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Enhancing Business Efficiency and Digitization Through Digital Knowledge Management in Select Chinese Universities

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ABSTRACT

This research investigates how Digital Knowledge Management (DKM) systems are used in Chinese universities to improve business efficiency and digitization for daily university operations. This study was conducted to identify the key challenges of adoption of DKMs and assess the impact of DKM on operational efficiency, cost efficiency, administrative effectiveness, digitisation, sharing knowledge, collaboration and data to decision-making implications. Basing on the theoretical underpinnings in the KBV (Knowledge-Based View), SECI Model, and TOE (Technology-Organization-Environment) framework, the research used a mixed methods approach, employing quantitative surveys with qualitative interviews. Results show that barriers to implementing DKM such as technological constraints, organizational resistance, and environmental limitations are very common. Nevertheless, DKM systems adoption is catalyzing the pace of digitizing digital resource management, smart campus initiatives, and online learning platforms. Moreover, DKM systems have a transforming influence on business process efficiency, for instance, workflows, distribution of resources, and administrative processes. They also promote a culture of knowledge exchange and collaboration, eroding silos and encouraging inter-disciplinary interaction. In addition, DKM systems support evidence-based decision-making with access to current, reliable, and validated information, enabling more effective strategic planning and allocation of resources. The research findings suggest that DKM is necessary for promoting innovation, effectiveness, and sustainability in the organization of higher education. Recommendations include capacity building, technical support, and utilization of advanced analytics software. Future work is encouraged to include a broader geographical range, a discussion of the influence of new technologies, and efforts to overcome digital equity issues in underprivileged areas. Such results offer implications for using DKM systems to promote the digitization and efficiency of universities.

RESUMO

Esta pesquisa investiga como os sistemas de Gestão do Conhecimento Digital (GCD) são utilizados em universidades chinesas para aprimorar a eficiência empresarial e a digitalização das operações diárias da universidade. Este estudo foi conduzido para identificar os principais desafios da adoção de GCD e avaliar o impacto da GCD na eficiência operacional, eficiência de custos, eficácia administrativa, digitalização, compartilhamento de conhecimento, colaboração e implicações na tomada de decisões com dados. Com base nos fundamentos teóricos da KBV (Visão Baseada no Conhecimento), do Modelo SECI e da estrutura TOE (Tecnologia-Organização-Ambiente), a pesquisa utilizou uma abordagem de métodos mistos, empregando pesquisas quantitativas com entrevistas qualitativas. Os resultados mostram que barreiras à implementação da GCD, como restrições tecnológicas, resistência organizacional e limitações ambientais, são muito comuns. No entanto, a adoção de sistemas de GCD está catalisando o ritmo da digitalização da gestão de recursos digitais, iniciativas de campus inteligentes e plataformas de aprendizagem online. Além disso, os sistemas de Gestão de Conhecimento (GDC) exercem uma influência transformadora na eficiência dos processos de negócios, por exemplo, nos fluxos de trabalho, na distribuição de recursos e nos processos administrativos. Eles também promovem uma cultura de troca de conhecimento e colaboração, eliminando silos e incentivando a interação interdisciplinar. Além disso, os sistemas de GDC apoiam a tomada de decisões baseada em evidências, com acesso a informações atuais, confiáveis e validadas, permitindo um planejamento estratégico e uma alocação de recursos mais eficazes. Os resultados da pesquisa sugerem que a GDC é necessária para promover a inovação, a eficácia e a sustentabilidade na organização do ensino superior. As recomendações incluem capacitação, suporte técnico e utilização de softwares de análise avançada. Recomenda-se que trabalhos futuros incluam uma abrangência geográfica mais ampla, a discussão da influência de novas tecnologias e os esforços para superar os problemas de equidade digital em áreas carentes. Tais resultados oferecem implicações para o uso de sistemas de GDC para promover a digitalização e a eficiência das universidades.

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Introduction

As China make efforts to modernize its educational culture and compete globally, this research inquires about the use of Digital Knowledge Management (DKM) systems ease the processing and streamline digital transition for the development of education. The policy programs of the Chinese government, such as Education Modernization 2035, prioritize the reliance on digital technologies at schools to enhance quality and efficiency of operations (Ministry of Education of the People's Republic of China, 2019). In this context, DKM stands out as an important approach, which makes it possible for universities to handle, share, and exploit knowledge assets that become manifest through technological infrastructure (Frost, 2020). This is especially crucial in educational settings where large amounts of information are being produced and stored daily varying from administrative records to scholarly information (Alavi & Leidner, 2001).

Benefits of DKM systems are anticipated to include increased knowledge flows, a more efficient institutional framework, and a culture of research and pedagogical creativity (Liu & Li, 2023). However, the operation of these systems within Chinese universities is highly contingent. These barriers are associated with technical constraints such as compatibility with legacy systems, and organizational and cultural barriers associated with digital skills and institutional power structures (Li & Zhao, 2022). While the existing research indicates the transformative power of DKM, a clear research gap exists, concerning empirical studies of the actual effects of DKM and obstacles to its adoption in the diverse field of higher education in China (Zhang & Liu, 2021).

The study examines the adoption and impact of DKM in some Chinese universities. It demonstrates how these systems can support digitization initiatives—that is, the management of digital assets, the establishment of smart campuses, the integration of online learning. Moreover, it investigates the role of DKM in fostering data-driven decision-making and knowledge sharing, as well as organizational resistance and university staff's diversified of digital competences (Jiang et al., 2021; Xu & Yang, 2023; Zhang et al., 2021). This will hopefully offer evidence-based contributions on the ways in which DKM systems affect administrative efficiency and cost savings as well as how they support the strategic institutional mission (Wang et al., 2022).

Based on the available empirical evidence that institutions with advanced DKM infrastructures achieve better research performance and increased collaboration output (Wang et al., 2021), the paper also examines the more general implications of DKM for China's position in the global knowledge economy. DKM could play an important role in realizing educational innovation and leadership by facilitating inter-university cooperation and international research cooperation (Huang et al., 2020). Nonetheless, despite good approaches, the issues of data protection, system interconnections and the attitude of the users remain still open and bad solutions and strong investment in infrastructure and training and augmented reality are required (Qiu & Zhang, 2022). While Digital Knowledge Management (DKM) systems are increasingly recognized as essential tools for supporting digitization in higher education, empirical studies examining their implementation, effectiveness, and challenges in Chinese universities are still limited.

It is based on the theoretical progression of knowledge management—from the SECI model of Nonaka and Takeuchi (1995); to contemporary digital frameworks— and seeks to fill the empirical void in the literature by providing an evaluation of the benefits and constraints associated with DKM implementation in China. With a reference to institutional performance, this study provides useful insights for the broader debate of digital reform in education and on an informed policy making towards sustainable technological integration.

