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Comparative Analysis of Knowledge Management Practices and Challenges: An Observational Study of Two Small and Medium Enterprises (SMEs)

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ABSTRACT

Knowledge management (KM) is inevitably a strategic capability for innovation and competitiveness in Small and Medium Enterprises (SMEs). However, it lacks recognition of its importance and practical application. Many SMEs face persistent challenges in formalizing KM due to limited resources, informal work structures, and a lack of understanding of how knowledge processes unfold in daily operations. Consequently, KM in SMEs often suffers from fragmented handling of unstructured data, limiting the efficiency of knowledge acquisition, information retrieval, and storage processes. This study examines how two SMEs manage these foundational KM components through structured non-participant observation, addressing the lack of behavior-based research in this domain. Guided by the Knowledge-Based View (KBV) and Practice-Based View (PBV), a comparative multiple-case design was applied over eight weeks, focusing on daily data-handling practices, documentation routines, and retrieval activities. Findings reveal that both SMEs rely on unstructured data sources, yet differ in their organizational approach to handling both explicit and tacit knowledge. In both cases, inconsistent storage and retrieval hindered knowledge accessibility and limited structured sharing. The study contributes theoretically by linking observable data practices to KM capability and methodologically by validating observation as a rigorous qualitative tool. Practical implications emphasize the need for standardized digital storage and retrieval systems at SMEs to enhance knowledge flow and organizational learning.

INTRODUCTION

It is inevitable for Small and Medium Enterprises (SMEs) to adopt and implement Knowledge Management (KM) as their strategic capability for innovation and competitiveness. However,

many SMEs face persistent challenges in formalizing KM even when they recognize its importance and practical application. This is due to limited resources, informal work structures, and a lack of understanding of how knowledge processes unfold in daily operations in SMEs. Consequently, KM in SMEs often suffers from fragmented handling of unstructured data, limiting the efficiency of knowledge acquisition, information retrieval, and storage processes.

Adopting effective KM enables SMEs to transform unstructured data into meaningful information and eventually valuable organizational knowledge. However, SMEs often lack systematic approaches for knowledge acquisition, information retrieval, and knowledge storage, resulting in fragmented repositories and inefficient access to information. While knowledge sharing remains essential, it is often shaped by the quality and organization of prior knowledge processes. From the perspective of a bottom-up approach, the quality and knowledge processes should start at the operational level, i.e., the individual knowledge workers themselves (People). Understanding how they manage their working knowledge, which eventually will turn into valuable insights to the organization, will help improve organizational KM (Process). In the advancement of today's technologies, the diverse ways of managing knowledge at the operational level are another challenge that needs further analysis (Technology).

To understand why adopting KM is a huge challenge at SMEs, this study investigates how two SMEs manage unstructured data and transform it into usable knowledge. This is conducted through observable acquisition, retrieval, and storage practices. By emphasizing behavioral and process-based observation, the study addresses a key methodological gap in KM research, which typically relies on self-reported data. Further elaboration on this will be covered in the Methodology section.

The study aims to examine how unstructured data is managed, stored, and retrieved in SMEs by comparing organizational routines related to knowledge acquisition and storage. In doing so, this study explores how these foundational processes influence knowledge sharing through the concepts of Effective Personal Knowledge Management (PKM) and People-Process-Technology (PPT).

THEORETICAL BACKGROUND

The research extends the theory of Effective Personal Knowledge Management (PKM) (Ismail & Ahmad, 2011a) by highlighting the micro-level enactment of KM processes in real work contexts. The Effective PKM framework conceptualizes how knowledge is managed at the personal level, contributing to the achievement of individual key performance indicators (KPIs). Collectively, these personal KPIs contribute to the organizational KPI (Ismail & Ahmad, 2011a, 2011b). Derived and related to the fundamental theories of the SECI Model (Nonaka & Takeuchi, 1995), the Effective PKM relates each KM process of socialization, externalization, combination, and internalization within the individual knowledge workers and the way they interact with the digital tools.

Within SME contexts, the SECI processes are frequently enacted through individual routines, informal communication, and interactions with digital tools. Consequently, PKM provides a useful lens for understanding how employees manage personal repositories, make sense of unstructured information, and engage in knowledge sharing that ultimately shapes organizational outcomes. Instead of approaching the KM practices from top to bottom levels of the organization like the popular KM theories, the approach of Effective PKM is bottom-up, paying close attention to the technology needs, business processes, and individuals' adoption of KM technology, aligned with the concept of People-Process-Technology (Schneier, 2008).

