on attitudes toward KS.

Intrinsic motivation
In the realm of research on KS behavior, intrinsic motivation has increasingly captured attention, with its significance firmly established in prior studies (Foss et al., 2009). While intrinsic motivation is not a new concept within the KS literature, several studies have delved into its impact on KS. For example, Gagné (2009) conducted a conceptual inquiry linking need satisfaction with employee attitudes and intentions regarding KS. Moreover, empirical investigations have incorporated intrinsic motivation into KS models, with some studies treating it as a unified construct. For instance, Foss et al. (2009) developed and validated a model to explore the influence of intrinsic and extrinsic motivation on employee KS behavior, revealing a significant effect of intrinsic motivation on both knowledge dissemination and reception.

Intention to share knowledge
Intention refers to an individual's subjective likelihood of engaging in specific behaviors (Alajmi, 2012). Ajzen and Fishbein (1975) suggest that intention reflects the motivational aspects shaping behaviors, indicating an individual's willingness and readiness to act. Therefore, an individual's intention to share knowledge significantly influences their actual behavior of sharing knowledge with others. Studies indicate that the most effective way to forecast whether an individual will engage in a particular behavior is by assessing their intention to do so (Ajzen and Fishbein, 1975). However, the intention to share knowledge may not always translate into actual KS behavior unless appropriate external controls or stimuli are considered (Yang and Farn, 2009). They also found that trust based on affect can enhance employees' inclination to share tacit knowledge, particularly within an informal environment.

Expected reward and association
In accordance with economic exchange theory, individuals act based on rational self-interest. Consequently, knowledge sharing is expected to take place when the perceived rewards align with expectations (Kuo, 2013). These rewards may encompass both monetary incentives, such as profit sharing and bonuses, as well as non-monetary rewards like paid time off. Numerous studies have shown that incentives play a significant role in influencing knowledge-sharing behaviors (Jahani et al., 2011). However, while certain researchers have posited that rewards linked to KS positively impact individual knowledge contributions within organizations (Bartol and Srivastava, 2002), others, like Osterloh and Frey (2000), have suggested that intrinsic motivations are more potent drivers of knowledge sharing compared to extrinsic incentives such as monetary or administrative rewards. These viewpoints warrant further exploration into the influence of rewards on knowledge sharing within organizations.

Attitude toward KS
Attitude is recognized as a fundamental factor shaping behavior. Defined as "a person's favorable or unfavorable evaluation of an object" (Ajzen and Fishbein, 1975), attitude represents a general predisposition that influences one's intention to engage in specific behaviors (Ajzen and Fishbein, 1988). According to Ajzen and Fishbein (1975), the strength of this intention hinges on an individual's subjective probability of performing the behavior. The relationship between attitude toward KS and the intention to share knowledge has been substantiated by the Theory of Reasoned Action (Ajzen and Fishbein, 1975), as well as in various studies exploring KS dynamics (Welschen et al., 2012). For instance, Welschen et al. (2012) identified positive associations between favorable attitudes toward KS and intentions to share knowledge.

2.4 Challenges in achieving optimal KS

While the significance of KS is widely acknowledged, organizations encounter persistent challenges in fostering a culture of openness and collaboration. The unwillingness of employees to engage in KS poses a substantial hurdle. Employees might experience anxiety about relinquishing ownership of their personal knowledge (Paulin and Suneson, 2015). According to Riege (2005), a significant impediment to implementing effective KM and KS is individuals' reluctance to share, rooted in their inclination to guard what they know as a form of personal intellectual property.

Unraveling this challenge necessitates an exploration of why, despite the acknowledged significance of KS, individuals remain hesitant. According to Pilsmo (2010), for knowledge-intensive businesses, navigating this challenge is complicated by individuals' innate survival instinct. KS is perceived as contradictory to human nature, creating a paradox where withholding information is deemed more advantageous than sharing, leading to a power struggle (Dunford, 2000). Additionally, the potential for inducing conflicts of interest further complicates the landscape of KS (Matzler et al., 2011).

Bock et al. (2005) identify this as a fundamental challenge in the KM process, highlighting the difficulty in motivating people to share their knowledge, citing factors such as the perceived scarcity and financial value of knowledge. Numerous examples exist where KS practices have not accomplished their objectives to manage companies' knowledge assets and skills, mainly due to the large diversity of potential sharing barriers (Riege, 2005). Moreover, factors at both the individual and organizational levels, such as the fear of job loss, lack of trust in colleagues, and pursuit of personal gain, often serve as drivers behind the reluctance to share knowledge. Therefore, organizations must address these challenges to overcome these barriers and facilitate effective KS.

According to Virtanen (2011), two crucial aspects of the KS process involve externalization of knowledge through organizational resources and its subsequent internalization by the recipient, both of which should be considered and facilitated for successful KS. From an economic standpoint, the value of knowledge is contingent upon its scarcity, with individuals holding critical knowledge reaping benefits. Riege (2005) contends that experts should freely share their knowledge for the overall advancement of the organization, emphasizing the potential benefits for both the organization and the individual expert. Azeem et al. (2021) underscore the necessity of giving more attention to the KS process, emphasizing that without sharing, organizations may encounter challenges, highlighting the imperative of sharing and disseminating knowledge for organizational prosperity.

2.5 KM and KS at maintenance

Within the dynamic landscape of knowledge-intensive industries, the efficacy of KM and KS is pivotal. Maintenance tasks often encompass a range of diverse and non-standardized activities across different systems, necessitating a variety of skills and competencies to diagnose and address issues effectively (Chirumalla et al., 2015). Within knowledge-intensive maintenance departments, the exigency of effective KM and KS is amplified. The intricate and dynamic nature of maintenance operations necessitates a robust framework for handling and sharing knowledge. Within maintenance activities, organizations face not only the typical barriers to KM and KS but also a series of distinct challenges specific to this field. The complexity of maintenance processes encounters a notable obstacle: employee resistance to KS. As highlighted by Abdullah et al. (2009), this reluctance emerges as a significant barrier, acknowledged as one of the most challenging issues in KM. Encouraging staff to share knowledge stands as a paramount challenge for many organizations (Al-Hawamdeh, 2003). Nevertheless, despite the acknowledged significance of KM and KS, numerous organizations encounter challenges in implementing efficient KS practices, especially with regard to novice or inexperienced employees (Gomes and Roham, 2023). Effective KM and KS practices become paramount in ensuring the seamless functioning of maintenance activities, minimizing downtime, and optimizing resource allocation.

