

**Benchmarking Knowledge Management Practices and Digital Empowerment for  
Business Excellence in Asia**

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**Abstract**

In the digital economy, knowledge management (KM) systems are critical enablers of innovation, compliance, and resilience. This study systematically evaluates benchmarking cases of KM practices against their planned objectives across system design, implementation, performance, and continuous improvement. Drawing on four cross-sector case studies, water infrastructure, printed circuit board manufacturing, healthcare, and digital technology services, this paper examines diverse organizations from public, private, international, and digital contexts to explore the distinctive characteristics of KM practices within developed Asian context. The analysis identifies four socio-technical mechanisms underpinning successful KM implementation: (1) codifying tacit knowledge into explicit routines, (2) enabling collaboration and visibility through digital platforms, (3) embedding KM into audits and regulatory standards, and (4) reinforcing adoption through leadership and culture. Theoretically, the study advances understanding of KM and digital empowerment as a capability bundle and clarifies scope conditions for developed Asia and extends socio-technical maturity models based on governance. Practically, it highlights the need for audit-ready design, visibility tools, codification of failures and successes, structured governance, and phased investments in less mature contexts. Overall, this study shows that KM systems, when coupled with digital empowerment and human capital, enable organizations to sustain competitive advantage in technology-intensive environments.

**Keywords:** Digital empowerment, knowledge management, human capital, dynamic capability, knowledge management system, sustainable system development, Asia

## 1. Introduction

The emerging global economic landscape is marked by heightened complexity and myriad risk factors, encompassing economic recessions, inflationary pressures, market shifts, and digitalization challenges such as information security and cybersecurity threats. In this context, the imperative to fully deploy technological innovations and novel business models in response to evolving market dynamics has become increasingly urgent. Knowledge management is considered a critical element for companies to effectively navigate during periods of transition (Dóci et al., 2022; Edwards & Lönnqvist, 2023; Wu et al., 2013) and is regarded and strengthen their competitive positioning (Audretsch & Thurik, 2004). As strategic asset, knowledge supports innovation and long-term resilience by fostering the integration of capabilities and resources (Chirico & Salvato, 2008). At the same time, the rise of digital empowerment has redefined how knowledge is created, shared, and applied (Hafeez et al., 2025; Leoni et al., 2024).

Research defines the concept of knowledge management (KM) as a set of interrelated processes: knowledge acquisition, conversion, application, and protection (Garcia-Perez & Ayres, 2009, 2010; Garcia-Perez & Mitra, 2007). The integration of KM and digital empowerment becomes prevalent in knowledge-intensive, standards-driven industries. Recent studies have emphasized the need to move beyond static KM repositories toward dynamic, digitally empowered knowledge systems (Baskerville & Dulipovici, 2006). Crucially, KM outcomes depend on human capital, as individuals provide the expertise and collaborative behaviors necessary to create, share, and apply organizational knowledge (Antunes & Pinheiro, 2020). Alongside these developments, organizations worldwide increasingly rely on knowledge management systems (KMS) to codify, share, and apply knowledge resources at scale (Del Giudice & Della Peruta, 2016). However, the implementation and adoption of KM system require alignment between technology, organizational culture, people and leadership (Pee & Kankanhalli, 2016).

Importantly, cultural context influences KM system adoption. In Western contexts, individualism, lower power distance, and formalized trust structures facilitate bottom-up knowledge flows and quicker adoption (Leidner et al., 2006; Suppiah & Sandhu, 2011). In contrast, Asian contexts are shaped by collectivism, hierarchical norms, and relational trust (*guanxi*), which can slow adoption unless systems are supported by top-

down leadership and culturally aligned incentives (Ford & Chan, 2003; Huang et al., 2008). These cultural differences underscore the need for context-specific KM research.

From the knowledge management perspective, effective knowledge management practices, combined with digital empowerment, human capital development, and organizational learning, contribute to the organization's capability for achieving business excellence (Schultz, 1961; Söderberg & Holden, 2002). Yet literature is largely Western-centric, with limited empirical evidence from Asia, where institutional and cultural practices differ significantly (Alharbi & Aloud, 2024). In addition, most empirical studies focus on single sectors, limiting the ability to understand how KM adoption varies across industries such as infrastructure, manufacturing, healthcare, and software. Although conceptual work highlights the potential of digital transformation for KM (Abdelrahman et al., 2025; Di Vaio et al., 2021; Scuotto et al., 2020), few studies provide comparative case evidence showing how corporations embed KM systems into daily routines to achieve business excellence.

From the perspective of business practice, effective knowledge management practices in business should be able to accommodate diverse organizational structures and industrial contexts. Benchmarking approach with real world business cases would be beneficial for better understanding of knowledge management systems in practices (Yan et al., 2019). This paper adopts a multiple-case study approach to benchmark KM practices and digital empowerment in developed Asian contexts. The study focuses on four diverse organizations: a state-owned water utility, a private PCB manufacturing firm, an international healthcare group, and a digital technology service provider. These cases demonstrate how corporations adopt KM systems to achieve sector-specific goals and knowledge retention and creation. By analyzing these cases, the study identifies both shared adoption mechanisms (codification, collaboration visibility, audit-readiness, leadership commitment) and sectoral variations which offer theoretical and practical insights into how KM and digital empowerment jointly contribute to business excellence.

## **2. Theoretical Background**

### **2.1. Knowledge Management and Digital Empowerment**

The emergence and rapid advancement of cutting-edge information technologies, such as cloud computing, big data analytics, artificial intelligence, blockchain, and 5G, have

substantially accelerated the digital transformation of enterprises (Vial, 2019). Traditional KM frameworks emphasize codification, personalization, and organizational learning routines (Hansen et al., 1999; Nonaka & Takeuchi, 1995; Tortorella et al., 2020). More recently, KM has been reframed within a digital empowerment perspective, highlighting how digital technologies enhance individuals' and organizations' capabilities to create, access, and utilize knowledge (Kane et al., 2015; Li et al., 2022; Mao et al., 2016; Vial, 2019) and extending KM from static repositories toward dynamic systems of knowledge flows, visibility, and integration (Santoro et al., 2019).

In today's dynamic context, organizations need to progressively enhance their KM aptitude to effectively govern the inflow and outflow of knowledge while exploiting external possibilities (Chen & Huang, 2009). The advancement of digital technologies has accelerated the development of knowledge management systems (KMS), designed to enable the creation, dissemination, and preservation of organizational knowledge (Soto-Acosta et al., 2016). However, the adoption remains fragmented, and the availability of commercial KM tools for small and medium enterprises is relatively limited and lack of maturity (Cerchione et al., 2016).