People-Process-Technology (PPT) as an Analytical Lens

In understanding the concept of the use of digital tools in SMEs, it is inevitable to relate the technology with the process and the people within the organization, hence the need to consider the People-Process-Technology (PPT) (Schneier, 2008) framework. This framework is used as a guide in analyzing the observation notes in this study. Covering the three elements in the PPT framework allows researchers to cover all grounds and evaluate the relationship between them in the context of the case studies. Applying the PPT lens allows a more holistic observation of the two SMEs, capturing not only the tools used but also how employees interact with them and how organizational routines reinforce or hinder effective knowledge practices.

Although there are other theories that conceptualize knowledge as critical resource (Grant, 1996) and emphasize that knowledge is enacted through daily routines and situated practices (Bromiley & Rau, 2014), only the integration of those theories is considered in this study, as the perspectives allows an examination of the observable mechanisms by which SMEs acquire, organize, and retrieve knowledge from unstructured sources. In SMEs especially, knowledge work tends to be informal, heavily reliant on tacit understanding, and shaped by interpersonal relationships rather than formalized systems. Integrating these theoretical perspectives allows this study to examine the tools and processes that exist, and how knowledge actually flows through observable behaviors, workarounds, and local adaptations within each SME. This is crucial for comparative analysis because SMEs often differ more in practice than in formal structure.

Empirical Trends of KM in SMEs

In most SMEs, the relevant key KM processes include knowledge acquisition, information retrieval, and knowledge storage and organization. Knowledge acquisition involves identifying and capturing new information from internal and external sources. Information retrieval involves locating and accessing stored data for reuse in operations or decision-making. Knowledge storage and organization involve structuring and maintaining repositories, whether digital or physical. These processes underpin the organizational knowledge capability, representing the early stages of knowledge flow that have significant implications for subsequent sharing, innovation, and decision-making.

Earlier KM in SMEs was often about simple knowledge capture or documentation, i.e., making tacit knowledge explicit. However, recent empirical work shows that KM is being linked with

competitive advantage, i.e., product differentiation, and cost leadership, as well as mediating performance outcomes (Zahara et al., 2024). This indicates that SMEs treat knowledge not as a passive asset but as a strategic resource to generate value. Failure in managing the knowledge or its processes effectively would jeopardize the growth and sustainability of the organization. In addition to this, a study showed that KM, market orientation, and product innovation jointly influence SME performance (Setiyono et al., 2022), proving that KM alone does not contribute to SME performance and competitive advantage, but together with other factors, the contribution is stronger.

A recent study empirically links information technology (IT) capabilities, i.e., infrastructure and competences, with innovation, mediated by KM practices (Al-Teneji et al., 2024). In the manufacturing SME context, for example, formalizing KM systems tailored to business scenarios would strengthen digital transformation (Yin & Ooi, 2024). This trend reflects the growing digital maturity that even resource-constrained SMEs are investing in IT to support KM, not limited to administrative work, but for innovation. Digital transformation here includes cloud, big data, and mobile devices, which are the technology that pushes SMEs to embed KM within digital tools, as IT-KM synergy becomes central.

From the aspect of the KM ecosystem in SMEs, the exploration-exploitation balance is sought. It is validated that SMEs engage in two modes of collaboration to acquire (explore) and internalize or use (exploit) knowledge (Hafeez et al., 2025). It is also found that dynamic capabilities, human capital, and technology, among other factors, mediate how KM practices affect SME performance (Escobar-Castillo et al., 2024). This suggests that SMEs are no longer inward-looking, but their KM is increasingly networked, relying on knowledge flows from external actors, i.e., suppliers, customers, and innovation intermediaries.

Other studies looked into the KM measurement and risk awareness in relation to practices in SMEs. It is observed that there is a marked increase in studies on KM measurement, performance, and risk management in SMEs, highlighting that knowledge risk, i.e., losing tacit knowledge when employees leave, is becoming a recognized concern (Durst, Edvardsson & Foli, 2023). This is supported by Escobar-Castillo et al. (2024), with their further dissection on how dependent, mediating, and moderating variables like human capital and technology capability would influence KM's effects in SMEs. Given their limited slack resources, measuring KM outcomes and being aware of risks is more pressing for SMEs. There is a maturation in KM research that is not limited to just knowing if SMEs do KM, but is more about how well they do KM. The risks of knowledge loss and informal knowledge are more explicitly addressed in recent studies, especially for knowledge-intensive organizations (Ismail & Shaikh Ali, 2024).