2.6 Role of novices in KM and KS

Research on KS underscores the importance of organizations comprehending the process of transferring expertise and knowledge from knowledgeable experts to novices who require such knowledge (Wang and Noe, 2010). A novice is defined as a learner with no prior experience, causing them to struggle with determining which tasks are most relevant to accomplish. The novice learns and develops skills by receiving instructions from someone more knowledgeable on how to perform specific actions (Benner, 1984). The expansive part of KM involves training novices to become competent members of the activity, as it is routinely carried out (Boer, 2005). Novices in maintenance are confronted with the demanding task of navigating dynamic and constantly evolving environments, posing obstacles to their acquisition of pertinent job-related knowledge. The ever-changing nature of their work exposes them to diverse situations and challenges, further complicating their learning process. Additionally, novices in maintenance may encounter difficulties in KS, as seasoned workers may exhibit reluctance to impart their expertise. Consequently, novices may find themselves lacking the guidance or

mentorship of experienced colleagues, necessitating them to navigate their learning journey independently. While traditional perspectives might view novices as passive recipients, contemporary literature highlights their potential as active contributors to the knowledge ecosystem (Gomes and Roham, 2023). Novices with their fresh perspectives and eagerness to learn, can influence organizational learning processes.

2.7 Rationale for leveraging novices as facilitators

Maintenance managers grapple with the task of transferring expertise and knowledge from seasoned professionals to novices (Hinds et al., 2001). Yet, the strategies for conveying and managing this knowledge often rely on tacit knowledge acquired by maintenance staff, which poses challenges for documentation and analysis (Cárcel-Carrasco et al., 2020). KS remains uncommon in many organizations, particularly within the context of maintenance operations. Recognizing and mitigating the educational and training gaps among novices is widely acknowledged as a critical challenge hindering KS within maintenance contexts (Chirumalla et al., 2015). To address the challenges posed by KS, there is a growing rationale for exploring innovative approaches. Leveraging novices as facilitators emerges as a compelling strategy. The unique perspectives, fresh insights, and enthusiasm of novices present an untapped resource that can potentially transform the dynamics of KS.

2.8 Addressing KM and KS gaps: leveraging novices

A critical analysis of the current literature on KM and KS has uncovered significant gaps and unexplored territories within this domain, emphasizing the pressing need for research to bridge these deficiencies. These identified gaps underscore the urgency of leveraging novices as facilitators in knowledge-intensive maintenance departments through the application of quantitative methodology. This approach seeks to introduce innovative insights and methodologies, ultimately aiming to revolutionize the landscape of KM and KS practices within organizations. Through quantitative research method, these gaps can be effectively addressed, fostering a culture of continuous learning and improvement.

2.9 Summary

In conclusion, the literature review establishes a solid foundation by encapsulating the rationale, theoretical foundations, and gaps in existing literature, setting the stage for the subsequent methodology section. This comprehensive understanding of KM, KS, and the potential role of novices as facilitators underscores the need for a focused quantitative research approach in knowledge-intensive maintenance departments. The exploration of theoretical frameworks, development of a conceptual model, and identification of gaps contribute to a nuanced perspective that underpins the proposed quantitative research.

3. Method

This section elucidates the research design and approach employed in this study to provide insight into the systematic process undertaken. It outlines the steps taken to address the research questions, emphasizing a quantitative research methodology for a thorough examination. Specifically, this study aims to investigate the utilization of novices as facilitators in KM and KS within maintenance departments, and to explore how they moderate the relationship between influencing factors affecting KS in knowledge-intensive maintenance departments.

Research design

The research design of this paper involves investigating factors influencing KS in maintenance departments of knowledge-intensive companies. It utilizes quantitative approach to provide a comprehensive understanding by taking following steps:

3.1 Literature review and theoretical framework

A comprehensive literature review was conducted to identify existing theories and concepts related to KM, KS, and the role of novices in organizational learning. Theoretical frameworks from literature were synthesized to inform the development of the conceptual model, ensuring a robust foundation for the study.

3.2 Variables and questionnaire development

During the initial phase, an extensive literature review informed the selection of 14 scales. The construction of the questionnaire was guided by prominent references, including Fullwood (2014), Karamitri et al. (2020), Oyemomi (2017), and Welschen (2014). By leveraging the expertise and findings from these sources, the questionnaire was crafted to capture essential aspects relevant to the research objectives. The incorporation of insights from these reputable references ensures a robust and well-founded instrument for data collection in this study. Following the research, those that were uncorrelated were omitted, leaving 8 independent, one moderator,

and one dependent variable. These variables, which have been described in the literature review, are presented in Table 1.

Table 1. Variables

Variable	Number of items	Reference
Intrinsic motivation	4	(Karamitri et al., 2020)
Attitude towards KS	4	(Fullwood, 2014)
Intention to share knowledge	4	(Fullwood, 2014)
Culture	5	(Oyemomi, 2017)
Extrinsic motivation	4	(Karamitri et al., 2020)
Expected rewards and associations	5	(Fullwood, 2014)
Anticipated reciprocal relationships	3	(Welschen, 2014)
Reputation	3	(Welschen, 2014)
Training by novices	1	(Gomes and Roham, 2023)
Knowledge Sharing	11	(Oyemomi, 2017)

3.3 Research questions

Before delving into the specific inquiries driving this study, it is paramount to establish the broader context in which KS operates within maintenance departments. As organizations increasingly recognize the pivotal role of KM in sustaining operational efficiency, it becomes imperative to dissect the multifaceted factors influencing KS practices. In this section, we embark on a journey through the research questions guiding our investigation, aiming to unravel the intricate interplay between individual attributes, organizational structures, and the transformative potential of novel training approaches led by novices.

Question 1: What are the key factors influencing KS within knowledge-intensive maintenance domains?

Question 2: How does the involvement of novices in training impact and facilitate KS within knowledge-intensive maintenance domains?

Question 3: What is the relationship between the effectiveness of "training by novices" and the influence of various factors on KS behaviors within knowledge-intensive maintenance contexts?

3.4 Hypothesis

In formulating the hypotheses for this study, a comprehensive examination of the research questions and the underlying theoretical framework has led to the articulation of the following hypotheses. These hypotheses serve as the structured propositions that guide the empirical investigation, providing a clear and testable framework for exploring the intricate dynamics of KS within knowledge-intensive maintenance departments.