Specifically, the objective of this work is to: (1) address challenges faced in implementing DKM from technological, organizational, and environmental perspectives; (2) assess the effectiveness of DKM for advancing digitization—namely, for digital resource management, smart campus infrastructure, and online learning systems; (3) evaluate the impact of DKM on operational and cost efficiency, administrative performance, and institutional decision-making. This paper also examines the impact of DKM in university collaboration and knowledge sharing among universities.

Thus, the aims of the research are fivefold: (i) to identify barriers to university DKM uptake in the technological, organizational, and environmental levels; (ii) to investigate the impact of DKM in the context of digitization ventures, particularly around resource and infrastructure management; (iii) to uncover the extent to which DKM enables business performance enhancements will be delivered including efforts of cost-effectiveness and administrative efficiency; (iv) to examine the extent to which DKM contributes to prompting institutional collaboration and knowledge sharing; and (v) to analyze the effect of DKM on the quality decision-making, data accessibility, and strategic planning.

Guiding this exploratory research, this study assumes the following null hypotheses: The introduction of DKM does not stress infrastructure, organizational or environmental conditions (H_{01}); its implementation does not aid digital efforts (H_{02}); it does not influence business performance metrics such as cost and operational performance (H_{03}); DKM does not impact academic knowledge sharing and collaboration (H_{04}); and the DKM does not support university decision-making (H_{05}).

However, to have a more in-depth analysis of these hypotheses, this paper will provide practical suggestions and Suggestions to optimize digital transformation strategies for education in China.

Methodology

This study employed a mixed methods research design to utilise both quantitative and qualitative approaches to capture both the empirical results and contextual factors of the implementation of Digital Knowledge Management (DKM) systems in the Chinese universities. The quantitative aspect captured through a structured questionnaire the perceived effects on business efficiency, digitalisation, collaboration, decision-making, whereas the qualitative aspect captured through semi-structured interviews the granular insights of managers involved in DKM projects. Business efficiency, as used in this study, refers to the ability of universities to optimize their administrative and operational processes through the implementation of Digital Knowledge Management (DKM) systems.

The sample of the study consisted of 100 general university administrators who were selected on the basis of purposive sampling and 8 experts in knowledge management (such as ICT directors) who furnished general as well as deep views. The administrators re presented various Chinese institutions, which were chosen to achieve a variety of institutional size and digital maturity. The universities in this study were purposively selected to represent a range of institutional sizes, geographic regions, and levels of digital maturity, ensuring diverse perspectives on DKM implementation.

Instrumentation

Two main instruments were used for this study. First, through close-ended questions rated on a Likert scale. It evaluated hurdles, the effects on digitalisation and on efficiency, knowledge exchange and governance based on data. The face validity of the instrument was ensured after expert review, and internal consistency was also verified using Cronbach's alpha values between 0.91 and 0.92 in all dimensions. The instrument was further developed by a pilot test. The interview guide used in the qualitative part consisted of open-ended questions corresponding to the main research topics. Thematic credibility was enhanced through the inter-rater reliability of coding.

Data collection occurred in two concurrent stages. The quantitative survey was delivered through an online cross-check platform (Sojump) and follow-up reminders were sent to ensure high the response rate. The interviews (qualitative) were held face-to-face or by video conference and were recorded as well as transcribed. All subjects were informed of their rights and extent of the study and gave their consent to participate.

Data collected from the survey were treated by using descriptive and inferential statistics via SPSS. Key variables were then explored using weighted means for patterns of

DKM adoption and outcome analysis. The qualitative interviews were thematically analyzed according to Braun and Clarke's framework, with themes emerging in relation to implementation challenges, digitization impacts, institutional efficiency and use of data in decision making. Data from both strands were merged during analysis, allowing triangulation to enhance validity of findings.

The university's ethics committee was approached prior to conducting the study. Study participation was voluntary and all the participants gave written informed consent. Anonymisation of data, secure storage and access control were used to guarantee the confidentiality. Respondents have the right to terminate participation without penalty at any time. This ethical standpoint has guaranteed that the work was done in the best parameters of research and participant protection.

Results and Discussion

The results and discussion of the study present key insights into the challenges faced by Chinese universities in implementing Digital Knowledge Management (DKM) systems. Drawing upon both survey responses and qualitative interviews, the findings are organized according to the study's objectives and are interpreted in light of existing literature and theoretical frameworks.

The Primary Challenges Faced by Chinese Universities in Implementing DKM Systems

To begin, the study identifies and categorizes the primary challenges encountered during DKM implementation into technological, organizational, and environmental dimensions. These results, summarized in Table 9, reflect the lived experiences of university administrators and ICT professionals across diverse institutional contexts.

Table 9.

The Primary Challenges Faced by Chinese Universities in Implementing DKM Systems.

Parameter	WM	SD	Verbal Interpretation
Technological Challenges			
1. Our university lacks the necessary technological infrastructure to effectively implement a DKM system.	4.14	0.841	Encountered
2. The integration of DKM systems with existing IT infrastructure has been challenging.	4.22	0.660	Encountered
3. The cost of acquiring advanced digital tools for DKM implementation is a significant barrier.	4.30	0.577	Highly Encountered
4. There is insufficient technical support to maintain the DKM systems in our university.	4.34	0.742	Highly Encountered
5. Our staff lacks the necessary technical skills to fully utilize the features of the DKM system.	4.35	0.796	Highly Encountered
Overall Weighted Mean	**4.27**	**0.385**	**Highly Encountered**
Organizational Challenges			
1. Resistance to change from faculty and staff has hindered the adoption of DKM systems.	4.36	0.718	Highly Encountered
2. There is insufficient leadership support for the	4.36	0.718	Highly Encountered

	implementation of DKM in our university.			
3.	There is a lack of clear policies and procedures for managing knowledge within the DKM system.	4.05	0.892	Encountered
4.	The DKM system is not aligned with our university's organizational goals and priorities.	4.25	0.796	Highly Encountered
5.	Our university has not allocated enough resources (e.g., budget, personnel) to support DKM implementation.	4.14	0.792	Encountered
Overall Weighted Mean		**4.23**	**0.514**	**Encountered**
Environmental Challenges				
1.	Government regulations and policies are unclear regarding the use of DKM systems in higher education institutions.	4.34	0.755	Highly Encountered
2.	External pressure from other universities has made it difficult to focus on effective DKM implementation.	4.15	0.880	Encountered
3.	The rapid pace of technological change has made it hard for our university to keep up with the latest DKM innovations.	4.34	0.794	Highly Encountered
4.	There is limited external funding available to support the development of DKM systems in our university.	4.36	0.718	Highly Encountered
5.	Our university struggles to find DKM systems that meet both international standards and local regulatory requirements.	4.41	0.780	Highly Encountered
Overall Weighted Mean		**4.32**	**0.569**	**Highly Encountered**
Overall Results		**4.27**	**0.412**	**Highly Encountered**