In terms of technology, the adoption of cloud as a KM platform is often mentioned in recent studies. Cloud-based KM systems are increasingly recognized for their affordability and scalability in SMEs (Saratchandra & Shrestha, 2022). Cloud and social media are also highlighted as the rising use of KM tools and as strategic enablers in SMEs (Durst, Edvardsson & Foli, 2023). This allows SMEs to overcome resource constraints, such as limited IT staff, and still implement robust KM as aligned to their needs. In other words, with limited internal IT resources, SMEs are

leveraging cloud-based KM systems, as such platforms lower the barriers to capture, store, and share knowledge.

METHODOLOGY

From the fundamental theories, an observation guide is devised, emphasizing the early stages of knowledge processing that influence subsequent sharing and innovation. A comparative multiple-case study approach was employed, focusing on two service provider SMEs:

1. SME A: A technology-based service provider with semi-digital KM systems.
2. SME B: An educational technology-based SME relying largely on manual and experiential methods.

Data were collected primarily through structured non-participant observation over eight weeks. The focus was on three areas: i) data handling and documentation routines; ii) information search and retrieval activities; and iii) storage, archiving, and version-control practices. These were recorded in the form of field notes and supported by relevant accessible documents.

Field notes, document reviews, and internal reports were triangulated. Data analysis was conducted using thematic coding, guided by the KM process framework. Trustworthiness was maintained through prolonged engagement, reflexive journaling, and peer debriefing. In other words, the findings throughout the eight weeks of study were clarified with the SMEs for confirmation of their accuracy, especially in terms of People, Process, and Technology.

The overall process of this study consists of six steps to produce a comparative analysis and insights to support the main objective:

1. ***Object and scope definition***: The objective of the comparative analysis is to identify the similarities and differences between the two selected case SMEs, with the scope of understanding how and why KM practices vary, exploring the contextual factors that shape these variations, and developing theoretical insights, extending relevant theories.
2. ***Unit of comparison identification***: In identifying what is exactly being compared, this study takes into account the KM processes observed within the case SMEs: Knowledge acquisition (how knowledge is captured from unstructured data), information retrieval (how staff access stored knowledge), knowledge storage and organization (how data and knowledge are archived and maintained), and knowledge sharing (how retrieval and storage enable or hinder sharing).
3. ***Analytical framework development***: A comparative framework is established in the form of a matrix that structures the analysis, consisting of columns (i.e., analytical dimension, SME code names, comparison insight) and rows (knowledge sources,

knowledge acquisition methods, storage system, information retrieval, sharing mechanism).

4. ***Thematic coding***: A procedure of open coding is performed to identify recurring behaviors, tools, and interactions related to data handling in each theme/dimension. As much as possible, similar codes are grouped under each KM dimension (axial coding).
5. ***Cross-case comparison***: Patterns across the two case SMEs are compared on each dimension, in the aspects of similarities, differences, and causal conditions (why).
6. ***Comparative insights derivation***: Similarities and differences are translated into theoretical insights, transforming description into a conceptual contribution.

RESULTS AND FINDINGS

Findings are discussed according to the key components of KM found relevant and necessary to the SMEs in the study: knowledge acquisition and unstructured data management; information retrieval practices; knowledge storage and organization; and influence on knowledge sharing.

In general, Table 1 shows the findings on cross-case comparison between SME A and SME B, according to the analytical dimension based on KM Processes.

Table 1: Cross-case Comparison between the case SMEs

Analytical Dimension	**SME A**	**SME B**	**Comparative Insights**
Knowledge Sources	Unstructured, mainly documented reports (texts), diagrams (images), forms (texts) *Approximately 80% text data*	Unstructured, mainly documented reports (texts), statistical data in documents (texts), photos/graphics (images), videos *Approximately 40% text data*	The impact of unstructured data on KM practices in SMEs would be the increasing importance of preprocessing and interpretation, the rising role of contextualization and sensemaking, the changes in knowledge capture and storage models, the demands of new metrics and quality controls, and the increasing complexity despite the richer knowledge generation. *(DIKW Model)*
Knowledge Acquisition Methods	Search within folders, using keywords of file names, authors' initials	Search with folders, using keywords (only applicable for text data)	There is a need to form a mental model of where knowledge is located, select the right search strategies (keywords), evaluate hits, and iteratively refine queries. *(Search-as-Learning (SaL) Theory)*
Storage System	Internal centralized shared drive/cloud provided by proprietary platform (Microsoft suite)	Internal public drive/cloud provided by commercial platform (Google Suite) *Inconsistent view of data in*	Need to analyze in the sense of provenance and traceability (what the memory records), retrievability and indexing (how memory is found), collaboration and social practices

