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CHALLENGES OF TACIT KNOWLEDGE AND DISRUPTIVE TECHNOLOGY AT THE UNIVERSITY LEVEL

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Abstract

This study investigates the challenges of tacit knowledge management and the influence of disruptive technologies at the university level. It examines the defining characteristics, management practices, philosophical and practical issues, technological constraints, and strategies for operationalizing tacit knowledge. The objectives include analyzing tacit knowledge features and management at universities, exploring philosophical and practical challenges, addressing technological and IT-related issues, and identifying research gaps. Using a sample of 100 teachers from Higher Education Commission-recognized universities in Punjab, Pakistan, the study employs a three-point rating scale developed from a literature review. Data analysis reveals general agreement on the complexity of tacit knowledge and its management, with notable issues in IT-related challenges. The study concludes that while tacit knowledge is deeply embedded and difficult to transfer, the role of technology remains crucial yet limited, necessitating more tailored solutions for effective knowledge sharing and operationalization.

Keywords: Tacit knowledge, disruptive technologies, knowledge management, practical challenges, and philosophical challenges.

Introduction

Tacit knowledge, often described as the internal, intuitive understanding acquired through individual experience, plays a crucial role in innovation and problem-solving (Kucharska & Erickson, 2023). Unlike explicit knowledge, which is systematically acquired and managed through IT systems, tacit knowledge remains undocumented and deeply embedded in personal practices and experiences (Hyttinen & Rintala, 2005). This form of knowledge is significant in influencing organizational settings, performance, and sustainability. However, managing tacit knowledge presents unique challenges, especially in university environments where traditional methods and fragmented processes can hinder effective knowledge transfer and utilization.

The importance of explicit knowledge is evident from various perspectives, including higher education. In universities, where collaboration and knowledge sharing are essential for academic and research excellence, understanding and managing tacit knowledge can enhance performance and innovation. Despite its significance, there is a lack of comprehensive strategies for effectively capturing and leveraging this knowledge, leading to missed opportunities for institutional development and improvement.

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The aim of this study is to bridge this gap by investigating the challenges associated with managing tacit knowledge in university settings, with a focus on Punjab, Pakistan. The research objectives are threefold: (1) to explore the specific challenges related to the definition and management of tacit knowledge in higher education institutions; (2) to analyze the philosophical and practical difficulties encountered in its application; and (3) to identify technical and operational strategies that could improve the transfer and utilization of tacit knowledge.

The relevance of this study is underscored by the increasing complexity of technology and the growing need for effective teamwork and knowledge-sharing in educational settings. Effective management of comprehensive knowledge is crucial for improving institutional performance and achieving sustainable development. However, traditional approaches often fall short, particularly in developing regions where knowledge management practices are overshadowed by a focus on tangible resources (Muthuveloo et al., 2017).

The current research highlights that although technologies can facilitate knowledge management, their success often depends on the effective integration of tacit knowledge through communication and collaboration (Edmondson et al., 2003). For instance, in the construction sector, Knowledge Capture (KC) initiatives have been recommended to enhance knowledge transfer (Saini et al., 2019). This study attempts to extend these findings to the context of higher education, exploring how universities can address challenges through similar strategies.

Ultimately, the aim of this study is to provide a nuanced understanding of tacit knowledge management in universities, offer insights to overcome current obstacles, and leverage comprehensive knowledge for institutional success. By addressing these challenges, the research seeks to contribute to the development of effective knowledge management practices that can enhance academic outcomes and institutional performance.

Review of the Related Literature

The concept of knowledge has been a central topic of inquiry across various disciplines, and its definition remains a challenge. Davenport and Prusak (1997) describe knowledge as valuable information derived from the human mind, encompassing reflection, synthesis, and context. Similarly, Clarke (1992) considers it "a body of facts and principles accumulated by mankind over time," while Turban et al. (2006) define knowledge as data or information that has been organized and processed to convey understanding, experience, accumulated learning, and expertise applicable to current problems or activities. These definitions highlight the multifaceted nature of knowledge, which has traditionally been categorized into two primary forms: tacit and explicit knowledge.

Building on the foundational work of Polanyi (1966), who first introduced the concept of tacit knowledge, Nonaka (1991) and others have emphasized that tacit knowledge encompasses mental models, beliefs, values, and assumptions that are deeply personal and often difficult to articulate. In contrast, explicit knowledge is more formal and codified, easily documented in artifacts such as texts and reports (Nonaka, 1991; Bennet & Tomblin, 2006; Nyame-Asiamah, 2009). This distinction between tacit and explicit knowledge forms the basis of much of the literature on knowledge management and organizational learning.