Hypothesis related to factors which influence KS in maintenance context:

H1: There is a positive relationship between intrinsic motivation and KS within the knowledge-intensive industrial maintenance domain.

H2: There is a positive relationship between attitude towards KS and KS within the knowledge-intensive industrial maintenance domain.

H3: There is a positive relationship between intention to share knowledge and KS within the knowledge-intensive industrial maintenance domain.

H4: There is a positive relationship between Culture and KS within the knowledge-intensive industrial maintenance domain.

H5: There is a positive relationship between extrinsic motivation and KS within the knowledge-intensive industrial maintenance domain.

H6: There is a positive relationship between expected rewards and associations and KS within the knowledge-intensive industrial maintenance domain.

H7: There is a positive relationship between anticipated reciprocal relationships and KS within the knowledge-intensive industrial maintenance domain.

H8: There is a positive relationship between reputation and KS within the knowledge-intensive industrial maintenance domain.

H9: There is a positive relationship between training by novices and KS within the knowledge-intensive industrial maintenance domain.

Figure 1 provides a summary of Hypotheses 1 to 9.

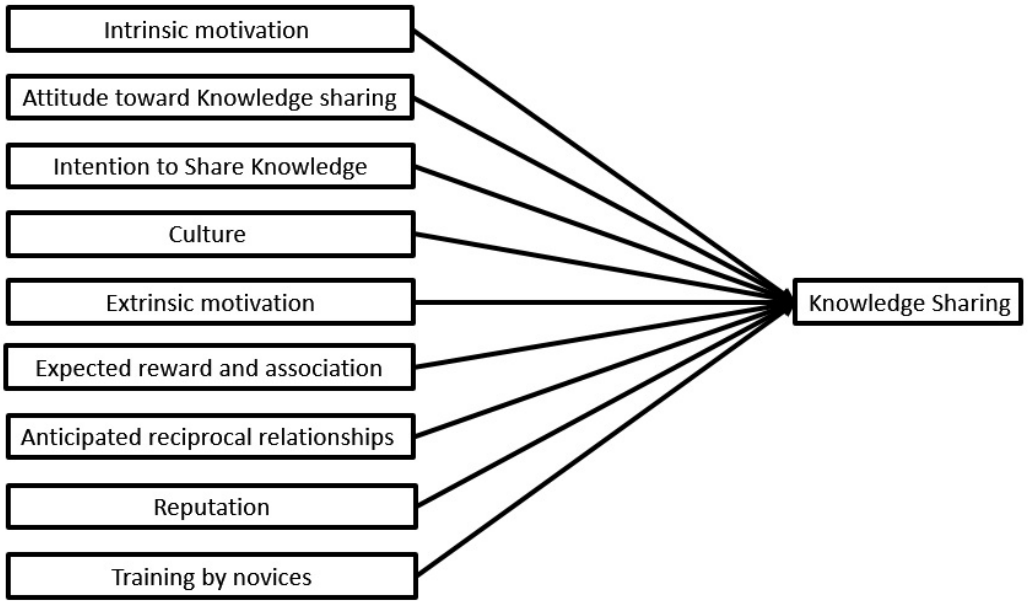

Figure 1. H1 to H9.

Hypothesis related to moderation effect:

H10: The impact of intrinsic motivation on KS within knowledge-intensive maintenance departments is moderated by "training by novices".

H11: The impact of attitude toward KS on KS within knowledge-intensive maintenance departments is moderated by "training by novices".

H12: The impact of intention to share knowledge on KS within knowledge-intensive maintenance departments is moderated by "training by novices".

H13: The impact of culture on KS within knowledge-intensive maintenance departments is moderated by "training by novices".

H14: The impact of extrinsic motivation on KS within knowledge-intensive maintenance departments is moderated by "training by novices".

H15: The impact of expected reward and association on KS within knowledge-intensive maintenance departments is moderated by "training by novices".

H16: The impact of anticipated reciprocal relationships on KS within knowledge-intensive maintenance departments is moderated by "training by novices".

H17: The impact of reputation on KS within knowledge-intensive maintenance departments is moderated by "training by novices".

These hypotheses collectively propose a nuanced understanding of how above mentioned factors contribute to KS within maintenance departments, and how the effectiveness of novices' training programs can enhance these

relationships. The study, through empirical analysis, can validate or refute these hypotheses, providing valuable insights for KM strategies in similar contexts.

3.5 Implementation

Before initiating the "training by novices" program, the initial phase involved collecting data. A questionnaire was meticulously crafted, consisting of 66 closed-ended questions derived from established scales, with the goal of comprehensively assessing the multifaceted dimensions of KM and KS variables. This questionnaire was administered to 103 personnel from the maintenance department of a knowledge-intensive industry, which boasted a workforce of 1250 employees. Table 2 insights into the composition of the study population, facilitating a deeper understanding of the research context.

Table 2. Participants' distribution by position and percentage

Participants' distribution							
Position	Technician	Foreman	Expert	Boss	Manager	Director	Total
Frequency	71	5	16	8	2	1	103
Percent	68.9	4.9	15.5	7.8	1.9	1.0	100.0

.

Concurrently, novices played a crucial role in the research endeavor. Fourteen individuals, representing the novice segment, were tasked with creating comprehensive training materials over an intensive two-month period. These materials encompassed various formats, including Word documents, PDFs, PowerPoint presentations, and engaging instructional videos. Throughout this immersive experience, the novices received ongoing support through a series of follow-up meetings, serving as collaborative forums to troubleshoot challenges, provide guidance, and tap into the novices' untapped potential.

A significant aspect of this methodology involved pairing novices with seasoned experts, under the guidance of sub-department managers. These partnerships culminated in semi-formal training and coaching sessions, where novices assumed dual roles as both educators and learners. This approach aimed to bridge knowledge gaps and foster a reciprocal learning environment. Subject matter experts, proficient in their designated domains, complemented this process by imparting precision and depth to the knowledge dissemination.

Approximately 21.3% of employees were deliberately excluded from the program, forming a control group to facilitate a comparative analysis and enable a robust assessment of the program's impact on knowledge enhancement and sharing dynamics.

As the five-month program concluded, the methodology seamlessly transitioned from knowledge acquisition to evaluation. Participants were engaged once again through a revisited questionnaire to gauge the evolving landscape of KM and KS variables. This phase of data collection incorporated a blend of closed-ended and open-ended questions, enabling a qualitative exploration of participants' experiences. Participants were encouraged to share opinions, proffer suggestions for refinement, and reflect on barriers to effective KS.