Interval: 1.00-1.80, Strongly Disagree/Not Encountered; 1.81-2.61, Disagree/Less Encountered; 2.62-3.42, Neither Agree not Disagree /Somewhat Encountered; 3.43-4.23, Agree/Encountered; 4.24-5.00, Strongly Agree/Highly Encountered

The most important challenges were related to technology with an overall WM of 4.57; it means the variables are "Highly Encountered." The ability of staff (WM = 4.35) and technical support (WM = 4.34) were reported as the weakest. These results are consistent with the Technology-Organization-Environment (TOE) model (Tornatzky & Fleischer, 1990) and its attention to the role of technological readiness in the adoption of innovation. Scholars such as Liu et al. (2022) and Chen et al. (2021) which also find that digital literacy gaps and poor infrastructure, are continuous impediments for the success of DKM systems. These findings indicate the need for universities to focus on digital upskilling and technical support collaborations to achieve sustainable implementation.

Regarding organization-related challenges, items generated a WM of 4.23, indicating that these challenges were quite common too. High resistance to change (WM = 4.36) and inadequate leadership support (WM = 4.36) were prominent obstacles. Correspondingly, it resonates with Roger's (2003) Diffusion of Innovations Theory which stresses the significance

that role of leadership and the level of cultural readiness play in the adoption of new practices/technologies. According to Xu et al. (2023) impede institutional transition when individuals in positions of power do not share a vision or deliver enough resources to make a success of DKM. These results suggest that, in order for an environment that fosters digital innovation to thrive within university departments, leaders must be involved in leading strategic change management interventions.

Environmental issues were also perceived as "Highly Encountered", WM = 4.32. Of the latter it was most pronounced that the problematic alignment of DKM systems with international standards and local regulatory demands (WM = 4.41). The report also identified ongoing challenges in the areas of regulatory uncertainty and insufficient external support. These are consistent with the observations of Wang et al. (2021), who emphasize the pressures rooted in changes to digital standards and a lack of government guidance at the higher education level in China. The findings indicate the necessity for more coherent institutional policy infrastructures and focused financial support to help institutions negotiate the external complexities of DKM use.

Overall mean = 4.27 The score for overall mean shows clearly that DKM systems in Chinese universities are confronted with barriers in all three dimensions. This further supports the relevance of both the TOE model and the Diffusion of Innovations Theory in explaining the complexity of factors associated with technology adoption in a school setting. The results support the recommendation of a holistic engagement strategy that focuses on technological readiness, organizational congruence, and community adaptation to facilitate the successful application of DKM systems in the reengineering of higher learning.

Thematic Analysis of Challenges in Implementing DKM Systems

Thematic analysis of the qualitative data revealed a triad of interconnected challenges—technological, organizational, and environmental—that hinder the effective implementation of Digital Knowledge Management (DKM) systems in Chinese universities. These themes are summarized in Table 10, which presents participant insights into the barriers encountered during DKM adoption across institutional contexts.

Table 10 presents the thematic findings on DKM implementation challenges, offering detailed descriptions and direct quotations from university administrators. These perspectives highlight the depth and complexity of the barriers experienced in practice.

Table 1.
Description of Challenges in Implementing DKM Systems

Theme	Description	Exemplar
Technological Challenges	The complexities associated with integrating Digital Knowledge Management (DKM) systems into existing infrastructures. This includes compatibility issues with legacy systems, ensuring the interoperability of various digital platforms, and addressing gaps in technological literacy among faculty and staff. Additionally, the scalability and maintenance of these systems pose significant hurdles, especially in institutions with diverse and complex needs.	"One of the primary technological challenges we face is integrating new DKM systems with our legacy infrastructure. Many of our systems were designed years ago and retrofitting them to work seamlessly with modern platforms requires significant resources and time. This can delay the digitization process significantly." *Dr. Ming Zhao, Yunnan University (ICT Director)* "Technological literacy among staff is a critical barrier. While the younger generation adapts quickly, more senior faculty members often struggle with understanding the potential of DKM systems, which limits their effective usage." *Dr. Wei Zhang, Dali University (Vice President for Technology and Innovation)* "A key technological challenge is ensuring the interoperability of various DKM tools.

		Research databases, learning management systems, and administrative platforms often operate independently, creating barriers to holistic data sharing." *Dr. Qiang Huang, Yunnan Normal University (Director of Research Knowledge Systems)*
Organizational Challenges	Center on resistance to change and the lack of a collaborative culture within universities. Many staff members are hesitant to adopt new systems due to unfamiliarity or concerns about the additional workload. Siloed departmental structures further hinder the seamless integration of DKM systems, making cross-departmental collaboration difficult. Securing institutional buy-in and aligning the goals of DKM initiatives with broader university priorities remain significant obstacles.	"Organizationally, the biggest hurdle is resistance to change among faculty and staff. Many are accustomed to traditional methods of knowledge sharing and feel overwhelmed by the learning curve associated with adopting digital systems. Building a culture of adaptability is an ongoing effort." *Ms. Liying Chen, Kunming University of Science and Technology (Head of Knowledge Management Division)* "From an organizational perspective, securing buy-in from all departments is a challenge. DKM systems require inter-departmental collaboration, but siloed work cultures often hinder this integration." *Ms. Mei Lin, Yunnan Minzu University (Chief Knowledge Officer)* "One challenge we face is aligning the goals of DKM implementation with the institution's strategic priorities. While technology adoption is essential, it is often sidelined in favor of more immediate operational concerns." *Dr. Lei Feng, Southwest Forestry University (Head of Smart Campus Initiatives)*
Environmental Challenges	Include external factors such as regulatory compliance, funding constraints, and competitive pressures within the higher education sector. Stringent government policies on data security and privacy often restrict the flexibility of system implementation. Limited budgets for technology projects also constrain the scope and functionality of DKM systems, while the need to maintain competitiveness in a rapidly digitizing global landscape creates additional pressure.	"Environmental challenges such as varying government regulations on data security and privacy complicate the implementation of DKM systems. We must comply with stringent policies, which can be a barrier when adopting more flexible or innovative solutions from international vendors." *Mr. Jian Li, Yunnan University of Finance and Economics (Director of Digital Transformation)* "Environmental factors, like limited funding for digital projects, restrict the pace at which we can adopt comprehensive DKM solutions. Often, only the core functionalities are implemented, leaving many gaps in what the system could achieve." *Ms. Yun Xia, Yunnan Agricultural University (Digital Resource Manager)*

Technological concerns became a predominant issue. It was identified that there are significant problems interoperating of DKM systems with existing infrastructure. For example, Dr. Ming Zhao mentioned legacy systems were causing a big delay on digitization, and Dr. Qiang Huang focused on the challenge of bringing independent digital tools like research database and learning management system together. Low technological literacy, especially in senior faculty, also was identified as a barrier to effective system usage, reflecting the Liu et al. (2022). These findings are consistent with the Technology-Organization-

Environment (TOE) framework (Tornatzky & Fleischer, 1990) that considers the technological readiness as a key predictor of innovative success.