Further refining the understanding of knowledge, Ikujiro Nonaka and Noboru Konno (1998) introduced the concept of "ba," or a shared space for emerging relationships, which can be physical, virtual, mental, or a combination thereof. This concept underscores the role of context in knowledge creation and suggests that knowledge is not static but continuously evolving. Nonaka and Konno's SECI model (Socialization, Externalization, Combination,

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Internalization) illustrates the dynamic nature of knowledge, particularly how it transitions between tacit and explicit forms through various processes.

Despite the growing recognition of tacit knowledge as crucial for sustainable competitive advantage, its definition and operationalization remain elusive due to its inexpressible and context-specific nature. Scholars like Grant (1993) and Spender (1993) emphasize its centrality to organizational success, given its difficulty in imitation and transfer. However, Ambrosini and Bowman (2001) note that empirical research on tacit knowledge is still limited, pointing to the need for more nuanced methodologies to study this elusive form of knowledge.

This lack of empirical research becomes particularly significant in the context of the modern knowledge-based economy, where the ability to leverage tacit knowledge is increasingly seen as a key driver of innovation and competitive advantage. Johannessen, Olaisen, and Olsen (2001) caution that an overreliance on information technology, which typically focuses on explicit knowledge, may undermine the value of tacit knowledge, leading to a loss of competitive edge in the global economy.

The implications of tacit knowledge extend beyond the business domain, influencing intellectual inquiries across various disciplines. Polanyi's (1983) assertion that "we can know more than we can tell" captures the essence of tacit knowledge as something that is deeply experiential and often non-codifiable. Nonaka and Takeuchi (1995) further differentiate tacit knowledge from explicit knowledge, which is articulated in formal language, by highlighting the inherent challenges in transferring tacit knowledge due to its deeply personal nature.

The debate over the nature of knowledge also encompasses discussions on whether knowledge is an individual possession or a socially constructed entity. While Blackler (1995) and Gherardi (2000) suggest that knowledge may be socially constructed, Nonaka and von Krogh (2009) propose that knowledge can be converted between tacit and explicit forms, a process that requires both individual and collective engagement. This perspective aligns with Cook and Brown's (1999) distinction between the 'epistemology of possession' and the 'epistemology of practice,' which reflects differing views on how knowledge is acquired and utilized within organizations.

Adding to this discourse, the concept of group tacit knowledge (GTK) has been explored as a socially constructed phenomenon that develops through interactions within a group (Erden, Von Krogh, & Nonaka, 2009). GTK involves shared practical skills, expertise, and cognition, and is described by Weick and Roberts (1993) as a "collective mind" that arises from coordinated actions and a shared purpose within the group. This collective dimension of tacit knowledge further complicates its operationalization and measurement, but it also underscores its importance in fostering innovation and organizational learning.

In exploring the mechanisms for creating and transferring tacit knowledge, the role of language and communication has been a point of contention. While some scholars, such as Hadamard (1996) and Wozniak and Smith (2006), suggest that non-verbal or solitary approaches may be more conducive to innovation, others, like Crossan et al. (1999), argue that language and metaphors play a critical role in the knowledge creation process. Empirical studies, such as those by Jisr and Maamari (2017), indicate that tacit knowledge often precedes innovation performance, challenging the frameworks that prioritize language development as the primary means of knowledge creation.

The transition to a knowledge-based economy has transformed organizational behavior, necessitating more dynamic modes of operation that rely on informal networks and flexible goals to meet customer demands (Mullins, 2005; Miles et al., 1997). McIntosh

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(1999) argues that organizations must rapidly integrate evolving knowledge to remain competitive, with knowledge-sharing strategies being crucial for leveraging collective expertise (Greengard, 1998; Drucker, 1998; Turban et al., 2006; Sharif, 2008). However, the challenge of capturing and codifying tacit knowledge remains significant, particularly in light of factors such as early retirement and workforce mobility (March, 1991; Macintosh, 1999).

One of the key challenges organizations face in the knowledge-based economy is the sharing of tacit knowledge, especially through social web tools. While information technology plays a crucial role in enabling knowledge sharing, traditional systems often focus more on information management than on facilitating interaction among knowledge holders (Huysman & Wulf, 2005; Marwick, 2001). Emerging technologies, such as Web 2.0 tools, offer potential solutions by enabling real-time, interactive communication that is essential for tacit knowledge sharing (Mitri, 2003; Marwick, 2001). However, as Panahi, Watson, and Partridge (2013) note, the effectiveness of these tools in supporting tacit knowledge sharing is still underexplored, highlighting a significant gap in the literature.