The formalization of KM through standards such as ISO 30401 reinforces the role of knowledge as a resource and a means of value generation. KMS can take diverse forms but are typically characterized by platforms that integrate technologies and practices to support knowledge creation, codification, storage, and transfer (Ruggles, 1997). In addition, digital empowerment has been shown to support three critical areas in KM research: (1) codification and accessibility, as digitized repositories reduce duplication and ensure version control (Durst & Zieba, 2019); (2) collaboration and visibility, where dashboards and traceability tools enable employees to coordinate effectively across boundaries (Pham et al., 2024; Short et al., 2023); and (3) integration with standards and audits, as digital systems embed knowledge into regulatory and quality routines for continuous improvement (Schmitt, 2022).

Taken together, these perspectives highlight the synergy between KM and digital empowerment. KM provides the conceptual and structural framework for leveraging intellectual resources, while digital technologies empower organizational capacity to scale, accelerate, and embed these processes through human capital and embedded routines, thereby enabling business excellence in dynamic environments.

## **2.2. Human capital and organizational performance**

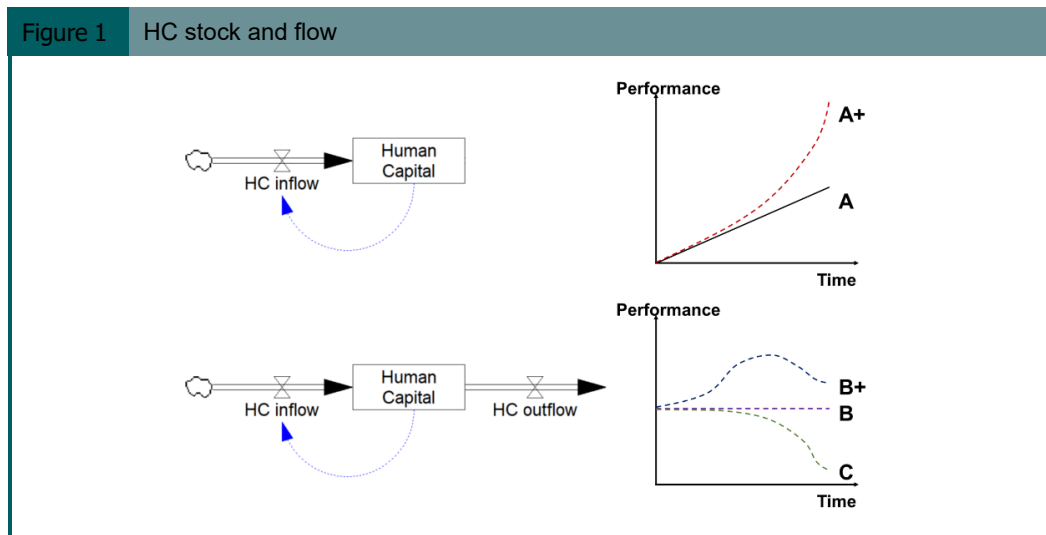
Human capital (HC) is the combination of employees' knowledge, skills, and attitudes that collectively determine an organization's innovative and adaptive capacity (Schultz, 1961). Unlike material resources, HC is intangible, mobile, and embedded in individuals, yet it delivers long-term value and generates outcomes that extend beyond physical assets (Tran & Vo, 2020). From a knowledge management (KM) perspective, knowledge acquisition, creation, sharing, and application depend on individuals' expertise, motivation, and collaborative behaviors (Antunes & Pinheiro, 2020). Organizations that effectively leverage human capital through KM systems can transform dispersed expertise into organizational routines and enhance long-term performance (Lönnqvist et al., 2022; Yan & Lee, 2024).

However, human capital is inherently transient; experienced employees contribute valuable knowledge upon entry but often take it away when they leave. This underscores the importance to capture, retain, and disseminate knowledge effectively. Recent research emphasizes that digital technologies empower employees to utilize their knowledge more effectively (Kane et al., 2015; Vial, 2019). Digital empowerment mechanisms such as knowledge platforms, audit dashboards, and AI-supported analytics can expand employees' capabilities by providing visibility and traceability of knowledge (Verhoef et al., 2021). In this manner, digital empowerment amplifies the contributions of individual human capital, translating them into organizational-level outcomes such as enhanced innovation and operational efficiency (Liu et al., 2023).

During the synergy of KM and digital empowerment, organization must manage the stock and flow of human capita for developing sustainable competitive advantages and performance. While resource infusion can lead to temporary performance growth in enhancing employee capabilities (as illustrated by Line A in Figure 1), achieving exponential growth requires utilizing the stock of human capital to reinvest into inflow of human capital (as represented by Line A+ in Figure 1). When the inflow of human capital equals the outflow, the performance would be stable as Line B in Figure 1. When the inflow of human capital is less than the outflow in a certain period of time, it results in the formation of the segment shown in Figure 1 as Line C, leading to a decline in performance. Conversely, when the inflow of human capital exceeds the outflow, it can stimulate improvements in organizational performance. However, if the inflow cannot consistently surpass the outflow over time, the organization's

performance may begin to decline, as indicated by the segment B+ in Figure 1.

From a knowledge management (KM) perspective, employees serve as carriers of knowledge, while KM systems function as mechanisms to capture, retain, and transfer it. The interplay between the stock and flow of human capital and KM is further reinforced through digital empowerment, enabling organizations to reduce knowledge loss and enhance responsiveness.