The evaluation phase further delved into the complex realm of participant roles within the program, enriching program dynamics and underscoring the empirical focus of quantitative research. Additionally, a nuanced examination of perceived knowledge improvement was conducted, with participants quantifying their progress and reflecting on their transformative journey. Importantly, participants' inclinations toward future program involvement served as a litmus test of the program's resonance and efficacy.

The culmination of data collection facilitated a statistical analysis, to unravel the program's influence on participants' KS and knowledge augmentation. This analytical approach provided both quantifiable insights and qualitative nuances, offering a comprehensive view of the program's impact on knowledge enhancement within the maintenance department.

Furthermore, based on the results of the second round of data collection and thematic analysis of open-ended questions, four main improvement suggestions were identified and implemented. Subsequently, the program continued by assigning new training tasks to novices for an additional seven months. The same questionnaire was distributed to evaluate changes in KM and KS, with additional questions addressing improvements.

Finally, maintenance employees were surveyed to ascertain their perception of KS improvement within the department and to specify the percentage of contribution attributed to the aforementioned improvements. It is important to emphasize that this study focuses on reporting the data extracted from the third round of data collection.

Data analysis
Data analysis primarily involved quantitative methods, employing descriptive statistics to uncover the program's impact on KS and knowledge augmentation. This approach provided quantifiable insights into the observed phenomena. This holistic approach provided a comprehensive understanding of the program's impact and the evolving landscape of knowledge enhancement within the maintenance department.

Validity and reliability
Validity pertains to the accuracy of a measure. Hair et al. (2012) described it as the degree to which a construct accurately captures what it intends to measure. Ensuring the validity and reliability of variables is essential for establishing the strength and credibility of research outcomes. The content validity of the variables was substantiated through an extensive examination of pertinent literature and expert opinions within the field. Rigorous alignment of each variable with the theoretical framework and existing knowledge base ensured content validity.

The study construction consisted of three phases. The first step involved discussions with senior pilots regarding the content of the questionnaire, aiming to check wording and identify which questions apply to the maintenance context. Based on feedback received, some adjustments were made to the wording and structure of certain questions to ensure clarity and relevance. The second step was the pre-test, which was administered to a small sample of respondents (6 maintenance employees) to verify validity and reliability. The focus was on how people answered, i.e., how they interpreted and responded to the questions in line with our research objectives. Lastly, the survey was distributed to all maintenance employees.

To assess internal consistency, Cronbach's alpha coefficient was calculated for scales and indices, indicating the degree of interrelatedness among the items within each variable. A high Cronbach's alpha suggests a strong internal consistency among the items. According to Hinton et al. (2004), the measures show moderate reliability when alpha is 0.50 or higher. The rigorous assessment of reliability using SPSS 25 instills confidence in the robustness of the variables employed in this study. Table 3 presents the Cronbach's alpha values for the variables included in the study.

Table 3. Cronbach's alpha of variables

variables	Alpha
Intrinsic motivation	0.804
Intention to share knowledge	0.863
Attitude towards KS	0.892
Culture	0.769
Extrinsic motivation	0.869
Expected reward and association	0.789
Anticipated reciprocal relationships	0.876
Reputation	0.887
KS	0.892

.

Descriptive statistics
The analysis was initiated with descriptive statistics to provide a comprehensive overview of key variables, including means, standard deviations.

Correlation analysis
Correlation analyses has been undertaken to unveil initial relationships among factors affecting KS.

Regression analysis
Multiple regression analyses was executed to rigorously test the direct relationships outlined in the hypotheses.

Moderation analysis
The influence of X on a variable Y is moderated by W when the magnitude, direction, or intensity of its impact relies on or can be anticipated by W. In such instances, W is termed as a moderator of X's effect on Y, signifying an interaction between W and X in shaping their influence on Y (Hayes, 2017). Moderation analysis, employing the Hayes' PROCESS macro version 4.2 in SPSS (written by Andrew F. Hayes), was applied to specifically explore these moderation effects. This involves examining interactions between influencing factors and "training by novices" to discern changes in the strength of their associations.

The macro process applies a bootstrapping test, i.e., a non-parametric method based on resampling with a replacement, which, in this case was done 5000 times. From each of these samples the indirect effect is computed, and a sampling distribution can be empirically generated. A confidence interval is computed, and it is checked to determine if zero is in the interval. If zero is not in the interval, then the researcher can be confident that the indirect effect is different from zero.

Model development

The methodology for this paper comprises the development and implementation of a conceptual model aimed at leveraging novices as facilitators in KS within maintenance departments of knowledge-intensive industries. The conceptual model serves as the foundational framework, delineating the key components and relationships that guide the intervention. The conceptual model was constructed based on the identified variables, emphasizing the transformation of novices from passive recipients to active facilitators in KM and KS processes. In the conceptual model of this study, the introduction of "training by novices" as a moderator adds a layer of complexity to the understanding of KS dynamics within maintenance departments. A moderator is a variable that influences the strength or direction of the relationship between independent and dependent variables. In this context, "training by novices" is poised to act as a moderator in the relationship between the influencing factors affecting KS (independent variables) and KS itself (dependent variable). This conceptualization sets the stage for a comprehensive empirical investigation into the intricacies of these relationships, offering insights that can inform targeted interventions and improvements in KM practices.

4. Results and discussion

The following section presents the results of the empirical investigation.

The comparison between data collected at first and second round of data collection (before and after the implementation of the "training by novices" program) reveals a significant improvement in the knowledge of all participants, with an overall increase of 71%. However, the enhancement in KS saw a modest increase of 6.2%, which did not reach statistical significance.

Additionally, participants were invited to provide feedback through open-ended questions, yielding valuable recommendations for program improvement. Through thematic analysis, four following main suggestions emerged.

1. Allocating sufficient time for both training material preparation and program participation.

2. Linking job promotion to active participation in KS activities.

3. Providing financial incentives for employees actively involved in KS.

4. Continuing program "training by novices".

These recommendations were subsequently implemented to enhance the effectiveness of the program. The study continued by assigning new training tasks to novices for an additional seven months, followed by the distribution of the same questionnaire (third round of data collection) to evaluate changes in KM and KS. Furthermore, new questions were incorporated into the questionnaire, prompting participants to evaluate the perceived enhancement in KS within the department. They were also tasked with allocating the percentage of this improvement attributed to the aforementioned enhancements. A summary of these results is presented in Table 4. Table 5 offers a comprehensive overview of the KS metrics collected across three rounds of data collection, providing valuable insights into the observed trends over time.