The importance of tacit knowledge in fostering innovation and driving economic development is well-documented. The transition to an information society, characterized by the accumulation and application of knowledge, underscores the centrality of knowledge and innovation to societal advancement (Duffy, 1999; Narayanan, 2001). However, the effectiveness of knowledge transfer, particularly in technologically mediated communication, often depends on shared social, cultural, and linguistic backgrounds. Trust and mutual understanding are essential for successful knowledge transfer (Foos, Schum, & Rothenberg, 2006), further complicating the process of capturing and sharing tacit knowledge.

In recent years, advancements in information technology and knowledge management have introduced various mechanisms for transferring tacit knowledge within organizations, including the use of communities of practice (CoP) and Web 2.0 technologies. Johanna identifies two main approaches to knowledge management: the mechanical approach, which emphasizes technical solutions, and the systematic approach, which prioritizes cultural factors and sustainable outcomes. Tasset's mechanisms for knowledge transfer, such as apprenticeship and storytelling, facilitate the externalization and integration of tacit knowledge into organizational processes (Nokes, 2009).

Despite these advancements, the challenges of codifying tacit knowledge remain substantial. Alqdah and Salim (2013) categorize tacit knowledge into implicit tacit skills and accessible tacit skills, with the latter being somewhat expressible through alternative methods such as metaphors and storytelling. However, difficulties in acquiring, storing, sharing, and reusing tacit knowledge often stem from inadequate mechanisms or processes that fail to promote the necessary social interactions for effective knowledge management (Asprey, 2004; Laudon & Laudon, 1997; McGee & Prusak, 1993; Sour, 2004).

Understanding the broader concepts of knowledge and intellectual capital is crucial for exploring the dynamics of knowledge generation, particularly tacit knowledge. Intellectual capital, as described by Edvinsson and Sullivan (1996), Nahapiet and Ghoshal (1998), Stewart (1997), and Alrich (1998) play a vital role in creating customer value and driving firm outcomes. Effective knowledge management (KM) systems support the creation, storage, and sharing of both tacit and explicit knowledge, but as Barney (1991) argues, explicit knowledge systems alone do not provide a sustainable competitive advantage. A comprehensive KM system should include processes for generating new knowledge, accessing external knowledge, embedding knowledge in processes, and measuring the value of knowledge assets (Ruggles, 1998; Harlow, 2008).

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In conclusion, while the literature highlights the significance of tacit knowledge in organizational success, substantial research gaps remain in its definition, operationalization, and empirical study. Scholars such as Venkitachalam and Busch (2012) suggest that further exploration is needed to understand the impact of tacit knowledge on knowledge management strategies and organizational learning. Additionally, Ambrosini and Bowman (2001) propose redefining tacit knowledge as tacit skills and developing methodologies for more rigorous empirical research. Addressing these gaps is crucial for advancing our understanding of tacit knowledge and its role in driving innovation and competitive advantage in the knowledge-based economy.

The purpose of this study was to explore the challenges associated with tacit knowledge and the impact of disruptive technologies at the university level, focusing on defined characteristics, management practices, philosophical and practical challenges, technological and IT-related issues, and operationalization strategies.

Statement of the Problem

This study aims to address the challenges of tacit knowledge and disruptive technology at the university level. The focus is on understanding how tacit knowledge is defined, managed, and influenced by emerging technologies within academic institutions.

Objectives of the Study

The study has several key objectives. First, it seeks to identify and analyze the defining characteristics and management practices of tacit knowledge at the university level. Second, it aims to examine the philosophical and practical challenges associated with tacit knowledge in these institutions. Third, the study will explore the technological and IT-related issues impacting knowledge sharing at universities. Finally, it intends to identify operationalization strategies and research gaps in the management of tacit knowledge at the university level.

Research Questions

To guide the investigation, the study will address the following research questions: What are the defining characteristics of tacit knowledge, and how is it managed at the university level? What philosophical and practical challenges are encountered in managing tacit knowledge in these institutions? What technological and IT-related issues affect knowledge sharing and management at the university level? Lastly, what are the current strategies for operationalizing tacit knowledge management, and what research gaps exist in this area?