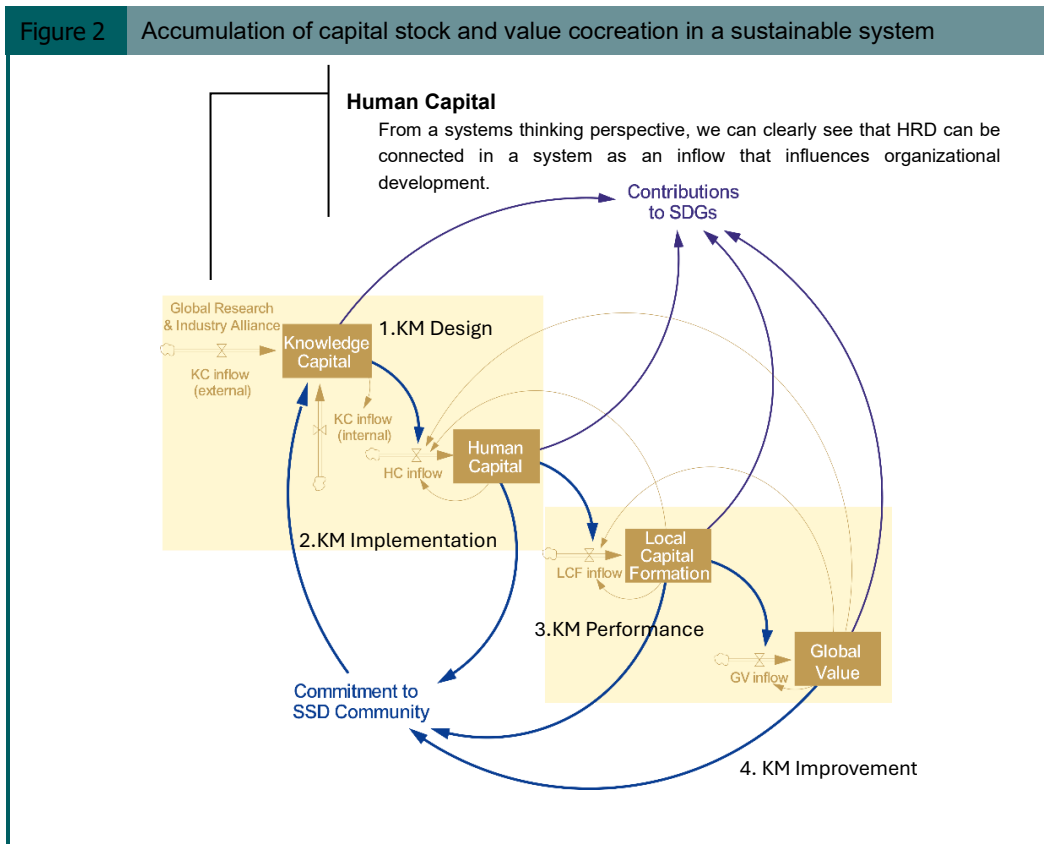


Source: Compiled by Yan (2021).

From the perspective of sustainable system development (SSD), knowledge capital (KC) and HC are connected as a system that drive organizational performance and global values (Yan, 2021). In the era of digital transformation, building a knowledge management system (KMS) enables organizations effectively manage internal knowledge capital, through which KMS can not only optimize the guidance of organizational knowledge value, but also serve as a formal basis for internal and external auditors to evaluate, certify, evaluate and recognize organizations (Carlucci et al., 2022). Digitally storing and structuring knowledge generates long-term value for organizations (Bordeleau et al., 2020; Schiuma et al., 2022) and supports organizational sustainability (Schiuma et al., 2021). KC can be accumulated to enrich HC and ensure sustainable system development and improve performance (Yan, 2021). The schematic of sustainable system development is shown in Figure 2.

Empirical evidence further substantiates these relationships. Antunes and Pinheiro (2020) show KM practices can enable organizations to preserve memory and enhance adaptability. Yet, prior literature indicates in low power-distance and individualistic contexts, employees may more freely contribute knowledge, whereas in high power-distance, collectivist environments and top-down mobilization of human capital tend

to play a greater role in enabling KM adoption (Leidner et al., 2006; Huang, 2008). In sum, it is the human element such as skills, creativity, and engagement that determines success, HC is a critical enabler of both KM process and digital empowerment.



Source: Yan (2021). Handbook of sustainable system development for strategic management and business innovation (1st ed.). Taipei: iLABs Taiwan Society for Sustainable System Development.

### 3. Methodology

An exploratory multiple case study of four international firms operating in different industries was conducted (i.e., Digital Technology Service, Printed Circuit Board (PCB) manufacturing, Healthcare Services and Resource Industry). The case study method facilitates the development of a comprehensive understanding of complex issues and is more suitable than quantitative investigations for theory building (Eisenhardt & Graebner, 2007). Multiple case study analysis enhances addressing 'how' and 'why' questions, and is well-suited for cross-case comparisons (Chiesa et al., 2007; Yin, 2009). Our study can generate theoretical implications by considering an adaptive systems approach. While addressing generalizability concerns, the findings may not lend themselves to broad empirical generalization (Tsang, 2014), yet the four case studies provide a strong basis for theoretical and analytical generalization (Yin, 2009). It offers insights into the use and application of digital empowerment tools and their relationships between KM practices, particularly for firms that exhibit similar

characteristics to those engaged in IT–business alignment initiatives.

The case sampling was conducted theoretically (Eisenhardt, 1989) based on three key elements: implementing a KM (knowledge management) system to enhance knowledge transfer (Argote & Ingram, 2000) and integration, promote digital empowerment in response to business development, and improve internal quality awareness and assurance to mitigate failure risk. The research design consists of the steps as described below (Barczak,2015).

### **3.1. Case selection**

We investigated four international firms operating in different industries which have invested in digital tools and implemented KM system to facilitate KM transfer and integration for more than one year. It provides a great opportunity to investigate how KM systems improve the mechanism of sharing experiences, knowledge and data collection in a more convenient and real-time manner. How these international firms initiated the project on KM system, how they overcame the challenges and achieved the accomplishments to discover business opportunities.

### **3.2. Identification of the units of analysis**

We examined IT-business alignment through an adaptive systems approach, emphasizing how it facilitates the transfer and integration of organizational knowledge management practices. These four cross-case comparisons allow understanding how companies can adopt KM system to enhance the capacity of KM integration.

### **3.3. Definition of the reference research framework**

The KM system and KM integration research framework described above served as the foundational basis for data collection (Eisenhardt, 1989). A neutral and unbiased stance was consistently maintained.

### **3.4. Data collection**

Data was collected in December 2024 using several primary and secondary sources (Eisenhardt, 1989) to enhance data validity and reliability. Regarding primary sources, we designed semi-open questions for the executive managers and their senior staffs of four international firms to provide their insights to enrich the descriptions. As secondary internal sources, we analyzed the firms' website, company presentations, and public data on KM systems and practices.

### **3.5. Data elaboration**

The gathered information was elaborated with data categorization, using the

categories/variables suggested by the KM system and KM transfer and integration literature. The different data sources were compared for each category. Data triangulation between primary and secondary sources ensured construct validity and limited post-hoc rationalization.

### 3.6. Data analysis

The key evidence from the previous step was analyzed in light of the reference models present in the KM system and KM literature. We discussed theoretical propositions to explain how the involvement of digital technologies in knowledge management has contributed to the competitiveness of firms and consequently driven higher performance. The authors independently reviewed the evidence from the responses of the cases, compared findings, and refined the results until reaching convergence. Finally, the propositions were jointly developed and discussed until reaching consensus.