	Version control is applied to some data, yet still provides challenges, especially to non-owners/non-creators of data.	*storage, partly due to individual file/folder shared access by the owners/creators. Different type of data is stored in different locations.*	(who edits memory and how), consistency, conflict resolution and governance, and long-term preservation and archival. The theoretical impact on Knowledge Acquisition and KM practice includes memory richness versus accessibility trade-offs, design memory-aware workflows, hybrid architecture, and governance and metadata matter. *(Organizational Memory Theory)*
Information Retrieval	Log in access using staff ID, shared link to storage (as shared by data owner). *Complication when external contract-based staff is hired but does not have a staff ID to access storage.*	Log in access using staff ID or shared ID, shared link to storage (as shared by data owner). *Complications occur when multiple platforms require multiple IDs, with some shared IDs (e.g., for image data storage).*	The concepts of shared links versus canonical storage require different perspectives, from "anyone with a link" to policy-governed share links that embed attribute checks (who, when, on what device) and expiration. Logging and immutable audit trails should be enforced to maintain organizational memory and accountability. *(Zero Trust Architecture (ZTA) and Attribute-Based Access Control (ABAC))*
Sharing Mechanism	Shared link in email or open messaging platform (WhatsApp).	Shared files/data in an open messaging platform (WhatsApp).	The sharing mechanism over an open messaging platform needs to be reduced or prohibited in stages to mitigate the risk of tampered data for the safety and confidentiality of organizational knowledge.

Based on the tabulated matrix above, discussions could be derived in terms of knowledge dimensions or themes, i.e., knowing where, knowing who, knowing what, knowing how, and knowing when.

Knowing where could be challenging (tacit knowledge) for most project members (staff), since it is highly dependent on the human memory capacity. In most cases observed in SME A, due to the need for proper organization of data, the location of the data is moved, either by renaming the folder or moving the folder elsewhere, or moving the file/data to a different folder, making the search and locating process difficult, especially when access permission needs to be reinstated to the changed folders. Meanwhile, in SME B, the challenge of knowing where is mainly on the abundant image data that is not properly organized with tags or labels, making it difficult to search, find, trace, and recall.

Knowing who is basically the People factor, as it would be highly challenging for a new member to onboard a project team. The recent practice in SME A is to name the file with the author's initials to indicate who created or is in charge of the data, but the person in charge may change upon the Project Director's instruction. In SME B, there is no trace of identity in file names. It is a norm in both SMEs to recall or ask in the messaging app (e.g. WhatsApp) to know

who updated or owns the data. In most cases, it is assumed that the Managing Director in SME B has the final version of all data. Knowing who also applies to access verification over multiple devices for shared accounts.

Knowing what is observed as SME A maintained a central but loosely structured digital repository, while SME B's storage remained fragmented across personal devices and paper records, regardless of the existence of some form of centralized storage. Both faced challenges in standardizing formats and ensuring version control. If the latest updated copy of confidential data is in an individual's personal hard disk, it is a challenge to know, search, request, and retrieve it.

Knowing how that is discussed here is based on the answer to "How to access, acquire, and retrieve data?" Although it is clear in both SMEs that the central repository exists, the process is not well documented. Due to the dynamic situation, behavior, and intention of the data owners, and based on the understanding of their individual work processes against management instruction, the process of accessing, acquiring, and retrieving data could be challenging for others. In SME B, it became a huge challenge when a project member unintentionally forgot to save and share the updated file/data.

DISCUSSION

Although this study only covered two SMEs for the comparative analysis, they still represent the common situation in most SMEs below five years of establishment. The working environment in these SMEs was highly dependent on the nature of work and the dynamics of work structure, especially for start-up companies that heavily rely on external funding and grants to operate their businesses.

Figure 1 illustrates the comparative insights that are encapsulated to represent the KM ecosystem in SMEs. In a nutshell, only the data and information level of the knowledge source could be shared and accessed among the employees of the SMEs if they are made available in the storage system. Often, knowledge and wisdom levels are embedded within human individuals at the C-level (i.e., chief officer level) or top management level in the companies. Regardless of the flat structure of SMEs, the "hierarchical" levels still exist at some point in time or based on projects.