Organizational challenges were also widespread, including resistance to change and a departmental structure of silos. According to Ms. Liying Chen, the tradition which has lasted for generations makes it too conservative for the farmers to change their modes of interaction, and the result that the digital related applications not being used at the agricultural end reflects the other point of view of Rogers (2003) concerning the necessity of an organizational culture supporting innovation adoption. The lack of working between departments which Mei Lin identifies makes DKM integration still additionally challenging. Furthermore, as Dr. Lei Feng pointed out, the DKM initiatives are not necessarily in line with institutional strategic priorities, leading to low investment and marginalization in university operations (Xu et al., 2023).

Environmental barriers comprised external barriers such as stringent regulations and limited resources. Mr. Jian Li noted how disparate national data privacy laws make it difficult for institutions to implement flexible, or even international, DKM platforms. Ms. Yun Xia also highlighted how meager budgets tie universities to just the basic levers and pulleys of an automated system. These difficulties resemble those of Wang et al. 's (2021) results and align with the Resource-Based View (RBV) which highlights the impact of external constraints on institutional capacity.

Taken together, these challenges illustrate the intricate interplay between internal preparedness and external expectations. The TOE model is helpful in understanding this systemic dynamic, demonstrating how technological constraints reinforce organizational reticence whilst environmental pressure reduces capacity to act in response. These needs demand a multi-tiered approach: modernizing digital infrastructure, driving cultural change within institutions, and campaigning for better policy and funding support. These results underpin that successful assimilation of DKM is not only technology-driven but also that institutional goals and environmental support play a crucial role.

Extent of Adoption of DKM Systems Accelerate and Improve Digitization Efforts

The findings presented in Table 11 illustrate how the adoption of Digital Knowledge Management (DKM) systems has significantly accelerated and improved digitization efforts across Chinese universities. The analysis focuses on three key areas: digital resource management, smart campus initiatives, and online learning platforms. The overall weighted mean of 4.35 (SD = 0.399) indicates that these contributions are highly observed by university administrators.

Table 11.

Extent of Adoption of DKM Systems Accelerate and Improve Digitization Efforts.

Parameter	WM	SD	Verbal Interpretation
Digital Resource Management			
1. The DKM system has significantly improved the accessibility of academic resources (e.g., research papers, course materials) within our university.	4.50	0.577	Highly Observed
2. The implementation of the DKM system has streamlined the organization and categorization of digital resources across departments.	4.40	0.550	Highly Observed
3. The DKM system has reduced the time it takes to retrieve and manage digital resources at our university.	4.35	0.592	Highly Observed
4. Our university's DKM system ensures that important institutional knowledge is preserved and easily accessible in a digital	4.25	0.657	Highly Observed

format.			
5. The DKM system has improved the efficiency of data storage and retrieval processes for faculty and students.	4.38	0.632	Highly Observed
Overall Weighted Mean	**4.38**	**0.399**	**Highly Observed**
Smart Campus Initiatives			
1. The DKM system has enhanced the integration of smart technologies for managing campus operations (e.g., administrative tasks, resource allocation).	4.34	0.590	Highly Observed
2. The DKM system has contributed to the development of smart campus features such as digital monitoring, automated scheduling, and campus security management.	4.39	0.618	Highly Observed
3. The DKM system facilitates the sharing of real-time information that supports smart campus initiatives (e.g., smart classrooms, digital libraries).	4.28	0.668	Highly Observed
4. The use of DKM systems has improved the overall digital infrastructure of our university's campus.	4.29	0.656	Highly Observed
5. The DKM system has accelerated the adoption of smart campus technologies, improving operational efficiency across campus services.	4.28	0.604	Highly Observed
Overall Weighted Mean	**4.32**	**0.441**	**Highly Observed**
Online Learning Platforms			
1. The DKM system has enhanced the development and delivery of online learning platforms at our university.	4.41	0.637	Highly Observed
2. The DKM system supports the effective integration of digital content into our university's online learning platforms.	4.30	0.628	Highly Observed
3. The DKM system has improved faculty and student access to learning materials and resources through our online platforms.	4.30	0.611	Highly Observed
4. The DKM system allows for better tracking and analysis of student performance and engagement in online courses.	4.37	0.630	Highly Observed
5. The adoption of DKM systems has improved the scalability and flexibility of online learning offerings at our university.	4.44	0.671	Highly Observed
Overall Weighted Mean	**4.36**	**0.460**	**Highly Observed**
Overall Results	**4.35**	**0.399**	**Highly Observed**

Interval: 1.00-1.80, Strongly Disagree/Not Observed; 1.81-2.61, Disagree/Less Observed; 2.62-3.42, Neither Agree not Disagree /Somewhat Observed; 3.43-4.23, Agree/Observed; 4.24-5.00, Strongly Agree/Highly Observed

In the area of digital resource management, DKM systems greatly enhance access, organization, and retrieval of academic and administrative records. The most favorably rated item, for which the weighted mean was 4.38, was better access to academically related resources, (WM = 4.50) followed closely by improved departmental organization among departments (WM = 4.40). These findings are in agreement with the study of Liu et al. (2022), who underscored that the potential use of DKM systems to save time and complexity in handling the high quantity of academic data. Similarly, Zhang et al. (2021) showed that knowledge consolidation systems greatly contribute to research effectiveness and operational efficiency. These results also demonstrate the importance of ongoing investments in smart digital repositories that support transparent resource access.

There were also impressive performances in smart campus projects with a total mean of 4.32. The use of automatic scheduling, digital monitoring, and real-time information communication was also reported to have increased, such change occuring, especially in smart

libraries and classrooms (WM = 4.39). These results are in line with Chen and Liu (2021) that emphasize that DKM systems serve as a spine to combine variety of smart technologies into a single digital ecosystem. Xu et al. (2023) further emphasized the importance of DKM for real world campus decision making and operation automation. The evidence indicates that DKM is a fundamental factor to face the challenge of creating efficient, tech-supported academic spaces.

The highest impact was in online learning at a mean of 4.36. Key contributions are the greater scalability of digital educational services (WM = 4.44) and improved insight into student engagement (WM = 4.37). These results are consistent with the report of Wang et al. (2022) who demonstrated how DKM enables personalised learning with both adaptive technologies and analytics. Zhang et al. (2021) also highlighted the function of centralized content systems for large scale online teaching. These findings highlight DKM's important role in supporting flexible, data-rich learning environments that adapt to the needs and abilities of individual students.