## 4. Findings from Case Interviews

### 4.1. The background of companies (Companies listed in alphabetical order)

Company	ALLIED CIRCUIT CO., LTD (ACCL)	Cyber Solutions	Land Seed International Medical Group	Taiwan Water Corporation (TWC)
Year of Establishment	1995	2000	1992	1974
Location	Taiwan (R.O.C)	Japan	Taiwan (R.O.C)	Taiwan (R.O.C)
Industry	PCB (Printed Circuit Board) manufacturing, cloud storage equipment, industrial computer boards	Digital Technology Service Providers	Healthcare Services, Recreational and Leisure Industry	Resource Industry
Customer	B2B	B2B	B2B and B2C	B2B and B2C
KM System by Galaxy Software Services	Yes	Yes	Yes	Yes
Length of KM System implementation	3.6years	1.3years	11.6 years	5.1years

#### 4.1.1 Allied Circuit Co, Ltd.

*Allied Circuit Co, Ltd* specializes in manufacturing high-reliability server PCB, cloud storage equipment, and industrial computer PCB. Allied Circuit is dedicated to

enhancing product quality and production efficiency, leveraging smart manufacturing and real-time information systems as competitive advantages. As demand in the high-end PCB market grows, Allied Circuit continues to drive innovation, actively implements knowledge management to retain and transmit expertise gained during development, ensuring stable quality and continuous improvement in internal management efficiency.

#### **4.1.2 Cyber Solutions**

*Cyber Solutions* is a professional software and cloud service provider in Japan. Its main products include email, email protection, email archiving management, and audit encryption software. The company’s business philosophy is "to continuously provide Japanese companies with secure business communication platforms." To date, it has accumulated over 20,000 clients in Japan, with more than 4 million registered users. Its products hold a market share of 35% within public sectors in the 23 areas of Tokyo.

#### **4.1.3 Land Seed International Medical Group**

*Land Seed International Medical Group* is rooted in healthcare, dedicated to the development of health service businesses. Upholding the brand spirit of "Achieving Health Equity," the group actively promotes digital transformation and knowledge transformation, integrating three major business sectors: medical institutions, recreational and leisure services, and the smart health ecosystem. It aims to create a barrier-free healthcare institution that provides comprehensive health services.

#### **4.1.4 Taiwan Water Corporation (TWC)**

*Taiwan Water Corporation (TWC)* is a state-owned enterprise responsible for supplying water. As Taiwan’s largest water supplier, TWC manages the development, treatment, and distribution of water resources to households, businesses, and industries. Its mission is to provide abundant, high-quality tap water through efficient management, aiming for corporate social responsibility, sustainable operations, and economic development.

### **4.2. KM System Project Initiatives and Goals**

<b>Case Company</b>	<b>Initiatives and Goals</b>
ALLIED CIRCUIT CO., LTD (ACCL)	To enhance quality management, reduce internal and external failure risks, and encourage continuous internal improvement. It required a dynamic KM system that actively connects related documents, enabling departments to retain and utilize knowledge effectively. 1. Customer Complaint Resolution: By recording all improvement histories in the system, processes and results

	<p>are easily retrievable.</p> <ol style="list-style-type: none"> <li>2. Cross-Department Communication: Reduces duplicate inquiries by ensuring real-time information sharing among departments.</li> <li>3. Process Abnormality Handling: Repeated handling experiences are documented, providing valuable reference for future cases.</li> </ol>
Cyber Solutions	<ol style="list-style-type: none"> <li>1. Knowledge Retention and Transfer: Through the knowledge management system, ensure that cybersecurity certification experiences are preserved and passed on, reducing knowledge loss due to staff turnover and enhancing cybersecurity awareness among all employees.</li> <li>2. Improve Certification Efficiency: Systematic management of certification evidence prevents data fragmentation and version inconsistencies, improving search and access efficiency, making the preparation process more organized and easier.</li> <li>3. Facilitate Cross-Department Collaboration: Break the old model where the Chief Information Security Officer (CISO) carries the sole responsibility, encouraging company-wide participation and embedding cybersecurity awareness into daily tasks to strengthen the overall cybersecurity culture.</li> <li>4. Professional Response to External Audits: Quickly present complete certification results, reducing the pressure of searching and providing additional documents, ensuring that external audits are smooth and efficient.</li> </ol>
Land Seed International Medical Group	<ol style="list-style-type: none"> <li>1. Deepen Knowledge Management Applications to Enhance Organizational Efficiency and Competitiveness: Integrate knowledge management into daily operational processes to optimize various business activities.</li> <li>2. Establish a Smart Hospital/Company: Integrate various information systems and apply data analysis and artificial intelligence technologies to improve decision-making efficiency and service quality.</li> <li>3. Create a Knowledge Alliance Ecosystem: Collaborate with external organizations to promote knowledge sharing and exchange, acquire best practices and innovative ideas from external sources, and enhance influence in the healthcare field.</li> <li>4. Continuously Convert Tacit Knowledge into Explicit Knowledge: Encourage employees to share experiences and establish a comprehensive knowledge documentation system.</li> <li>5. Leverage Generative AI Technology to Improve Knowledge Management Efficiency: Explore applications of AI in knowledge acquisition, sharing, and innovation to optimize knowledge management processes.</li> </ol>

Taiwan Water Corporation (TWC)	<ol style="list-style-type: none"> <li>1. Over the next decade, nearly 30% of employees will reach retirement age, with retiring executives comprising 50%. This makes a knowledge management mechanism and platform urgently necessary to accelerate the transfer of expertise and integrate knowledge management into the organization's DNA.</li> <li>2. Internal knowledge file management varies across departments, with some units independently establishing knowledge databases based on their needs, leading to a lack of shared learning and usage.</li> </ol>
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Source: Compiled by authors

#### 4.3. Key Challenges during the KM System Implementation Process

Case Company	Key Challenges
ALLIED CIRCUIT CO., LTD (ACCL)	<ol style="list-style-type: none"> <li>1. Cross-departmental communication posed a significant challenge in the early stages of KM implementation.</li> <li>2. Differing from traditional board manufacturers, Allied Circuit's production includes front-end design, material recommendation, and simulation testing.</li> <li>3. The Quality Assurance department led cross-departmental coordination, eventually securing buy-in from the entire company through consistent effort. Implementation challenges, such as knowledge retention, post-training, were mitigated with tailored measures, regular audits, and supplementary training sessions.</li> </ol>
Cyber Solutions	<ol style="list-style-type: none"> <li>1. Division of Work and Non-Digitalized Planning: the degree of document digitization is low, leading to scattered data, high duplication, and difficulty in version control, which reduces efficiency.</li> <li>2. Collaboration Challenges During the Preparation Phase: Lack of progress tracking tools makes it difficult for managers to monitor the progress of various departments and the low transparency in collaboration.</li> <li>3. Time-Consuming Review Periods and Difficulty in Traceability: The internal and external audit processes rely on manual work, with supporting documents being scattered and hard to search, which further increases the time and pressure involved in the review process.</li> <li>4. Challenges in Continuous Improvement After the Review: The company's quality awareness and cybersecurity standards are difficult to integrate into daily operations. The lack of automated tools to support continuous improvement makes knowledge transfer and standardized management challenging.</li> </ol>