Table 4. Distribution of implemented enhancements impacting KS.

Improvement	Sufficient time	Linking job promotion	Financial incentives	Training by novices
Share of percentage in KS improvement	18.25%	29.7%	21.55%	30.05%

Table 5. Descriptive statistics of KS metrics across three data collection rounds

	Improvement
KS at first round of data collection	
KS at second round of data collection	6.1%
KS at third round of data collection	27.7%

Table 6 illustrates the participants' perceptions regarding the removal of KS barriers in the second and third rounds of data collection, indicating improvements over time.

Table 6. Perceived improvement in removal of KS barriers.

Data collection round	improvement
First round	
Second round	1.8%
Third round	22.7%

Hypothesis testing

The correlation analysis conducted in this study aimed to explore the relationships between various factors and KS within the knowledge-intensive industrial maintenance domain. The results revealed significant positive correlations between several factors and KS (Table 7).

Table 7. correlation between independent variables and dependent variable.

Correlation matrix										
		Intrinsic motivation	Attitude towards knowledge sharing	Intention to share knowledge	Culture	Extrinsic motivation	Expected rewards and associations	Anticipated reciprocal relationships	Reputation	Training by novices
KS	Pearson Correlation	.303**	.388**	.484**	.744**	.470**	.479**	.342**	.419**	.522**
	Sig. (2-tailed)	.002	.000	.000	.000	.000	.000	.000	.000	.000

Firstly, consistent with hypothesis H1, there was a positive relationship between intrinsic motivation and KS ($r = 0.303$, $p < 0.01$). This suggests that individuals who exhibit higher levels of intrinsic motivation are more likely to engage in knowledge sharing activities within the maintenance domain.

Similarly, hypothesis H2 posited a positive relationship between attitude towards knowledge sharing and KS itself. The correlation analysis supported this hypothesis, indicating a significant positive correlation between attitude towards knowledge sharing and knowledge sharing behavior ($r = 0.388$, $p < 0.01$).

Hypothesis H3 proposed a positive relationship between intention to share knowledge and knowledge sharing. The results provided further support for this hypothesis, with a significant positive correlation observed between intention to share knowledge and actual knowledge sharing behavior ($r = 0.484$, $p < 0.01$).

Moreover, hypothesis H4 suggested a positive relationship between organizational culture and knowledge sharing. The correlation analysis confirmed this hypothesis, revealing a strong positive correlation between culture and knowledge sharing ($r = 0.744$, $p < 0.01$).

Furthermore, hypotheses H5, H6, H7, H8, and H9, which respectively examined the relationships between extrinsic motivation, expected rewards and associations, anticipated reciprocal relationships, reputation, and training by novices with KS, were all supported by the correlation analysis. Significant positive correlations were found between each of these factors and knowledge sharing behavior (all $p < 0.01$).

Overall, these findings provide empirical evidence supporting the notion that various above mentioned factors, play crucial roles in influencing KS behavior within the knowledge-intensive industrial maintenance domain.

Multiple regression

The multiple regression analysis was conducted for all variables included in the study, and among them, "culture" and "intention to share knowledge" emerged as the most significant predictors of KS behavior within the knowledge-intensive industrial maintenance domain. These two variables collectively explain approximately 60.2% of the variance in knowledge sharing behavior, indicating their substantial impact in shaping the dynamics of KS within the organizational context. Tables 8, 9 and 10 present the results of conducting multiple regression.

Table 8. Summary of model statistics for individual factors predicting KS

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.776[a]	.602	.594	.38291
a. Predictors: (Constant), culture, intention to share knowledge				

Table 9. ANOVA results for predictors of KS.

ANOVA[a]						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	22.140	2	11.070	75.502	.000[b]
	Residual	14.662	100	.147		
	Total	36.803	102			
a. Dependent Variable: KS						
b. Predictors: (Constant), culture, intention to share knowledge						

Table 10. Coefficients for predictors of KS

Coefficients[a]						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.097	.346		6.057	.000
	Intention to share knowledge	.205	.059	.235	3.449	.001
	Culture	.441	.046	.655	9.598	.000
a. Dependent Variable: KS						

The model summary table provides information about the overall fit of the regression model. The coefficient of determination (R-squared) value indicates that approximately 60.2% of the variance in knowledge sharing behavior can be explained by the predictors included in the model. The adjusted R-squared value, which adjusts for the number of predictors in the model, is slightly lower at 59.4%. Overall, the model shows a good fit to the data, suggesting that culture and intention to share knowledge are significant predictors of knowledge sharing behavior.

The analysis of variance (ANOVA) table assesses the overall significance of the regression model. The F-statistic is highly significant ($F = 75.502$, $p < 0.001$), indicating that the regression model as a whole is a good fit for the data. This suggests that the predictors (culture and intention to share knowledge) collectively contribute to the prediction of knowledge sharing behavior.

Moving on to the coefficients table, both culture and intention to share knowledge have significant positive effects on knowledge sharing behavior. The standardized coefficients (Beta) indicate the relative importance of each predictor. Culture has a higher standardized coefficient (Beta = 0.655) compared to intention to share knowledge (Beta = 0.235), suggesting that culture has a stronger influence on knowledge sharing behavior in this context.

Overall, these results suggest that both organizational culture and individuals' intention to share knowledge significantly contribute to KS behavior within the studied context. A positive organizational culture and a strong intention to share knowledge are associated with higher levels of KS among employees. These findings highlight

the importance of fostering a supportive organizational culture and promoting individuals' willingness to share knowledge in enhancing KS within the knowledge-intensive industrial maintenance domain.

Moderation effect

The Hayes process macro analysis was utilized to explore the moderating impact of "training by novices" on the association between all other independent variables with KS within the maintenance context. However, the analysis revealed a negative moderation effect for "training by novices" on the relationship between all independent variables and KS, except for hypothesis 12 (intention to share knowledge). Consequently, hypotheses 10 to 18, with the exception of hypothesis 12, were not supported by the findings (Tables 11, 12 and 13 present the results).