The results generally supported the role of DKM systems in promoting the digitization of Chinese higher education. This is consistent with the Technology-Organization-Environment (TOE) framework (Tornatzky & Fleischer, 1990) that notes the interaction between organizational readiness, technological capacity, and environmental demands necessary to facilitate innovation. As university institutions in China move forward on their digital journey, DKM systems offer a strategic platform to enable institutional transformation and efficiency.

Thematic Analysis of Adoption of DKM Systems Accelerate and Improve Digitization Efforts

The thematic findings summarized in Table 12 provide insights into how Digital Knowledge Management (DKM) systems accelerate and improve digitization efforts in Chinese universities. The analysis centers on three major themes: Digital Resource Management, Smart Campus Initiatives, and Online Learning Platforms, drawing on qualitative data from university administrators and aligning with relevant theoretical and empirical literature.

Table 12.
Description of the Adoption of DKM Systems Accelerate and Improve Digitization Efforts.

Theme	Description	Exemplar
Digital Resource Management	The systematic organization, storage, and retrieval of institutional knowledge and resources using Digital Knowledge Management (DKM) systems. It encompasses managing research outputs, administrative records, and learning materials, ensuring accessibility, data consistency, and collaboration across departments. Efficient digital resource management improves operational efficiency and supports data-driven decision-making.	"Our focus in digital resource management has been on consolidating research data and administrative records into a centralized digital repository. This ensures easier access for faculty and staff. However, one challenge is maintaining data consistency across departments, especially when each has its own data management protocols." *Dr. Ming Zhao, Yunnan University (ICT Director)* "Digitization through DKM systems has improved our ability to manage digital resources, especially for interdisciplinary research projects. Faculty now collaborate seamlessly using shared digital platforms, which wasn't possible before. It has significantly boosted research outputs." *Dr. Wei Zhang, Dali University (Vice President for Technology and Innovation)* "The introduction of DKM systems has enhanced how we manage research outputs and student records. By digitizing our archives, we've reduced the time it takes to retrieve critical data for decision-making and reporting." *Dr. Qiang Huang, Yunnan*

		Normal University (Director of Research Knowledge Systems)
Smart Campus Initiatives	Involve the integration of advanced technologies and DKM systems to streamline campus operations. These initiatives include automating administrative processes, optimizing energy use, managing facilities, and enhancing campus security. By leveraging real-time data and analytics, smart campuses promote sustainability, improve resource utilization, and enhance the overall experience for students, faculty, and staff.	"Smart campus initiatives have transformed how we manage university operations. For example, our DKM system integrates attendance tracking, resource allocation, and campus security, providing real-time updates to decision-makers. It has streamlined operations significantly." Ms. Liying Chen, Kunming University of Science and Technology (Head of Knowledge Management Division) "Our smart campus initiative uses DKM systems to integrate energy management, library systems, and student services. The ability to monitor and optimize resource use in real time has made our campus operations more sustainable and cost-efficient." *Ms. Mei Lin, Yunnan Minzu University (Chief Knowledge Officer)* "Smart campus initiatives supported by DKM systems have allowed us to digitize facilities management and optimize classroom scheduling. For example, we now use data analytics to predict peak usage times and adjust accordingly, which helps us save energy and improve facility utilization." *Dr. Lei Feng, Southwest Forestry University (Head of Smart Campus Initiatives)*
Online Learning Platforms	Digital systems supported by DKM tools that facilitate remote and blended education. They enable personalized learning experiences through the integration of lecture materials, assessments, and feedback mechanisms. These platforms ensure seamless interaction between educators and students while overcoming geographical barriers, fostering inclusivity, and enhancing educational outcomes.	"Online learning platforms powered by DKM systems have been a game-changer for us. They allow personalized learning experiences and real-time feedback mechanisms. However, ensuring consistent access to these platforms for students in rural areas remains a significant hurdle." *Mr. Jian Li, Yunnan University of Finance and Economics (Director of Digital Transformation)* "Online learning platforms have allowed us to deliver high-quality education to remote areas. DKM systems ensure the seamless integration of lecture materials, assessments, and feedback, creating a cohesive learning experience for students and instructors alike." *Ms. Yun Xia, Yunnan Agricultural University (Digital Resource Manager)*

Digital Resource Management was identified as a cornerstone value in using DKM technology. Interviewees had experienced how central digital stores had made it possible to organise, store and retrieve research outputs, administrative documents and learning resources. Dr. Ming Zhao stressed the importance of centralized access, but added that challenges persist in ensuring data consistency among departments. Dr. Wei Zhang emphasized that the system would be important to spur interdisciplinary research. These experiences are consistent with the Technology-Organization-Environment (TOE) framework (Tornatzky & Fleischer, 1990), which introduces the notion of technological infrastructure as a prerequisite for organizational effectiveness. This was also confirmed by Liu et al. (2022) who indicated that centralized knowledge systems improve institutional decision making, and Zhang et al. (2021) who highlighted their influence on scholarly productivity.

The other site which is transformed by the DKM systems is Smart Campus Initiatives. There were respondents who reported gains in energy management, scheduling, security, and administrative automation. Ms. Liying Chen illustrated how the real-time data integration enabled better decision making and Ms. Mei Lin stressed on the sustainability impact of the optimized resource utilisation. Dr. Lei Feng emphasized the importance of predictive analytics for facility management. These results are consistent with those reported by Xu et al. (2023) found that the use of smart campuses with the aid of DKM systems has positive effects on the level of efficiency and environmental performance. The results highlight the importance of smart technology and DKM integrations in creating data-driven, healthy learning environments.

Online Learning Platforms also gained tremendously from DKM systems, particularly in terms of personalized learning, scalability, and digital content (re)use. Mr. Jian Li talked of how these systems had provided real-time feedback and customized pathways to learning but also of the difficulty in ensuring access in the rural hinterlands. Ms. Yun Xia adds that DKM made it easy to deliver content without a hitch, as well as to engage with students and instructors. Through these accounts, we echo Wang et al. (2022), who argued that DKM enhances adaptive learning environments, and with Constructivist Learning Theory, which calls for the integration of interactive and personal instruction.

The qualitative evidence supports the transformative function of DKM systems in the digital transformation of Chinese higher education. They also contribute to the efficiency of institutions, sustainability and the development of inclusive digital learning environments. But tapping their potential to its fullest extent involves addressing internal protocol inconsistencies, making infrastructure more scalable, and enabling more equitable access—especially for underserved regions. These results contribute to the systemic importance of TOE framework in DKM adoption and emphasize the significance of leadership in aligning these systems with the goals of their institutions.