Land Seed International Medical Group	<ol style="list-style-type: none"> <li>1. Challenges in Knowledge Document Completion Rate and Quality Challenges: During the initial stage, some employees were unfamiliar with the guidelines for writing knowledge objects or too busy to complete knowledge documents on time. This led to low completion rates and suboptimal content quality for some documents.</li> <li>2. Low Participation Willingness and Knowledge Management Awareness Challenges: Some employees may lack understanding of the value and importance of knowledge management or fear that sharing knowledge could jeopardize their roles, resulting in low participation.</li> <li>3. One-Time Efforts with Low Sustainability Challenges: Some employees may view knowledge management tasks as one-off projects, failing to continuously update and maintain documents, which eventually become outdated and lose value.</li> </ol>
Taiwan Water Corporation (TWC)	<ol style="list-style-type: none"> <li>1. Implementing a new knowledge management system must comply with security regulations, and employees must adapt to a new interface and learn new operations.</li> <li>2. The organization's large structure and extensive accumulated knowledge documents are poorly classified, making them difficult to use.</li> <li>3. Knowledge is scattered and inconsistently managed, stored across units or in the minds of senior employees, leading to challenges in quick access and dissemination.</li> <li>4. Tight manpower and busy schedules require extra time planning to implement knowledge management initiatives.</li> </ol>

Source: Compiled by authors.

#### 4.4. Major Achievements after KM System Implementation

Case Company	Major Achievements
ALLIED CIRCUIT CO., LTD (ACCL)	Following the implementation of the KM system, the company has achieved substantial improvements in product quality and management efficiency, with significant reductions in internal failure costs and RMA rates. The system enables quick customer response, allowing problem resolution within six hours—three times faster than the industry standard. Key achievements include the effective transfer of management expertise, enhanced risk assessment and anomaly handling capabilities among frontline supervisors, and accumulated knowledge on quality issues, preventing recurring problems.

Cyber Solutions	<ol style="list-style-type: none"> <li>1. Standardized Planning and Division of Work: After implementing the KM system and verification management system, the company's management policies became clearer, and the division of responsibilities among departments was more defined, effectively reducing communication misunderstandings.</li> <li>2. Optimized Knowledge Document Management: The digital platform made storing, reviewing, and updating documents more convenient, avoiding issues with version control and difficult searches, and improving the consistency and traceability of documents.</li> <li>3. Improved Efficiency in Internal and External Audits: After the system implementation, the preparation time for audit data was significantly reduced, and the verification process on audit days became more efficient. The systemized platform allowed data and documents to be presented quickly, significantly improving review efficiency.</li> <li>4. Enhanced Overall Cybersecurity Awareness: The company can easily integrate quality and cybersecurity awareness into daily operations, making compliance and risk management part of regular workflows. Automation and digital management continuously improve and maintain high cybersecurity and quality standards.</li> <li>5. Promoting Knowledge Internalization Through Overall Compliance Standardization: With the support of the KM system, the company achieved process standardization, systematic document management, and increased efficiency in the review process, strengthening overall compliance capabilities and cybersecurity awareness.</li> </ol>
Land Seed International Medical Group	<ol style="list-style-type: none"> <li>1. Enhancing Healthcare Quality and Competitiveness: The company reaches its primary goal of enhancing healthcare quality and competitiveness by accumulating, sharing, and applying knowledge.</li> <li>2. In 2022, the company became the world's first healthcare institution to achieve ISO 30401 certification, further improving its knowledge management system.</li> <li>3. Enhancing Knowledge Content and Organizational Memory: Implementing KMS has improved the knowledge content and organizational memory by visualizing knowledge and experiences from critical processes, the system facilitates learning and understanding among employees, aiding in the retention of organizational knowledge.</li> <li>4. Reducing Learning Curves and Promoting Knowledge</li> </ol>

	<p>Sharing: KMS enables the rapid dissemination of problem-solving experiences, shortening learning curves and helping branch offices quickly acquire new knowledge, ultimately enhancing healthcare quality.</p> <p>5. Optimizing Processes and Enhancing Efficiency: it strengthened the transmission of best practices and improved the learning outcomes of training programs. It also helps employees identify issues in processes, proposing solutions to optimize workflows and efficiency.</p>
Taiwan Water Corporation (TWC)	<ol style="list-style-type: none"> <li>1. Facilitated cross-business learning through the knowledge management platform. For instance, uploading and downloading meter-reading data with a checklist reduced human error and saved 13.5 hours of manpower during transitions.</li> <li>2. Established 171 graphical SOPs to enhance operational efficiency.</li> <li>3. Improved work documents such as digitizing construction site photos and consolidating experiences in handling construction challenges, enabling horizontal connections and knowledge transfer.</li> <li>4. Systematized knowledge integration and application, shortening onboarding time. For example, independent inspection learning time decreased from 180 days to 76 days (a 57% improvement), enhancing efficiency in training and engineering supervision.</li> <li>5. Reduced time spent on task exploration by creating relevant knowledge files, such as an "Activity Planning Guide," categorized into teacher workshops, water conservation advocacy, and event receptions. This allowed beginners to prepare large-scale events in two weeks instead of one month, saving 40 person-days annually.</li> </ol>

Source: Compiled by authors.

## 5. Cross-Case Analysis and Discussion

### 5.1. KM Design-Organizational Pathways of KM Systems

The implementation of KM systems requires organizations to navigate both technological and organizational pathways. Prior research emphasizes that systems provide the technological infrastructure for codification, search, and storage, but human capital and organizational culture determine whether knowledge is effectively shared and applied (Antunes & Pinheiro, 2020). The implementation involves three interdependent dimensions, including (1) technological functionalities that enable

codification and accessibility; (2) human and cultural factors that support sharing and collaboration (Yan, 2018); and (3) governance mechanisms that ensure security, compliance, and sustainability (Santoro et al., 2018).

Galaxy Software Services (GSS) established in 1987, is a leading provider of Enterprise Applications software and cloud services (SaaS) in Taiwan's IT industry. The KM system helps the organization to transform by building a knowledge library for employees to interact, accumulate, manage and share organizational knowledge and experience assets as shown in Figure 3. The AI-powered enablement is to use technology to break down barriers and enhance knowledge mobility across department and systematically integrate knowledge and information. Echoing the literature on codification and accessibility (Durst & Zieba, 2019). People are the owners and creators of knowledge. Personal expertise and experience or tacit knowledge within a team are all core assets of knowledge management. Sharing is the spirit of knowledge management and the key to realizing its value. Knowledge sharing requires not only technical support, but also the cultivation of an organizational learning culture and a transparent communication environment. In addition, confidentiality should be taken into consideration, and the security of sensitive information should be ensured through layered permissions or encryption technology.