Table 11. Summary of model statistics for training by novices predicting KS

Model Summary: Model : 1 X: Intention to share knowledge , W: Training by Novices, Y: KS						
R	R-sq	MSE	F	df1	df2	p
.5968	.3561	.2393	18.2535	3.0000	99.0000	.0000
a. Predictors: (Constant), Training by novices, Intention to share knowledge						

Table 12. Hayes' regression coefficients and significance levels for model variables

Model						
	coeff	se	t	p	LLCI	ULCI
constant	5.5312	.0516	107.2460	.0000	5.4289	5.6335
Intention to share knowledge	.3462	.1002	3.4548	.0008	.1473	.5450
Training by novices	.0322	.0080	4.0032	.0001	.0162	.0481
Int_1	.0139	.0057	2.4623	.0155	.0027	.0252
Product terms key: Int_1 : Intention to share knowledge * Training by novices						

.

Table 13. Test results for highest order unconditional interactions

Test(s) of highest order unconditional interaction(s):					
	R2-chng	F	df1	df2	p
X*W	.0394	6.0628	1.0000	99.0000	.0155
Focal predict: Intention to share knowledge (X) Mod var: Training by novices (W)					

The results for intention to share knowledge indicate that the overall model is statistically significant ($p < .001$), with an R-squared value of .3561, suggesting that approximately 35.61% of the variance in KS behavior can be explained by the predictors included in the model.

Individually, both "intention to share knowledge" and "training by novices" were found to have a significant positive effect on KS behavior ($p < .001$ for both). Specifically, for every one-unit increase in "Intention to Share Knowledge," there is a corresponding increase of approximately .3462 units in KS behavior, holding all other variables constant. Similarly, for every one-unit increase in "training by novices," there is a corresponding increase of approximately .0322 units in knowledge sharing behavior.

Furthermore, the interaction term "Int_1" (representing the interaction between "intention to share knowledge" and "training by novices") was found to be statistically significant ($p = .0155$), indicating that the moderating effect of "training by novices" on the relationship between "intention to share knowledge" and " KS" is significant.

In summary, these findings suggest that "intention to share knowledge" and "training by novices" play important roles in influencing KS behavior within the knowledge-intensive industrial maintenance domain. Moreover, the interaction between these factors further amplifies their impact on KS behavior, highlighting the complex interplay between individual intentions and organizational support in facilitating effective KS practices.

Conceptual models

Based on the results of this study, a conceptual model has been developed to illustrate the moderating role of "training by novices" on the relationship between "intention to share knowledge" and "KS within the knowledge-intensive maintenance domain (Figure 2). This model highlights how the presence of novices at trainer roles

influences the propensity of individuals to share knowledge, emphasizing the significance of intentionality in shaping KS behaviors.

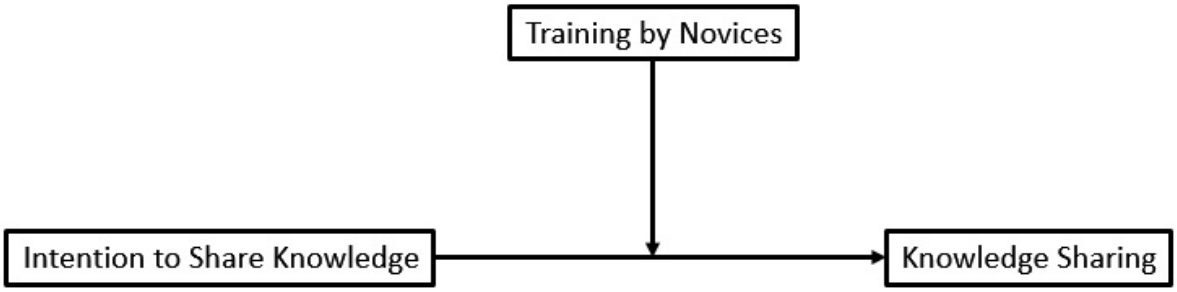

Figure 2. Conceptual model; influence of intention to share knowledge on KS, moderated by training by novices.

5. Conclusion

In this study, all hypotheses 1 to 9 were validated, revealing substantial positive correlations among influencing factors and KS within maintenance departments. Notably, the effectiveness of "training by novices" emerged as a moderator, highlighting its pivotal role. These results emphasize the significance of culture and intention to share knowledge as the most influential factors shaping KS dynamics within knowledge-intensive sectors.

However, it is essential to acknowledge certain limitations inherent in this study. Firstly, the research was conducted within a specific context, limiting the generalizability of the findings to other industries or organizational settings. Additionally, while efforts were made to control for various factors, there may still be unaccounted variables that could influence KS dynamics. Biases may have been introduced due to the self-report nature of the data, as participants may have provided socially desirable responses or inaccurately assessed their own KS behaviors.

Furthermore, the duration of the program and the relatively short timeframe of the study may have restricted the depth of insights gained. The program's effectiveness and the sustained impact of novices' involvement in KS initiatives could be better understood through longer-term observation and evaluation. Additionally, the reliance on quantitative measures may have overlooked qualitative aspects of KS experiences and perceptions, potentially missing nuances that qualitative research methods could capture. Biases may have been introduced due to the self-report nature of the data, as participants may have provided socially desirable responses or inaccurately assessed their own KS behaviors.

Certainly, the theoretical and practical implications of this study are substantial. The confirmation of the hypothesized positive relationships between influencing factors and KS within maintenance departments contributes significantly to existing literature on KM and organizational behavior. The findings underscore the importance of considering the role of culture and intention to share knowledge in fostering KS, particularly in knowledge-intensive industries where effective knowledge transfer is crucial for organizational success.

Theoretically, this study advances our understanding of the complex interplay between training by novices and individual factors, organizational factors, and KS behaviors. By highlighting the moderating role of "training by novices," it sheds light on the potential of innovative training approaches to enhance KS dynamics within organizations.

Practically, the insights gleaned from this study have direct implications for organizational leaders and managers seeking to improve KS practices within their departments. By recognizing the importance of both individual competencies and organizational support structures, organizations can design more effective training programs, implement supportive organizational policies, and create a conducive environment for KS to thrive. Moreover, the findings emphasize the value of incorporating diverse perspectives, such as those of novice employees, in KS initiatives, thereby promoting inclusivity and fostering a culture of continuous learning and innovation.

Overall, the theoretical and practical implications of this study contribute to the ongoing discourse on KM and organizational behavior, offering valuable insights for scholars, practitioners, and organizational leaders alike. By addressing the multifaceted nature of KS and the factors that influence it, this research paves the way for future endeavors aimed at enhancing KM practices and driving organizational success.