Delimitations

Due to the broad nature of the topic and time constraints, the study is limited to a sample size of 100 university teachers. The research will focus exclusively on teachers from 100 Higher Education Commission (HEC) recognized universities located in Punjab, Pakistan.

Material and methods

The population for this study comprised 100 Higher Education Commission (HEC) recognized universities. A sample of 100 university teachers, including lecturers, assistant professors, associate professors, and full professors, was selected from the population.
Table 1 presents the demographic distribution of the sample:

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Sr. No	Male	Female	Professor	Associate Professor	Assistant Professor	Lecturer
1	58	42	28	26	34	12

Research Tool

A three-point rating scale was developed specifically for university teachers. This scale was designed to assess various aspects of tacit knowledge and technology-related challenges.

Methods and Procedures

A comprehensive review of relevant literature was conducted to identify challenges associated with tacit knowledge and the impact of enabling and disruptive technologies. Based on this literature review, a three-point rating scale was developed. The scale encompassed the following main categories:

The study explores several dimensions of tacit knowledge management. It begins with defining and managing tacit knowledge, focusing on how this type of knowledge—often unspoken and intuitive—can be identified and handled within organizational contexts. The research then delves into the philosophical and practical challenges associated with tacit knowledge. This includes examining the inherent difficulties in capturing and articulating knowledge that is not easily codified.

The investigation further addresses technological and IT-related issues in knowledge sharing. This aspect highlights the role of various technologies in facilitating or hindering the transfer and dissemination of tacit knowledge. Lastly, the study examines the operationalization and research gaps in tacit knowledge management. This involves identifying how tacit knowledge management practices can be effectively implemented and pinpointing areas where further research is needed to enhance understanding and application in real-world settings.

Data collection involved personally administering the rating scale to all respondents in the sample. The response rate was high, with most university teachers cooperating with the researchers.

Data Analysis

The collected data were tabulated and analyzed using percentage calculations and standard deviations. The results were then interpreted to draw conclusions and make recommendations based on the findings.

3. Results and Discussions

Challenges of Tacit Knowledge and Disruptive Technology at the University Level

Part 1: Defining and Managing Tacit Knowledge

The following statements explore the challenges associated with tacit knowledge, as rated by participants:

Table 1: Defining and Managing Tacit Knowledge

Sr. No	Statement	Disagree	Neutral	Agree
1	Knowledge is "very difficult to define," which presents a fundamental challenge in reaching a consensus on its meaning.	15%	5%	80%
2	The diversity in descriptions of knowledge by different scholars reflects its complexity and multifaceted nature.	8%	3%	89%

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Sr. No	Statement	Disagree	Neutral	Agree
3	Tacit knowledge is difficult to transfer and communicate due to its embedding in mental models, beliefs, and assumptions.	4%	5%	91%
4	Clarifying the relationship between tacit and explicit knowledge is essential for understanding their roles as forms of knowledge.	2%	0%	98%
5	Identifying and estimating tacit knowledge, particularly in the context of workers and their experiences, is challenging.	12%	10%	78%
6	Developing frameworks and methods to manage tacit knowledge within a workforce is necessary for effective knowledge transfer and development.	23%	12%	65%
7	Implementing tacit knowledge projects in remote areas can enhance organizational outcomes such as productivity, safety, and sustainability.	5%	19%	76%

According to Table 1, the difficulty in defining knowledge presents a significant challenge, with 80% agreeing that this makes consensus difficult. Similarly, the complexity of tacit knowledge and its transfer is highlighted by 91% of participants who agree on its challenging nature.

Interpretation

Defining and managing tacit knowledge presents notable challenges and complexities, as reflected by the responses from the study participants. A significant majority of respondents (80%) find defining knowledge to be challenging, highlighting the inherent complexity of this task. Additionally, an overwhelming 89% of participants recognize the intricate and diverse nature of understanding knowledge. Tacit knowledge, specifically, is noted for being particularly difficult to transfer, with 91% agreeing on its embedded nature which complicates its dissemination.

The distinction between tacit and explicit knowledge is seen as critically important by nearly all respondents (98%), underscoring the need for clarity in managing different types of knowledge. Challenges in quantifying tacit knowledge are also acknowledged by a strong majority (78%), pointing to the difficulties in measuring this type of knowledge effectively. While a majority (65%) agree on the necessity of implementing tacit knowledge projects, there remains a significant minority (23%) who are either uncertain or disagree, reflecting a range of perspectives on the practical implementation of these projects. Despite this, a majority (76%) see value in such initiatives, although a sizable neutral group (19%) indicates some level of uncertainty.