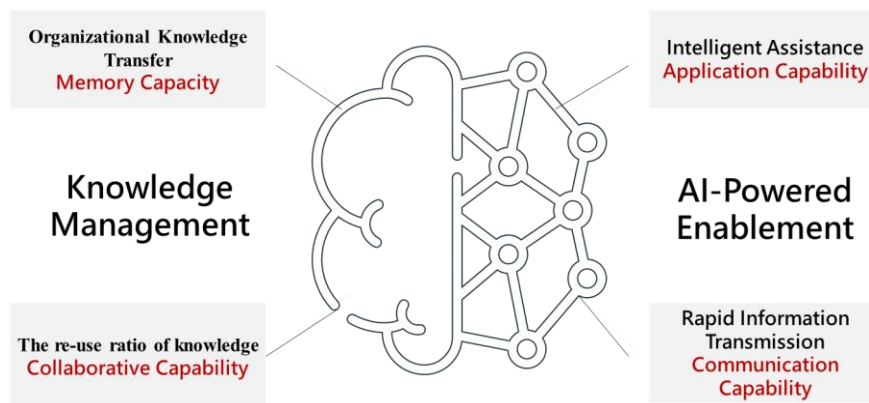


Figure 3: AI-Powered Enablement for Knowledge Management

Source: Compiled by authors.

This knowledge library is like a file explorer which holds the data of a knowledge object entity in a single binder. A knowledge object can be connected to several classified objects by the mechanism of multiple classification for a single file making the users check platform information from different perspectives. The features include the function of quick and precise full-text search across diversified resources of knowledge. A powerful built-in search engine is provided to support text searches for

Office, Open Office (ODF format) and converted PDF files. It can be easily designed knowledge type (form) without writing a program. The fields of diversified types (date, drop down list, single choice, multiple choice and rich text editor, etc.) can be flexibly configured within the composite form using the custom knowledge-type (form) in unlimited quantities.

Diversified applications can be created without writing any program. Online view for attachment access can be subdivided into "view" and "download". Online review not only offers browse guidance but also can activate and set the display properties of watermark flexibly. In addition, the version and automatically comparing the differences is another key feature for KM practice. The revised versions of files can be recorded by batches so that new users will not misuse files. The smart function for the content comparison of revised attachment files clearly present revised tracks such that the efficiency of the inner and outer audits is tremendously improved. Figure 4 and Figure 5 demonstrates the features of KM system and Figure 3 indicates the KM system.

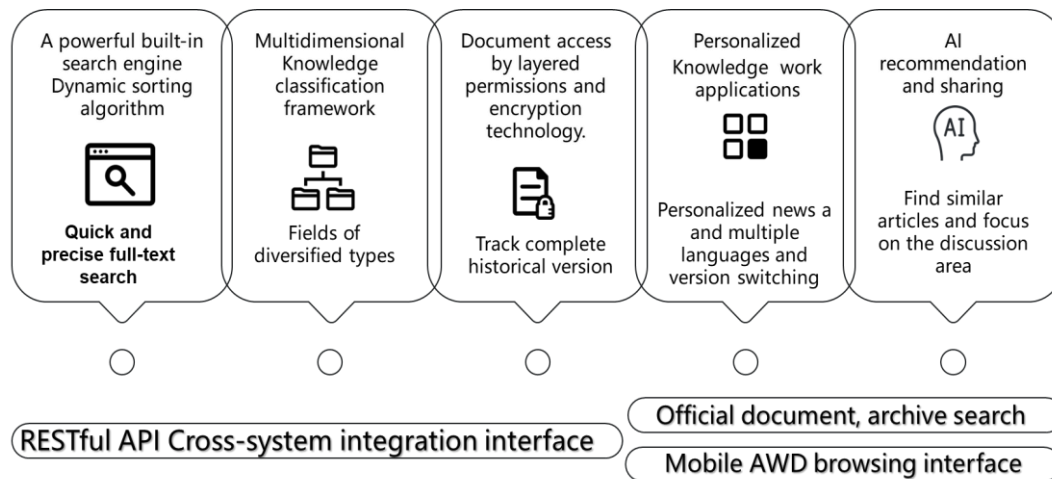


Figure 4: The features of Knowledge Management System

Source: Compiled by authors.

From the knowledge management perspective, the accumulation of organizational knowledge must fully integrate people and information through technology and achieve a multiplier effect under a sharing culture. To achieve these goals, the system provides users with an innovative conservation model which strengthens the sharing and interactive mechanism among people in the platform, increases their participation, accumulates the energy of crowd wisdom and connects acquainted people with the unacquainted to create new values. If an enterprise plans to introduce knowledge management, it has to start with personnel, information, and technology, and improve processes through sharing and integration. To make recording work and experiences

sharing more effectively, KMS provides the connection to the original Vitals ESP server, enabling users to access and search files anytime. The function of attachment review is to offer online preview of files, allowing users to read and examine attachment files. It offers a secure and convenient mechanism for KM from the perspective of organizational resource utilization.

The pathway of implementation KM system reflects the principle that knowledge systems must evolve with organizational needs (Benbya et al., 2004). It highlights the importance of collaboration and visibility. Employees are the creators and carriers of tacit knowledge, and systems alone cannot ensure knowledge sharing without cultural reinforcement (Baskerville & Dulipovici, 2006; Nonaka & Takeuchi, 1995). By providing features such as version control and audit tracking, the platform not only enhances collaboration but also strengthens trust and accountability, which are prerequisites for adoption in collectivist contexts where hierarchical and relational norms matter (Huang et al., 2008). Finally, implementation requires embedding KM into compliance and audit routines, the GSS system’s layered permissions, encryption mechanisms, and automated version comparison directly support this integration for the efficiency of both internal and external audits. This resonates with findings that digitized KM systems can transform compliance from a cost burden into a capability for competitive advantage (Carlucci et al., 2022; Schiuma et al., 2021).