Moving forward, future research endeavors could explore the longitudinal effects of novices' involvement in KS initiatives, tracking the sustainability of their contributions over time. Furthermore, investigating the role of technology in facilitating KS processes, particularly in virtual or remote work environments, presents an avenue for further exploration. Additionally, qualitative studies delving into the nuanced experiences and perceptions of individuals involved in KS initiatives could provide valuable insights into the underlying mechanisms driving effective knowledge exchange.

In conclusion, this research highlights the pivotal role of both culture and intention to share knowledge in shaping KS dynamics within maintenance departments. While the findings offer valuable insights into enhancing KM practices, future research endeavors should continue to explore and expand upon these foundations to foster a deeper understanding of KS processes in diverse organizational contexts.

References

Abdullah, H. S., Hassim, A. A., and Chik, R., Knowledge sharing in a knowledge intensive organisation: identifying the enablers. *International Journal of Business and Management*, *4*(4), 115-123, 2009.

Ajzen, I., and Fishbein, M., A Bayesian analysis of attribution processes. *Psychological bulletin*, *82*(2), 261, 1975.

Ajzen, I., and Fishbein, M., Theory of reasoned action-Theory of planned behavior. *University of South Florida*, *2007*, 67-98, 1998.

Al-Hawamdeh, S., *Knowledge management: cultivating knowledge professionals*. Elsevier, 2007.

Al-Alawi, A. I., Al-Marzooqi, N. Y., and Mohammed, Y. F., Organizational culture and knowledge sharing: critical success factors. *Journal of Knowledge Management*, 2007.

Alajmi, B. M., The intention to share: psychological investigation of knowledge sharing behaviour in online communities. *Journal of Information & Knowledge Management*, *11*(3), 1250022-1250012, 2012.

Azeem, M., Ahmed, M., Haider, S., and Sajjad, M., Expanding competitive advantage through organizational culture, knowledge sharing and organizational innovation. *Technology in Society*, *66*, 101635, 2021.

Bartol, K. M., and Srivastava, A. Encouraging knowledge sharing: The role of organizational reward systems. *Journal of leadership & organizational studies*, *9*(1), 64-76, 2002.

Becerra-Fernandez, I., and Sabherwal, R., *Knowledge management: Systems and processes*. Routledge, 2014.

Benner, P., From novice to expert. *Menlo Park*, *84*(1480), 10-1097, 1984.

Bennet, D., and Bennet, A., The rise of the knowledge organization. In *Handbook on Knowledge Management 1* (pp. 5-20). Springer, 2004.

Bock, G.-W., Zmud, R. W., Kim, Y.-G., and Lee, J.-N., Behavioral intention formation in knowledge sharing: Examining the roles of extrinsic motivators, social-psychological forces, and organizational climate. *MIS quarterly*, 87-111, 2005.

Boer, N., *Knowledge sharing within organizations*, 2005.

Brown, J. S., and Duguid, P., Organizational learning and communities-of-practice: Toward a unified view of working, learning, and innovation. *Organization science*, *2*(1), 40-57,1991.

Cabrera, E. F., & Cabrera, A., Fostering knowledge sharing through people management practices. *The international journal of human resource management*, *16*(5), 720-735, 2005.

Cárcel-Carrasco, J., Cárcel-Carrasco, J.-A., and Peñalvo-López, E., Factors in the relationship between maintenance engineering and knowledge management. *Applied Sciences*, *10*(8), 2810, 2020.

Chirumalla, K., Bengtsson, M., and Söderlund, C., Experience reuse in production maintenance: Practices and challenges. 22nd European Operation Management Association Conference, EurOMA, June, 2015.

Chow, W. S., and Chan, L. S., Social network, social trust and shared goals in organizational knowledge sharing. *Information & management*, *45*(7), 458-465, 2008.

Cummings, J. N., Work groups, structural diversity, and knowledge sharing in a global organization. *Management science*, *50*(3), 352-364, 2004.

Damodaran, L., and Olphert, W., Barriers and facilitators to the use of knowledge management systems. *Behaviour & Information Technology*, *19*(6), 405-413, 2000.

Dunford, R., Key challenges in the search for the effective management of knowledge in management consulting firms. *Journal of Knowledge Management*, *4*(4), 295-302. https://doi.org/10.1108/13673270010379849 , 2000.

Foss, N. J., Minbaeva, D. B., Pedersen, T., and Reinholt, M., Encouraging knowledge sharing among employees: How job design matters. *Human resource management*, *48*(6), 871-893, 2009.

Fullwood, R. W., *An investigation of the factors that influence knowledge sharing between academics* Manchester Metropolitan University, 2014.

Gagné, M., A model of knowledge-sharing motivation. *Human Resource Management: Published in Cooperation with the School of Business Administration, The University of Michigan and in alliance with the Society of Human Resources Management*, *48*(4), 571-589, 2009.

Gomes, J., and Roham, H., Bringing Novices From the Passive Role in Knowledge Sharing to the Active Role. European Conference on Knowledge Management, 2023.

Goodman, J., *Measuring the value of knowledge management*. Ark Group, 2007.

Hair, J. F., Sarstedt, M., Ringle, C. M., and Mena, J. A., An assessment of the use of partial least squares structural equation modeling in marketing research. *Journal of the academy of marketing science*, *40*, 414-433, 2012.

Hayes, A. F., *Introduction to mediation, moderation, and conditional process analysis: A regression-based approach*. Guilford publications, 2017.

Hinds, P. J., Patterson, M., and Pfeffer, J., Bothered by abstraction: The effect of expertise on knowledge transfer and subsequent novice performance. *Journal of applied psychology*, *86*(6), 1232, 2001.

Hinton, P., Brownlow, C., McMurray, I., and Cozens, B., Using SPSS to analyse questionnaires: Reliability. *SPSS explained*, *356*, 366, 2004.

Ismail, M. B., and Yusof, Z. M., The impact of individual factors on knowledge sharing quality. *Journal of Organizational knowledge management*, *13*(1), 1-12, 2010.

Jackson, S. E., Chuang, C.-H., Harden, E. E., and Jiang, Y., Toward developing human resource management systems for knowledge-intensive teamwork. In *Research in personnel and human resources management*. Emerald Group Publishing Limited, 2006.

Jahani, S., Ramayah, T., & Effendi, A. A., Is reward system and leadership important in knowledge sharing among academics. *American Journal of Economics and Business Administration*, *3*(1), 87-94, 2011.