Impact of DKM on Business Efficiency

The findings presented in Table 13 demonstrate that the adoption of Digital Knowledge Management (DKM) systems has a very high impact on business efficiency in Chinese universities. This impact is evident across three major dimensions: operational efficiency, cost efficiency, and administrative effectiveness, with an overall weighted mean of 4.33 (SD = 0.434), reflecting strong consensus among respondents on the transformative role of DKM in institutional operations.

Table 13.
Impact of DKM on Business Efficiency

Parameter	WM	SD	Verbal Interpretation
Operational Efficiency			
1. The DKM system has streamlined day-to-day operations across various departments at our university.	4.36	0.612	Very High Impact
2. The adoption of DKM has reduced redundancies in administrative processes, improving overall workflow efficiency.	4.32	0.618	Very High Impact
3. DKM systems have made it easier to manage and monitor university resources, leading to better operational performance.	4.34	0.607	Very High Impact
4. The DKM system has reduced delays in communication and coordination between departments.	4.31	0.692	Very High Impact
5. The implementation of DKM systems has increased the speed at which decisions and processes are carried out within the university.	4.36	0.612	Very High Impact
Overall Weighted Mean	**4.34**	**0.450**	**Very High**

			Impact
Cost Efficiency			
1. The DKM system has helped reduce operational costs by optimizing resource allocation across the university.	4.41	0.637	Very High Impact
2. The use of DKM systems has minimized the need for paper-based processes, resulting in significant cost savings.	4.32	0.680	Very High Impact
3. Implementing the DKM system has reduced the costs associated with managing and storing physical records and documents.	4.29	0.608	Very High Impact
4. The DKM system has improved financial efficiency by providing better tools for budgeting and financial management.	4.32	0.649	Very High Impact
5. The reduction in manual labor and repetitive tasks through DKM systems has led to notable savings in labor costs.	4.24	0.622	Very High Impact
Overall Weighted Mean	**4.32**	**0.459**	**Very High Impact**
Administrative Effectiveness			
1. The DKM system has enhanced the effectiveness of administrative tasks such as scheduling, reporting, and documentation.	4.32	0.649	Very High Impact
2. The DKM system has improved the accuracy of administrative data, reducing errors in decision-making and reporting.	4.36	0.644	Very High Impact
3. The adoption of DKM systems has increased the transparency of administrative processes, making it easier to track progress and outcomes.	4.27	0.664	Very High Impact
4. The DKM system has enabled more efficient monitoring and evaluation of key performance indicators (KPIs) within the university.	4.33	0.604	Very High Impact
5. The DKM system has significantly improved the university's ability to handle complex administrative tasks and functions.	4.40	0.651	Very High Impact
Overall Weighted Mean	**4.34**	**0.464**	**Very High Impact**
Overall Results	**4.33**	**0.434**	**Very High Impact**

Interval: 1.00-1.80, Strongly Disagree/Very Low Impact; 1.81-2.61, Disagree/Low Impact; 2.62-3.42, Neither Agree not Disagree /Moderate Impact; 3.43-4.23, Agree/High Impact; 4.24-5.00, Strongly Agree/Very High Impact

In terms of operational efficiency, DKM systems have significantly streamlined day-to-day processes, improved coordination across departments, and accelerated decision-making (WM = 4.34). Respondents noted reduced communication delays and better resource monitoring, which aligns with the Technology-Organization-Environment (TOE) framework (Tornatzky & Fleischer, 1990). These findings are consistent with Liu et al. (2022), who reported enhanced workflow integration due to DKM systems, and Xu et al. (2023), who highlighted improved operational agility through real-time data access. These outcomes underscore the value of DKM systems in supporting fast, data-informed operations.

In the area of cost efficiency, the results (WM = 4.32) reveal that DKM systems effectively reduce operational expenses by minimizing manual processes, paper use, and storage costs. The highest-rated item—optimization of resource allocation (WM = 4.41)—illustrates how DKM contributes to financial sustainability. These findings support Wang et al.

(2021), who noted that automating routine tasks through DKM results in substantial cost savings. They also align with the Resource-Based View (RBV) theory, which emphasizes efficient resource use as a driver of institutional advantage. These insights suggest that expanding automation and integrating financial tools within DKM platforms could yield further savings.

Regarding administrative effectiveness, participants reported improved task execution, data accuracy, and process transparency, with an overall mean of 4.34. The system's ability to handle complex administrative functions (WM = 4.40) stood out as a key benefit. These observations are in line with Chen and Liu (2021), who emphasized the role of DKM in monitoring key performance indicators (KPIs), and with Rogers' (2003) Diffusion of Innovations Theory, which highlights how technological innovations can modernize traditional practices. The findings suggest that institutions should enhance their use of DKM for strategic planning and performance monitoring.

Mainly, the results confirm that DKM systems significantly improve business efficiency in higher education by reducing redundancy, lowering operational costs, and enhancing administrative processes. Supported by established theoretical models and current literature, these systems represent essential infrastructure for modern university governance. Institutions should continue to invest in the development and integration of advanced DKM features to maximize efficiency and strategic impact.

Thematic Analysis of Impact of DKM on Business Efficiency

The thematic findings presented in Table 14 reveal the substantial impact of Digital Knowledge Management (DKM) systems on business efficiency in Chinese universities. The analysis focuses on three core areas: operational efficiency, cost efficiency, and administrative effectiveness, based on insights from university administrators and aligned with existing literature and theoretical models.

Table 14.
Description of the Impact of DKM on Business Efficiency.

Theme	Description	Exemplar
Operational Efficiency	The enhanced performance of institutional processes achieved through the integration of Digital Knowledge Management (DKM) systems. These systems streamline workflows, automate repetitive tasks, and improve collaboration across departments, leading to faster and more accurate execution of university operations.	"The implementation of DKM systems has significantly improved operational efficiency by automating repetitive tasks such as data entry and report generation. This allows our staff to focus on more strategic activities, reducing delays in decision-making." *Dr. Ming Zhao, Yunnan University (ICT Director)* "The operational efficiency achieved through DKM systems is evident in our project management processes. By enabling real-time tracking of tasks and collaboration across departments, we've reduced project timelines by almost 30%." *Dr. Wei Zhang, Dali University (Vice President for Technology and Innovation)*
Cost Efficiency	The financial benefits derived from adopting DKM systems. By reducing reliance on physical resources, optimizing resource allocation, and transitioning to digital tools, institutions lower operational costs while maintaining or improving the quality of their services.	"In terms of cost efficiency, the DKM systems have reduced our reliance on physical resources like paper and filing cabinets. Transitioning to digital processes has not only saved money but also streamlined our workflows, making daily operations more seamless." *Ms. Liying Chen, Kunming University of Science and Technology (Head of Knowledge Management Division)* "From a cost perspective, DKM systems have optimized resource allocation. For instance, we've been able to identify underutilized facilities and redirect them for other