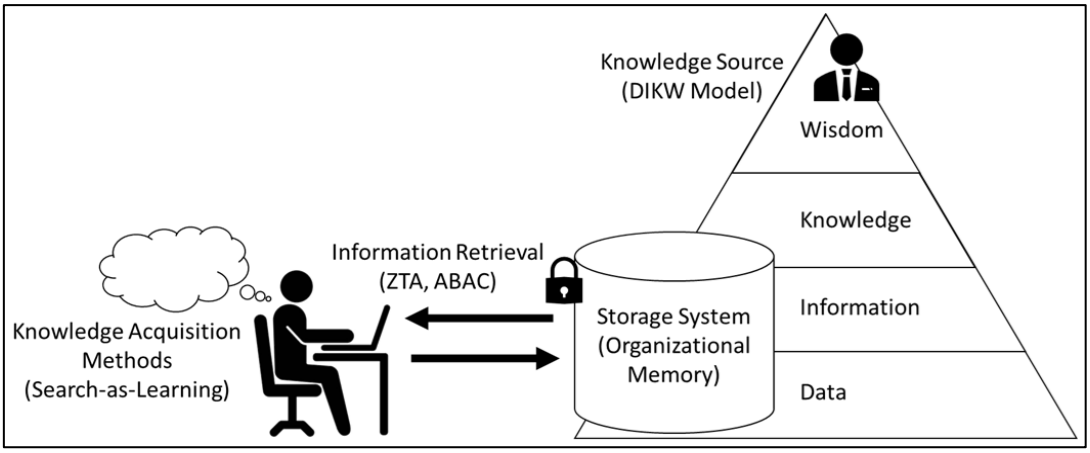

Figure 1: Insights into the KM ecosystem in SMEs

With the habit of burning the midnight oil, rushing for deadlines at night, often employees could not reach or access the tacit knowledge spontaneously or at their own convenience directly from the individual knowledge sources, i.e., humans at top management or C-level, who possessed the wisdom level of knowledge. The same goes for the top management or C-level individuals; it is difficult for them to get a spontaneous response from the other employees when they need data on the spot. This frequently happened when the individuals tacitly knew the data could be extracted or existed in the system, i.e., storage system, but were unable to retrieve or could not easily access due to complications or other inconvenient situations.

Since the work environment for most SMEs today is in the form of hybrid, remote work, or work from home, it adds to the complexity of the information retrieval processes. Having said this, the unstructured nature of the files and folders made it almost impossible for non-owners of the knowledge assets to search and retrieve, and the loop of trying to acquire the knowledge became a never-ending learning process; hence, the search-as-learning became a norm. This causes the inability to perform quickly, especially when time is of the essence when dealing with customers' ad hoc demands. In other words, the simple practice or process of tagging, labeling, and mapping knowledge on knowledge assets seemed to be the most vital, yet SMEs were unable to make it fully work or work more efficiently. This links to the struggle at the initial stage of company growth for SMEs, in which the small number of experienced and insightful human resources hinders the capacity of the team.

Concluding the comparative insights in Table 1, SMEs need to be aware of the impact of unstructured data on KM practices. Organizations would feel burdened by the increasing importance of preprocessing and interpretation of data, as well as the contextualization and sense making of the information. Knowing that employees practice 'searching' as a way to retrieve data and information or to acquire new knowledge, a mental model is required to identify where the right knowledge is located and can be accessed at the right time by the right people. Storing knowledge sources alone is insufficient without proper management of organizational memory. Hence, the sense of provenance and traceability, retrievability and indexing, and other long-term

preservation and archival methods for better organizational knowledge governance are vital in the long run. Although knowledge sharing is significant for quick decision-making and responses, zero trust and proper access control should be the priority in implementing KM at SMEs, especially when the employee turnover is very high.

CONCLUSION

This study reveals that unstructured data and information management, as well as the organization of knowledge repositories, are pivotal yet often neglected in SMEs. It is strongly guided by the theories of Effective PKM (Ismail & Ahmad, 2011a) and People-Process-Technology (Schneier, 2008) that remain relevant today. The application of these theories is aligned with the trends of KM in SMEs, especially in the aspect of adopted technologies.

Observations made in this study uncovered gaps between formal intent and actual practice, demonstrating that KM success depends on consistent knowledge acquisition and retrieval routines before sharing can be institutionalized. The intent is to highlight the struggle and view the complications from the individual knowledge workers' perspectives, which would lead to the significance of effective personal knowledge management for a bottom-up approach in SMEs. Future research should include the integration of digital trace analytics or process mining to further enhance the understanding of unstructured data flows in KM systems, especially in knowledge-intensive SMEs.

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