Overall, the mean agreement across these points is 81.57%, with the mode response being "Agree." This suggests a strong consensus among respondents on the significance of defining and managing tacit knowledge, although some variations in perspective on implementation remain.

Table 2: Philosophical and Practical Challenges of Tacit Knowledge

Sr. No.	Statement	Disagree	Neutral	Agree

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Sr. No.	Statement	Disagree	Neutral	Agree
1	Transformational linguistics suggests that certain grammatical structures are innate, requiring a coherent notion of "tacit knowledge."	93%	2%	5%
2	There is debate on how tacit knowledge relates to explicit knowledge and whether it can be adequately explained or codified.	4%	2%	94%
3	The philosophical debate on the nature of knowledge, whether it can be explicitly stated or remains inherently tacit, is a significant challenge.	18%	35%	47%
4	The unstructured and intangible nature of tacit knowledge makes it hard to document and share.	11%	19%	70%
5	Early retirements and rising workforce mobility can lead to a loss of valuable knowledge within organizations.	22%	29%	49%
6	Lack of time, inadequate rewards, or poorly designed knowledge management systems can hinder knowledge sharing.	17%	20%	63%
7	Some technologies do not support cognitive mapping or higher-level learning, potentially leading to information overload.	12%	5%	83%
8	Organizations struggle to establish the appropriate environment and incentives for individuals to share their unstructured knowledge.	18%	22%	60%

Interpretation

In analyzing the responses, an overwhelming 93% of participants expressed skepticism about linking tacit knowledge to transformational linguistics, highlighting a significant disagreement on this matter. In contrast, a strong 94% of respondents reflected ongoing debates about the nature of tacit versus explicit knowledge, underscoring the complexity and contentiousness surrounding these concepts. The mixed responses, with only 47% agreeing, suggest that the debate on tacit knowledge remains unresolved.

A majority of participants, 70%, acknowledged the difficulties in documenting and sharing tacit knowledge, indicating a broad recognition of this challenge. There is a near-even split on the issue of knowledge loss due to workforce changes, suggesting concern but not an overwhelming consensus. While 63% agreed that these factors hinder knowledge sharing, a significant minority either disagreed or remained neutral, reflecting varying perspectives on this issue.

Regarding the limitations of certain technologies in knowledge management, 83% showed strong agreement, highlighting substantial concern about the effectiveness of these tools. Although 60% agreed with the statements about organizational strategies, the substantial neutral group (22%) reveals some uncertainty about these strategies.

Overall, the mean agreement across these statements is 56.12%, with "Agree" being the most frequent response, except for the first statement. This indicates a general consensus on most challenges, though there are significant areas of disagreement and uncertainty.

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Sr.no	**Part 3: Technological and IT-Related Issues in Knowledge Sharing**	Disagree	Neutral	Agree
1	Researchers have conflicting opinions on what constitutes tacit knowledge and whether it can be effectively shared using IT.	90%	0%	10%
2	Researchers have conflicting opinions on what constitutes tacit knowledge and whether it can be effectively shared using IT.	81%	3%	16%
3	There is no consensus on whether IT can facilitate tacit knowledge sharing, with traditional IT often focusing on information management rather than interaction among knowledge holders.	13%	15%	72%
4	The complex nature of tacit knowledge and differing views on IT's ability to support its sharing contribute to a lack of understanding in the field.	5%	7%	88%
5	There is insufficient research on the effectiveness of social web tools in facilitating tacit knowledge sharing.	73%	18%	9%
6	Current approaches to managing tacit knowledge face significant limitations in capturing, storing, sharing, and reusing this knowledge.	91%	7%	2%
7	There is a need to promote knowledge creation, sharing, and reuse, along with the development of tools to support these processes.	8%	2%	90%

The challenges of managing tacit knowledge and the role of disruptive technologies in knowledge sharing at the university level are complex and multifaceted. Analysis of survey responses from university faculty reveals a range of opinions, insights, and areas of consensus. These challenges are categorized into four key sections: the definition and management of explicit knowledge, philosophical and practical challenges, technological and IT-related issues, and operationalization and research gaps. By examining these aspects in detail, we can gain a better understanding of the difficulties institutions face in navigating tacit knowledge management.