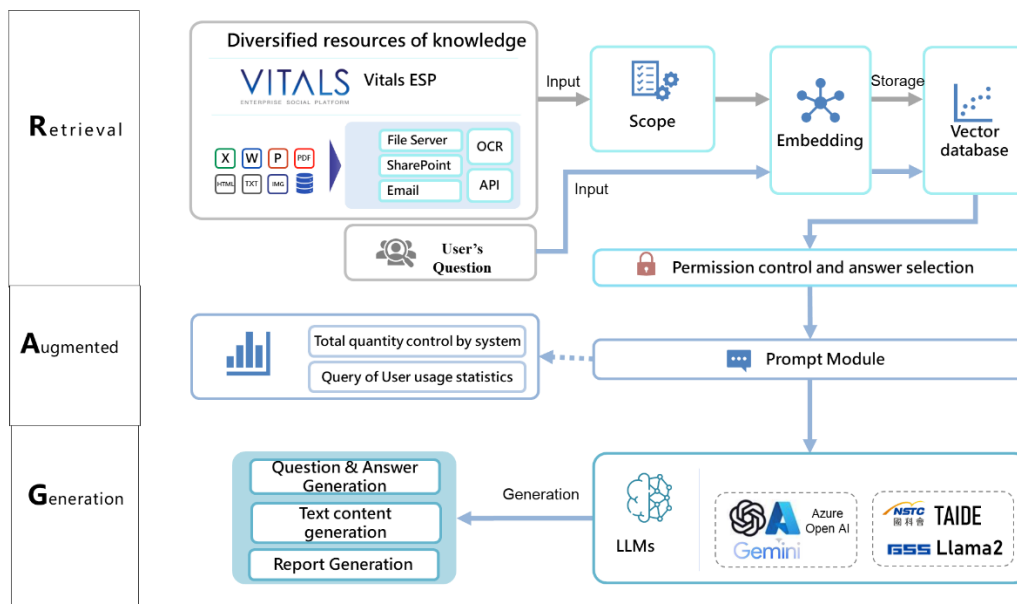


Figure 5: Knowledge Management System

Source: Compiled by authors.

## **5.2. KM Implementation: Shared Mechanisms Linking KM and Digital Empowerment**

Despite sectoral differences, the four cases reveal a set of shared socio-technical mechanisms through which KM systems generate organizational value and long-term performance. These mechanisms highlight how digital empowerment amplifies the processes of knowledge codification, collaboration, compliance, and cultural reinforcement. First of all, Codification of Tacit Knowledge. A central mechanism across all organizations was the transformation of tacit expertise into explicit, reusable knowledge. Examples include standard operating procedure (SOP) libraries at the Water Utility and clinical knowledge repositories at Land Seed International Medical Group. This codification ensured continuity by reducing the risks associated with employee retirement or turnover. Knowledge spiral, group discussions, and AI-powered search engines were employed to convert experiential knowledge into accessible formats which create a foundation for organizational learning and knowledge renewal.

Secondly, Collaboration and Transparency. Digital empowerment enabled employees to interact, accumulate, and share knowledge more effectively across boundaries. KM systems incorporated dashboards, notification systems, and progress tracking to support cross-departmental collaboration. For example, Cyber Solution's audit management platform. These features enhanced transparency, accountability, and reduced duplication of effort and confirmed prior findings that digital tools are not simply repositories but platforms for visibility and empowerment (Baskerville & Dulipovici, 2006). Thirdly, Audit and Standard Coupling. Across all sectors, KM systems were integrated with compliance and quality assurance routines. For example, Land Seed International Medical Group achieved ISO 30401 certification. Embedding KM practices into audit processes not only reduced organizational risk but also

transformed compliance into a source of legitimacy and competitive advantage (Schmitt, 2022).

Lastly, Leadership and Cultural Reinforcement. Each organization required visible leadership commitment, cultural change, and systematic training to embed knowledge-sharing behaviors. Champions, “seed members,” and regular training activities played a key role in sustaining adoption. The cases show that employees are the true carriers of knowledge and cultivating a knowledge-sharing culture was necessary to unlock the potential of digital empowerment. These mechanisms demonstrate that the synergy of KM and digital empowerment transfer tacit knowledge to explicit knowledge by embedding socio-technical routines that connect people, processes, and technology into compliance and cultural practices.

### **5.3. KM Performance: Sectoral Contingencies in KM Practices and Outcomes**

While the four cases reveal shared mechanisms, the manifestations of KM practices and outcomes were contingent on sector-specific context. This finding confirms that KM adoption is context-sensitive, shaped by industry characteristics, regulatory requirements, and organizational priorities (Durst & Zieba, 2019). KM initiatives of Taiwan Water Corporation (TWC) were driven by the need for knowledge retention and continuity in the face of impending retirements. Digital empowerment supported onboarding efficiency and cross-unit learning, with codified SOPs and searchable repositories that reduce knowledge loss and enhance employee training.

KM practices of ACCL emphasized quality assurance and process improvement. The codification of anomaly reports and complaint clouds translated directly into operational efficiency. It reduces the defect rates and reinforces organizational resilience. Land Seed International Medical Group’s KM approach integrates compliance with innovation. ISO 30401 certification institutionalized knowledge practices, and their smart hospital initiatives and AI integration enhanced patient safety

while strengthening the organization's competitiveness. It highlighted how KM systems can simultaneously reinforce regulatory compliance in the healthcare sector and foster innovation-driven differentiation.

As for digital technology service providers, Cyber Solutions closely aligned with cybersecurity certification and compliance. Digital empowerment embedded risk management routines into daily operations that enable employees to contribute more effectively to audits and standards. This illustrates how KM systems can transform compliance from a burdensome requirement into a source of strategic advantage.

#### **5.4. KM Improvement: Systematic and Continuous Review**

These distinctions highlight the necessity of contextualizing KM systems. In healthcare and software, compliance emerged as the dominant imperative; in manufacturing sector, the process quality and efficiency were paramount; and in infrastructure of water, knowledge continuity was central. The four case studies demonstrate that effective knowledge management (KM) requires not only robust system design but also systematic and continuous review. Across infrastructure, manufacturing, healthcare, and digital technology, organizations emphasized the importance of ongoing refinement and whether through updating SOP libraries, codifying failures alongside successes, embedding audits, or strengthening cybersecurity awareness. In sum, continuous evaluation enabled firms to identify gaps, adapt digital tools, and reinforce cultural commitment to knowledge sharing and creation. This iterative process ensured that KM systems are embedded through a systems approach rather than as a stand-alone technological intervention. It remained responsive to organizational needs and regulatory standards that sustain competitiveness and resilience in dynamic environments.

### **6. Key findings**

### **6.1 KM System Implementation Are Socio-Technical process**

The cases confirm that successful KM implementation pathway is not purely technical but a socio-technical process. Organizations struggled with knowledge loss due to employee turnover. When key personnel resigned, new employees often had to start from scratch, wasting time and resources. Traditional training and preparation processes are inefficient due to scattered supporting materials, version confusion, and difficult searches, which often put great pressure on the employees. KM systems mitigated these risks by providing structured repositories, version control, and powerful search functions, aligning with prior research that indicates the need for technological and cultural integration (Santoro et al., 2018).

### **6.2 Shared Mechanisms Reinforce KM and Digital Empowerment Synergy**

Codification of tacit knowledge, collaboration and transparency, audit and standard coupling, and leadership reinforcement are shared mechanisms during the adoption of KM system. Effective information management involves leveraging tools and technologies that enable organizations to enhance knowledge-sharing capabilities. Consequently, selecting the appropriate knowledge management software is crucial for bolstering KM practices in industry domain. When evaluating options, key considerations should include features that foster knowledge, democracy, protection, and integration with existing software.