		purposes, leading to substantial savings in operational costs." *Ms. Mei Lin, Yunnan Minzu University (Chief Knowledge Officer)* "DKM systems have helped us cut costs in managing library resources by transitioning to digital subscriptions and e-books. This not only reduces physical storage needs but also makes resources more accessible to students and faculty." *Ms. Yun Xia, Yunnan Agricultural University (Digital Resource Manager)*
Administrative Effectiveness	Involves the improved management and execution of administrative functions facilitated by DKM systems. These systems enhance decision-making with data-driven insights, speed up administrative tasks, and foster better interdepartmental coordination, ensuring smooth and responsive institutional operations.	"Administrative effectiveness has improved dramatically with the integration of DKM systems. For example, our student enrollment and record-keeping processes, which previously took weeks, can now be completed in a matter of days due to centralized data management." *Mr. Jian Li, Yunnan University of Finance and Economics (Director of Digital Transformation)* Administrative effectiveness has been enhanced by the system's ability to generate detailed analytics on research outputs and departmental performance. This data supports evidence-based decisions, ensuring that resources are allocated where they are needed most." *Dr. Qiang Huang, Yunnan Normal University (Director of Research Knowledge Systems)* "The administrative processes on our campus are now more efficient due to DKM-enabled integrations. Scheduling, maintenance, and even incident reporting have become more streamlined, reducing response times and enhancing overall campus operations." *Dr. Lei Feng, Southwest Forestry University (Head of Smart Campus Initiatives)*

Operational efficiency emerged as the most cited opportunity area. Respondents reported that DKM solutions automate repeatable processes, simplify communications, and improve visibility across departments. Dr. Ming Zhao said that automation helps staff focus on more strategic work rather than transactional tasks, while Dr. Wei Zhang noted that project timelines were 30% faster due to the ability to track progress in real-time. In line with the Technology-Organization-Environment (TOE) (Tornatzky & Fleischer, 1990) and Liu et al. (2022), noted that digital integration resulted public organizations to become more effective insofar as it eliminates duplication and improves agility.

Moreover, the theme of cost-effectiveness was also one of the major issues. The reduced use of paper and space, as well as digital services, were being utilized by the interviewees as critical elements for cost savings. Ms. Liying Chen emphasized the shift from manual to digital processes, and Ms. Mei Lin explained DKM systems enabling deployment of under-utilized resources. These results are consistent with Wang et al. (2021) that discovered that DMK decreases operational costs by removing manual intervention and automatically mechanisms. RBV theory also states that use of digital resources for Resource T A A S ensures long-term institutional viability.

Administrative efficiency was the third major target of reform. The DKM has resulted in more accurate data, faster administration processes and better analytics for decision making. Enrollment and record-keeping procedures that used to take weeks "may now be done in days," Mr. Jian Li said, and performance analytics has helped plot allocations based on

evidence, according to Dr. Qiang Huang. These results also correspond to the research of Chen and Liu (2021) and the Diffusion of Innovations Theory (Rogers, 2003) that indicate digital innovations promote transparency and efficiency in institutional governance.

DKM Systems Influence on Knowledge Sharing and Collaboration

The findings presented in Table 15 illustrate the strong influence of Digital Knowledge Management (DKM) systems on knowledge sharing and collaboration within Chinese universities. With an overall weighted mean of 4.39 (SD = 0.330), the results indicate that DKM systems are extremely influential in promoting collaborative cultures and facilitating seamless exchange of institutional knowledge.

Table 15.
DKM Systems Influence on Knowledge Sharing and Collaboration.

Parameter	WM	SD	Verbal Interpretation
Knowledge Sharing Practices			
1. The DKM system has improved the sharing of knowledge and expertise among faculty members within our university.	4.46	0.558	Extremely Influential
2. DKM systems have enhanced access to institutional knowledge, making it easier for faculty and staff to collaborate on projects.	4.37	0.525	Extremely Influential
3. The DKM system facilitates the sharing of research data and resources across departments, improving overall knowledge flow.	4.40	0.620	Extremely Influential
4. Faculty members are more willing to share their research and insights through the university's DKM system.	4.34	0.590	Extremely Influential
5. The DKM system has reduced barriers to knowledge sharing, making it easier for faculty and staff to access and contribute to institutional knowledge.	4.37	0.597	Extremely Influential
Overall Weighted Mean	**4.39**	**0.341**	**Extremely Influential**
Collaboration Practices			
1. The DKM system has strengthened collaborative efforts between departments and faculties within the university.	4.40	0.586	Extremely Influential
2. DKM systems have enabled more effective collaborations between our university and other institutions, both locally and internationally.	4.45	0.592	Extremely Influential
3. Cross-departmental collaborations have increased due to the ease of sharing information through the DKM system.	4.35	0.539	Extremely Influential
4. The DKM system facilitates joint research projects by providing a platform for	4.37	0.614	Extremely Influential

	collaborative work and resource sharing.			
5.	The implementation of DKM systems has promoted a culture of teamwork and collaboration within our university.	4.37	0.646	Extremely Influential
Overall Weighted Mean		**4.34**	**0.384**	**Extremely Influential**
Overall Results		**4.39**	**0.330**	**Extremely Influential**

Interval: 1.00-1.80, Strongly Disagree/Not at all Influential; 1.81-2.61, Disagree/Slightly Influential 2.62-3.42, Neither Agree not Disagree /Somewhat Influential; 3.43-4.23, Agree/Very Influential; 4.24-5.00, Strongly Agree/Extremely Influential

With regard to the knowledge-sharing practices, a high weighted mean score of 4.39 (SD = 0.341) was obtained, reflecting accessibility to institutional information and fewer constraints in data sharing. The parameter indicating increased sharing of expertise between the faculty was especially high (WM = 4.46), highlighting the role of the system in encouraging the openness of knowledge generation. These data are consistent with Liu et al. (2022), who underlined the fact that DKM systems enhance transparency and accessibility to the organisation's knowledge. Similarly, Zhang et al. (2021) emphasized the importance of central digital archives in fostering interdisciplinarity and the breaking down of information siloes.

Collaboration effect sizes were also moderate, with a weighted mean of 4.34 (SD = 0.384). Successful Working of DKM Systems The operating practices of DKM systems were assessed to facilitate intersystem coordination (WM = 4.35) and cross-institutional collaboration (WM = 4.45). This is in line with findings from Chen and Liu (2021) who emphasized that DKM platforms may facilitate collaborative research and resource sharing, and Xu et al. (2023) who concluded that this kind of system supports international cooperation by means of integrated digital communication tools.

Collectively, these findings support the proactive role of DKM systems in the construction of a culture of joint knowledge creation and collaboration. They also are consistent with Roger's (2003) Diffusion of Innovations Theory, whereby digital technologies could influence organizational behavior by enabling greater cooperation and encouraging new ways of working. While universities develop their digital capabilities, using DKM for wider stakeholder engagement, e.g. working with industry partners, can enhance academic output as well as institution connectivity.