Defining and Managing Tacit Knowledge

The difficulty in defining knowledge is a recurring theme, with 80% of respondents agreeing that reaching consensus on its meaning is challenging. 89% of participants also acknowledge the complexity and multidimensional nature of knowledge, recognizing the diversity of definitions provided by scholars. Furthermore, 91% agree that tacit knowledge, deeply embedded in mental patterns and assumptions, is difficult to transfer and communicate. A near-universal agreement (98%) emphasizes the need to differentiate between explicit and tacit knowledge to fully understand their roles within knowledge management. However, when it comes to correcting the amount of tacit knowledge within the workforce, 78% recognize this as a challenge, while a smaller proportion (65%) agree on the need to develop frameworks and methods for its management. The implementation of explicit knowledge projects, especially in remote areas, is positively viewed by 76%, although 19% remain neutral, indicating some uncertainty about the practical benefits.

Overall, this section reflects a high level of agreement (81.57% agreement) on the importance of defining and managing explicit knowledge. The frequent response of "agreement" clarifies

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the consensus on its complexities, though there are also varying perspectives on the challenges of implementation.

Philosophical and Practical Challenges

Philosophical discussions related to tacit knowledge present a more fragmented picture. A majority (93%) is not firmly aligned with linking transformative knowledge to transformative linguistics, reflecting skepticism towards certain theoretical frameworks. In contrast, 94% agree on the ongoing debate about the relationship between explicit and tacit knowledge, highlighting discussions on how knowledge can be organized. There is mixed opinion on whether tacit knowledge can ever be fully documented or shared, with only 47% agreeing, indicating that this debate remains unresolved.

Other practical challenges are also noted, such as concerns about knowledge loss due to workforce mobility acknowledged by 70% of respondents, though opinions are divided. While 63% agree that time constraints, inadequate rewards, and poor knowledge management systems impede sharing, a significant minority remains neutral or disagrees. The limitations of certain technologies are evident with 83% agreeing that they do not fully support knowledge management processes, yet only 60% agree that organizations struggle to encourage the sharing of unstructured knowledge.

In this section, the average agreement drops to 56.12%, indicating a less uniform perspective compared to the previous section. Although some consensus exists, there are notable areas of disagreement, particularly regarding philosophical aspects.

Technological and IT-Related Issues

The role of IT in facilitating clear information sharing faces significant skepticism. A substantial portion (90%) disagrees with the notion that IT can effectively support knowledge sharing, while only 10% believe it can. This skepticism is reflected in the fact that 81% of respondents agree that there are conflicting opinions regarding the effectiveness of IT. Although 72% acknowledge the limitations of traditional IT systems, 88% agree that varying opinions on how IT supports knowledge sharing contribute to confusion in the field, with the complexity of tacit knowledge being a major obstacle. Interestingly, 73% do not agree that social web tools, despite limited research on their effectiveness, can support knowledge sharing.

Despite these challenges, there is a near-universal agreement (90%) on the need for improved tools and processes to aid in the creation and sharing of knowledge. The overall average agreement for this section is 53.43%, indicating a division between agreement and disagreement regarding the role of IT in addressing knowledge challenges.

Operationalization and Research Gaps

The final section of the analysis focuses on the operationalization of tacit knowledge and existing research gaps. A slight majority (51%) agrees that the ineffable characteristics of tacit knowledge make it challenging to work with. However, 24% remain neutral, indicating some uncertainty. Similarly, there is a close division among those who believe that explicit knowledge (50%) is given too much emphasis and those who do not (35%).

60% agree that there is a lack of emphasis on tacit knowledge. Furthermore, 88% concur that addressing research gaps can provide valuable insights for improving knowledge management. Despite the overall lower agreement in this section (i.e., 56.12% agreement), the strong emphasis on research gaps indicates a need for further study to enhance understanding.

The analysis of survey responses across all sections reveals a broad consensus on the challenges of managing tacit knowledge. Agreement across sections ranges from 53.43% to

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81.57%, with most respondents recognizing the inherent difficulties in defining, transferring, and operationalizing tacit knowledge. However, there are notable disagreements, particularly regarding the role of IT and the philosophical foundations of tacit knowledge. These insights highlight the complexities universities face in comprehensive knowledge management, especially in the context of emerging technologies and organizational practices.

Discussion

The results of this study reveal significant challenges in managing comprehensive knowledge within universities and leveraging disruptive technologies, particularly in the context of Higher Education Commission (HEC)-recognized universities in Punjab, Pakistan. Among the four key categories examined—defining and managing explicit knowledge, philosophical and practical challenges, technological and IT-related issues, and operationalization and research gaps—the survey responses highlight the complex nature of tacit knowledge management and underscore critical areas of consensus, as well as notable points of divergence..