### **6.3 Sectoral Contingencies Shape KM Outcomes**

Though mechanisms were shared, the manifestations of KM practices varied across sectors. In infrastructure, KM focused on retention and onboarding efficiency; in manufacturing, KM supported quality assurance and defect reduction; in healthcare, KM linked compliance with innovation and smart hospital initiatives; and in software, KM reinforced cybersecurity certification and risk management. Notably, cybersecurity awareness emerged as a recurring challenge. Many employees lack involvement and

make it challenging to establish a company-wide cybersecurity culture. Case companies responded by strengthening continuous training and embedding cybersecurity routines into KM systems. These contingencies reinforce the importance of contextualizing KM to sector-specific imperatives (Durst & Zieba, 2019).

#### **6.4 Human Capital Remains the Critical Enabler**

The cases highlight that KM systems succeed only when human capital is effectively mobilized. Case organizations recognize that establishing a knowledge management culture is not an overnight process; it requires sustained effort and investment over time. If the organization and its team can continuously promote a knowledge management culture and integrate it into the organization's daily operations, it will make a great influence for creating an inclusive culture for KM sharing across departments. Thus, aligning organizational culture with KM strategies ensures that knowledge sharing becomes deeply embedded in daily operations (Antunes & Pinheiro, 2020).

#### **7. Theoretical Contributions**

This study illustrates how codification mechanisms (e.g., standard operating procedures, knowledge libraries, and case repositories), collaboration and visibility tools (e.g., progress tracking, dashboards, and cross-unit communication channels), and audit coupling practices (e.g., integration with standards and certifications) collectively form a mutually reinforcing capability. These socio-technical elements enable the transformation of individual human capital into organizational capital, and further strengthen organizational learning, adaptability, and long-term competitiveness (Youndt et al., 2004; Subramaniam & Youndt, 2005). These mechanisms operate as a dynamic capability that enables organizations to adapt, learn, and maintain compliance under uncertainty (Teece, 2018). The cases specify when KM and digital empowerment mechanisms are most effective in contexts characterized by high standardization requirements in developed Asia. This adds a region-specific contribution and extends

KM adoption literature by clarifying why developed Asian economies (Taiwan and Japan) provide fertile ground for embedding KM practices.

By linking ISO 30401 certification and governance structures to KM outcomes, the study extends KM maturity models. It shows that socio-technical alignment, when reinforced through standards-anchored routines can foster resilience and a pathway toward higher levels of KM maturity (Schmitt, 2022).

## **8. Practical Contributions**

Building on the cross-case analysis, several practical lessons can be learnt to optimize KM systems in digitally empowered environments. First of all, it is essential to design KM systems with auditing in mind. Embedding evidence capture into everyday tasks ensures that compliance data are generated as part of normal workflows and prevent last-minute “audit panic” and reduce regulatory risk. Second, organizations should focus on empowerment through visibility. Tools such as dashboards, role-based access, and notification logic not only enhance transparency but also reduce search and coordination costs that enable smoother collaboration across departments (Kane et al., 2015; Yan et al., 2019).

Third, organizations must codify failures as well as successes. Establishing anomaly libraries, lessons-learned repositories, and case archives will accelerate organizational learning loops by ensuring that mistakes become shared knowledge assets rather than repeated costs. Fourth, effective implementation requires the formalization of governance structures. Layered governance should be reinforced through incentives, audits, and continuous feedback mechanisms. In this way, structures sustain engagement and embed KM practices into daily operations.

Finally, for organizations in developing or less digitally mature environments, KM investments should be sequenced. Establishing digital infrastructure, basic skills, and

data standards is a necessary process to capture the benefits of KM and digital empowerment integration observed in more advanced contexts.

## **9. Conclusion**

The benchmarking cases of knowledge management (KM) practices are systematically evaluated against their planned objectives across system design, implementation, performance, and continuous improvement. Drawing on cross-sector case studies, the paper examines diverse organizations from public, private, international, and digital contexts to explore the distinctive characteristics of KM practices in Asia. In the digital economy, knowledge management (KM) has become a strategic facilitator of innovation, collaboration, and competitiveness. Enterprises that align KM practices with digital technologies are better positioned to transform data into actionable insights and sustain advantage in increasingly complex environments (Yan, 2018). KM systems enable organizations to codify knowledge, integrate information flows, and support rapid, evidence-based decision-making (Yan et al., 2022).

This study examined four cases of KM implementation across developed Asian sectors, the findings reveal common socio-technical mechanisms underpinning successful KM adoption: (1) codifying tacit expertise into explicit routines, (2) leveraging digital empowerment tools such as dashboards, AI analytics, and collaboration platforms, (3) coupling KM with regulatory standards and audits, and (4) sustaining adoption through leadership commitment and cultural reinforcement. These mechanisms demonstrate that KM systems are not merely repositories but dynamic routines that empower employees, institutionalize learning, and reduce organizational risk.

The study makes several contributions. First, it reinforces KM's role as a dynamic capability (Teece, 2018) that enables resource reconfiguration under uncertainty. Second, it advances understanding of the KM and digital empowerment synergy that shows how digital tools amplify KM processes to support compliance, innovation, and resilience (Kane et al., 2015; Vial, 2019). Third, it integrates human capital into the KM framework. IT illustrates that employee expertise when supported by digital platforms and governance structures, remains central to organizational learning and performance (Youndt et al., 2004; Subramaniam & Youndt, 2005). Lastly, the cases also highlight actionable lessons. KM systems should be designed for audit-readiness, knowledge continuity, and collaboration visibility. Sustained cultural reinforcement, incentives,

and continuous training are essential to embed KM into daily operations.

Some limitations to be addressed. The cases are bounded to developed Asian economies (Taiwan and Japan) and industries with strong compliance and standardization imperatives. Transferability to developing contexts may be constrained by differences in institutional maturity, and cultural practices. Furthermore, the cases are cross-sectional snapshots, and longitudinal research is needed to assess how KM evolves with technological advances. Future research should extend inquiry into developing Asian economies and industries with less formalized standards to assess cultural and institutional influences.

In conclusion, adopting a systems-oriented perspective and incorporating sustainable system development methods are crucial for designing and administering efficient, adaptable knowledge management systems, as well as fostering a culture that encourages knowledge sharing. The presented case studies illustrate the integration of knowledge management, digital empowerment and human capital offers organizations a powerful pathway to strengthen innovation, compliance, and resilience. By identifying shared mechanisms and sector-specific contingencies, this study provides both theoretical foundations and practical guidance for organizations to leverage KM practices for business excellence in the digital age.

## **DISCLOSURE STATEMENT**

### **Disclosure of interest**

No potential conflict of interest was reported by the author(s).

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### **Data availability statement**

The data that support the findings of this study are available from the corresponding author upon reasonable request. The data is not publicly available due to their containing information that could compromise the privacy of research participants.

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