Kankanhalli, A., Tan, B. C., & Wei, K.-K., Contributing knowledge to electronic knowledge repositories: An empirical investigation. *MIS quarterly*, 113-143, 2005.

Karamitri, I., Kitsios, F., and Talias, M. A., Development and validation of a knowledge management questionnaire for hospitals and other healthcare organizations. *Sustainability*, *12*(7), 2730, 2020.

Kuo, T. H., How expected benefit and trust influence knowledge sharing. *Industrial Management & Data Systems*, *113*(4), 506-522, 2013.

Lee, D.-J., and Ahn, J.-H., Reward systems for intra-organizational knowledge sharing. *European Journal of Operational Research*, *180*(2), 938-956, 2007.

Liebowitz, J., and Frank, M., *Knowledge management and e-learning*. CRC press, 2016.

Lin, H. F., Knowledge sharing and firm innovation capability: an empirical study. *International Journal of Manpower*, 2007.

Márquez, A. C., *The maintenance management framework: models and methods for complex systems maintenance*. Springer Science & Business Media, 2007.

Matzler, K., Renzl, B., Mooradian, T., von Krogh, G., and Mueller, J., Personality traits, affective commitment, documentation of knowledge, and knowledge sharing. *The international journal of human resource management*, *22*(02), 296-310, 2011.

McInerney, C. R., and Koenig, M. E., Knowledge management (KM) processes in organizations: Theoretical foundations and practice. *Synthesis Lectures on Information Concepts, Retrieval, and Services*, *3*(1), 1-96, 2011.

Mesmer-Magnus, J. R., and DeChurch, L. A., Information sharing and team performance: A meta-analysis. *Journal of applied psychology*, *94*(2), 535, 2009.

Michailova, S., and Husted, K., Managing the dynamic interfaces between culture and knowledge: A research agenda, 2002.

O'Dell, C. S., Grayson, C. J., and Essaides, N., *If only we knew what we know: The transfer of internal knowledge and best practice*. Simon and Schuster, 1998.

Osterloh, M., and Frey, B. S., Motivation, knowledge transfer, and organizational forms. *Organization science*, *11*(5), 538-550, 2000.

Oyemomi, O. O., *The Impact Of Organisational Factors On Knowledge Sharing Performance* University of Plymouth, 2017.

Paulin, D., and Suneson, K., Knowledge transfer, knowledge sharing and knowledge barriers–three blurry terms in KM. *Leading Issues in Knowledge Management*, *2*(2), 73, 2015.

Riege, A., Three-dozen knowledge-sharing barriers managers must consider. *Journal of Knowledge Management*, 2005.

Rolfsen, M., "We put teamwork back on the agenda again and again" The role of support systems in autonomous teamwork. *Team Performance Management: An International Journal*, *19*(5/6), 292-304, 2013.

Ryan, R. M., and Deci, E. L., Intrinsic and extrinsic motivations: Classic definitions and new directions. *Contemporary educational psychology*, *25*(1), 54-67, 2000.

Rybo Molin, M., and DAHLBERG, E., *Managerial Challenges with Knowledge Sharing A case study at a consultancy firm within the construction industry*, 2018.

Schwartz, D., *Encyclopedia of knowledge management*. IGI Global, 2005.

Søndergaard, S., Kerr, M., and Clegg, C., Sharing knowledge: contextualising socio-technical thinking and practice. *The learning organization*, 2007.
Virtanen, I., Externalization of tacit knowledge implies a simplified theory of cognition. *Journal of Knowledge Management Practice*, *12*(3), 139-145, 2011.
Wang, S., and Noe, R. A., Knowledge sharing: A review and directions for future research. *Human resource management review*, *20*(2), 115-131, 2010.
Wasko, M. M., and Faraj, S., Why should I share? Examining social capital and knowledge contribution in electronic networks of practice. *MIS quarterly*, 35-57, 2005.
Welschen, J., Todorova, N., and Mills, A. M., An investigation of the impact of intrinsic motivation on organizational knowledge sharing. *International Journal of Knowledge Management (IJKM)*, *8*(2), 23-42, 2012.
Welschen, J. E., An investigation of the impact of extrinsic and intrinsic motivators on organisational knowledge sharing, 2014.
Wong, K. Y., Tan, L. P., Lee, C. S., and Wong, W. P., Knowledge management performance measurement: measures, approaches, trends and future directions. *Information Development*, *31*(3), 239-257, 2015.
Yang, S.-C., and Farn, C.-K., Social capital, behavioural control, and tacit knowledge sharing—A multi-informant design. *International Journal of Information Management*, *29*(3), 210-218, 2009.
Yi, J., A measure of knowledge sharing behavior: scale development and validation. *Knowledge Management Research & Practice*, *7*(1), 65-81, 2009.
Zheng, T., A literature review on knowledge sharing. *Open Journal of Social Sciences*, *5*(03), 51, 2017.

Biographies

Hamid Roham, a dedicated PhD student in management at the University of Lisboa, Portugal, since 2020, brings a wealth of experience to his academic pursuits. With a strong academic foundation that includes a DBA from the same institution in 2020 and an MSc in biomedical engineering from the University of Technology Amir-Kabir, Iran, Hamid has consistently demonstrated a passion for learning and research. In addition to his academic achievements, Hamid boasts an impressive 23 years of hands-on experience in maintenance management and equipment manufacturing at knowledge-intensive companies. This extensive practical experience has significantly enriched his academic journey and provides valuable real-world insights into his research interests, which primarily focus on maintenance management and human resource management. Hamid's multidimensional background, combining academic rigor and extensive industry expertise, uniquely positions him to make substantial contributions to his field and advance the understanding of knowledge-intensive processes and practices.

Jorge F.S. Gomes is Full Professor in Organizational Behavior and Human Resource Management at the Lisbon School of Economics and Management, University of Lisbon, and researcher at Advance/CSG. Dr. Gomes's research interests cover the HRM process view, alternative perspectives on leadership, and organizational purpose. He has published in Technovation, International Journal of HRM, Human Resource Management, British Journal of Political Science, European Management Review, and Journal of Organizational Change Management. He holds a PhD degree from the Alliance Manchester Business School (2001); an MSc in Statistics and Information Systems Management, from the Higher Institute of Statistics and Information Systems Management, Lisbon Nova University, Portugal (1995); and a BSc in Social and Organizational Psychology, from the Higher Institute of Applied Psychology, Portugal (1992).