Defining and Managing Tacit Knowledge

In this section of the study, a strong consensus (80% to 98%) indicates that tacit knowledge is difficult to define, transfer, and manage. These findings reflect the intrinsic nature of tacit knowledge, which often becomes embedded in personal experiences, beliefs, and mental models, making it inherently challenging to articulate or formalize. The near-universal agreement (98%) on the importance of distinguishing between explicit and tacit knowledge underscores the need for universities to effectively recognize and manage these different forms of knowledge. Moreover, the implementation of tacit knowledge projects in remote areas is viewed as a valuable initiative, with 76% agreeing on its potential benefits in improving organizational outcomes such as productivity and sustainability.

However, the results also highlight some uncertainty regarding the frameworks and methodologies used to manage tacit knowledge. While the majority (65%) agrees on the need to develop frameworks, a significant minority expresses skepticism, indicating that there may still be a lack of clarity or consistency in the practical implementation of knowledge management strategies. This suggests a need for a more targeted approach and potentially the development of more robust guidelines for managing tacit knowledge across diverse contexts.

Philosophical and Practical Challenges

This section of the study highlights the existence of profound philosophical debates and practical challenges in the management of tacit knowledge. While there is a strong consensus (94%) on the ongoing debate between explicit and tacit knowledge, the mixed responses regarding whether tacit knowledge can be adequately documented or shared (47% agree, 35% neutral) indicate that this challenge remains unresolved. The diversity of opinions suggests that, although universities recognize the importance of tacit knowledge, there is no agreed-upon understanding or strategy to address these challenges.

The study also sheds light on the practical barriers to sharing tacit knowledge, such as insufficient time, rewards, and poorly designed knowledge management systems. With 63% agreeing that these factors hinder knowledge sharing, it becomes evident that the academic environment often fails to provide the necessary infrastructure or incentives to promote the exchange of tacit knowledge. Similarly, the lack of consensus on managing the unstructured

nature of tacit knowledge (60% agree, with a sufficiently neutral group) further underscores the difficulties universities face in handling these intangible assets.

Technological and IT-Related Issues

One of the most surprising findings in the study is the widespread skepticism regarding the role of IT in facilitating knowledge sharing. The majority of respondents (90%) do not agree that IT systems can effectively manage knowledge, reflecting concerns that traditional IT approaches are more focused on information management rather than promoting interaction among knowledge holders. Although some respondents (72%) acknowledge the limitations of IT in this context, the high level of disagreement suggests that current IT solutions are still not fully aligned with the needs of knowledge management. This highlights a significant gap between the capabilities of existing technologies and the unique requirements of exceptional knowledge management.

Despite these challenges, there is near-universal agreement (90%) on the need to develop better tools and processes to facilitate comprehensive knowledge sharing. This consensus indicates that, although there are doubts about the current state of IT, it is recognized that technology can play a valuable role if it is appropriately aligned with the complexities of tacit knowledge. The study also reveals a lack of research on the effectiveness of social web tools in supporting knowledge sharing, with 73% of respondents disagreeing that these tools are sufficient. This further underscores the need for advanced technological solutions that move beyond traditional IT approaches

Operationalization and Research Gaps

In the study's results, a slight majority (51%) agree that the indescribable nature of tacit knowledge makes it challenging to formalize. The high level of neutrality in responses (24%) indicates uncertainty among respondents, potentially stemming from a lack of empirical research on the practical implications of managing tacit knowledge in university settings. Similarly, the close division between agreement (50%) and disagreement (35%) on the emphasis placed on explicit knowledge suggests that universities are struggling to balance these two forms of knowledge, potentially overlooking tacit knowledge, which is crucial for maintaining competitive advantages.

There is strong consensus (88%) that addressing the research gap on the role of tacit knowledge could provide valuable insights for better management. This underscores the importance of further empirical studies aimed at understanding the operationalization of tacit knowledge, especially in educational institutions where the exchange of unstructured knowledge is essential for innovation and development.

Recommendations

Based on the study's findings, several recommendations can be made to enhance comprehensive knowledge management and address the challenges posed by disruptive technologies at the university level. Based on the study's findings, several recommendations can be made to enhance comprehensive knowledge management and address the challenges posed by disruptive technologies at the university level.

1. **Develop Tailored Frameworks for Tacit Knowledge Management**

   "Universities should prioritize the development of clear and customized frameworks that specifically address the unique characteristics of tacit knowledge. These frameworks

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should be adaptable to various contexts, including remote areas, where tacit knowledge initiatives can contribute to increased productivity and sustainability. Furthermore, institutions should establish explicit guidelines for the identification, estimation, and management of tacit knowledge within academic environments."

2. **Create Incentives and Support Systems for Knowledge Sharing**

To encourage comprehensive knowledge exchange, universities should establish incentives and support systems for faculty and staff. This may involve developing more organized knowledge management systems, offering rewards for knowledge-sharing activities, and ensuring appropriate time allocation for collaboration and interaction among peers. Addressing these practical barriers will create a more conducive environment for knowledge sharing.

3. **Invest in Research and Development of Innovative Technological Solutions**

In light of the broader skepticism regarding IT capabilities, universities should invest in research and development to develop advanced technological solutions that surpass traditional information management systems. Technologies that promote interaction, knowledge mapping, and higher-order learning should be prioritized. Furthermore, research into the utility of social web tools should be expanded to facilitate the sharing of academic knowledge, thereby exploring their potential within educational settings.

4. **Promote Balanced Knowledge Management Strategies**

Universities should strive to achieve a balance in the management of explicit and tacit knowledge, ensuring that no one is overlooked. Recognizing the value of comprehensive knowledge in maintaining competitive advantages and fostering innovation, universities can implement strategies that incorporate both forms of knowledge. This may include developing training programs that emphasize the role of tacit knowledge and encourage its integration into organizational practices.

5. **Address Research Gaps through Empirical Studies**

Further empirical research is needed to operationalize tacit knowledge within universities. Institutions should support studies that investigate the practical implications of managing specific knowledge, particularly in areas such as knowledge transfer, knowledge loss due to workforce mobility, and the effects of disruptive technologies. Addressing these research gaps will provide valuable insights for developing more effective knowledge management practices.

6. **Foster a Culture of Continuous Learning and Knowledge Exchange**

Universities should foster a culture that promotes continuous learning and the exchange of knowledge. This can be achieved by creating spaces for collaboration, both physical and virtual, where faculty and staff can share their experiences and insights. Encouraging informal conversations and interactions will facilitate the transfer of tacit knowledge, which is often best shared through personal interactions and experiences.

By implementing these recommendations, universities can enhance their approach to comprehensive knowledge management and better leverage disruptive technologies, ultimately improving organizational outcomes and cultivating a culture of knowledge sharing and innovation.

Conclusion

This study makes a significant contribution to the field of tacit knowledge management by elucidating the inherent complexities involved in defining and managing tacit knowledge. The findings reveal that tacit knowledge is deeply embedded in individuals' cognitive patterns, beliefs, and assumptions, making it challenging to articulate and transfer. Consistent with the existing literature, the study confirms that the deeply ingrained nature of tacit knowledge complicates communication and management.

The research highlights the importance of distinguishing between explicit and tacit knowledge, supporting the hypothesis that such differentiation enhances understanding and management practices. This crucial perspective is essential for effective knowledge management, as it facilitates the development of more targeted strategies to address the unique characteristics of tacit knowledge.

Philosophically, the study sheds light on significant challenges in conceptualizing and managing tacit knowledge within the frameworks of transformation linguistics and knowledge management. These challenges present barriers to understanding and applying tacit knowledge, affecting its practical use in organizational contexts.

Practically, the study identifies substantial difficulties in quantifying and estimating the amount of tacit knowledge within the workforce. These challenges impede the effective transfer and development of tacit knowledge, posing obstacles to organizational knowledge management efforts.

Technical and IT-related issues are also recognized as barriers to the effective sharing of explicit knowledge, particularly in educational settings. Although technology is often viewed as a key enabler of knowledge management, the study clarifies its limitations in facilitating the sharing of explicit knowledge. It underscores the need for more appropriate and contextually relevant technological solutions.

Particularly in remote areas, activating tacit knowledge projects presents additional challenges. Despite these difficulties, respondents acknowledge the importance of such projects in enhancing organizational outcomes, including increased productivity, safety, and sustainability.

In summary, the study confirms that managing tacit knowledge requires a nuanced understanding of its unique characteristics and challenges. These findings underscore the need for improved conceptual frameworks and practical tools to effectively manage tacit knowledge within organizations. Future research should focus on developing and testing innovative methods and technologies that address the specific needs and barriers identified in this study.

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