Thematic Analysis of DKM Systems Influence on Knowledge Sharing and Collaboration

The findings presented in Table 16 explore how Digital Knowledge Management (DKM) systems influence knowledge sharing and collaboration in Chinese universities. The thematic analysis reveals that these systems play a critical role in building inclusive, interconnected academic environments by centralizing information access and enhancing cooperative practices across departments and institutions.

Table 16.
Description of DKM Systems Influence on Knowledge Sharing and Collaboration.

Theme	Description	Exemplar
Knowledge Sharing Practices	Involve the dissemination and exchange of information, expertise, and resources within and across institutional departments. Facilitated by Digital Knowledge Management (DKM) systems, these practices ensure that knowledge is	"Our DKM systems have made knowledge sharing more structured and accessible. Faculty and staff can now access centralized repositories for research data, reducing redundancy and ensuring everyone is working with the most updated information." *Dr. Ming Zhao, Yunnan University (ICT Director)* "DKM systems encourage more open knowledge-sharing practices. For instance,

	accessible, updated, and transparent. By centralizing repositories and enabling real-time updates, institutions promote a culture of collective learning and innovation, reducing redundancy and enhancing productivity.	we've implemented a feature where staff can upload and annotate research materials, fostering a culture of collective learning and peer feedback." *Dr. Wei Zhang, Dali University (Vice President for Technology and Innovation)* "Knowledge sharing has become more dynamic, especially for research purposes. Instead of waiting for annual conferences, researchers can now exchange findings instantly through our DKM platform, accelerating innovation." *Dr. Qiang Huang, Yunnan Normal University (Director of Research Knowledge Systems)* "Our knowledge-sharing practices now emphasize inclusivity. The system ensures that even junior staff and students can contribute to ongoing projects, fostering a more collaborative and transparent academic environment." *Dr. Lei Feng, Southwest Forestry University (Head of Smart Campus Initiatives)*
Collaboration Practices	The coordinated efforts of individuals and teams working together to achieve shared goals. Through DKM systems, institutions streamline communication, integrate task management tools, and foster interdepartmental and external partnerships. These practices enable more efficient project execution, strengthen interdisciplinary research, and facilitate connections with industry and other academic entities, enhancing institutional outcomes.	"One of the biggest changes is the ability to collaborate across departments in real time. For example, when planning interdepartmental projects, the system provides a shared platform where resources and ideas can be exchanged seamlessly." *Ms. Liying Chen, Kunming University of Science and Technology (Head of Knowledge Management Division)* "Our collaboration practices have improved significantly. With integrated DKM systems, faculty and researchers from different campuses can now co-author publications and share insights without the delays caused by physical meetings or inconsistent communication channels." *Mr. Jian Li, Yunnan University of Finance and Economics (Director of Digital Transformation)* "The system has strengthened our collaboration with external partners. By granting controlled access to certain resources, we can engage with industry stakeholders and other universities more efficiently, leading to more productive joint projects." *Ms. Mei Lin, Yunnan Minzu University (Chief Knowledge Officer)* "Collaboration practices have been enhanced by features like shared task boards and project management tools within the DKM system. These help coordinate activities between different departments, especially during large-scale projects." *Ms. Yun Xia, Yunnan Agricultural University (Digital Resource Manager)*

Sharing of knowledge has been greatly enhanced through DKM system as it consolidates data holdings, make transactions in real time, and support easy access to the knowledge base of the institution. Dr. Ming Zhao remarked the efficiency of structured data access and Dr. Wei Zhang was pleased with the abilities of the annotation tools and how they support collective learning. These findings are in line with Liu et al. (2022) and Zhang et al.

(2021) who showed that centralized digital platforms inhibit redundancy and promote innovation. Furthermore, the inclusive nature of sharing was highlighted, with Dr. Lei Feng observing how the system allowed junior staff and students to share—a case in point that applies to the Resource-Based View (RBV) theory which emphasises the strategic weight of organisation knowledge accessibility.

Practices of collaboration have also changed. The real-time interdepartmental project coordination and external collaboration which it was enabling, was the kind of discussion which was being mentioned by the respondents. Ms. Liying Chen also observed how shared platforms facilitate collaborative planning across departments, and Ms. Mei Lin provided examples of successful partnerships with outside institutions through access control of resources. This result is in line with Chen and Liu (2021) and Xu et al. (2023) who discovered that DKM systems promote inter-disciplinary and international collaboration. Project management capabilities such as common task board (as identified by Ms. Yun Xia) are included in the TOE model, and it emphasizes the role of integrated digital tools for enhancing organizational performance.

At the broad level, DKM systems notably enable the flow of knowledge and collaborative capability among universities. Thanks to their access, inclusivity, connectivity and instant interaction, these systems help us in fostering an environment of innovation and connectedness. Institutions are urged to upscale these systems by introducing extra features like artificial intelligence and increasing secure access to outside collaborators to enhance institutional impact.

DKM Systems Enhance Data-Driven Decision-Making Processes

The results presented in Table 17 highlight the significant role of Digital Knowledge Management (DKM) systems in enhancing data-driven decision-making across three key areas: access to data and information, quality of decision-making, and strategic planning and resource allocation. The overall weighted mean of 4.35 (SD = 0.301) indicates that DKM systems are highly observed as effective tools in supporting informed and evidence-based university decisions.

Table 17.
DKM Systems Enhance Data-Driven Decision-Making Processes.

Parameter	WM	SD	Verbal Interpretation
Access to Data and Information			
1. The DKM system provides timely access to critical data needed for decision-making in our university.	4.34	0.572	Highly Observed
2. The DKM system makes it easier for administrators to retrieve and analyze relevant institutional data.	4.38	0.565	Highly Observed
3. The DKM system offers comprehensive access to historical data, improving decision-making processes.	4.31	0.615	Highly Observed
4. DKM systems have simplified the aggregation of data from different departments, enhancing overall data accessibility.	4.31	0.563	Highly Observed
5. The integration of DKM systems has improved the ability to track and analyze student and faculty performance data for decision-making purposes.	4.41	0.605	Highly Observed
Overall Weighted Mean	**4.35**	**0.375**	**Highly Observed**
Quality of Decision-Making			
1. The DKM system has improved the accuracy of decisions by providing reliable and up-to-date	4.45	0.520	Highly Observed

information.			
2. Data provided by the DKM system has reduced errors in administrative and academic decision-making processes.	4.26	0.543	Highly Observed
3. The DKM system enables evidence-based decision-making, leading to better outcomes in university operations.	4.37	0.646	Highly Observed
4. The DKM system has facilitated faster decision-making by providing quick access to relevant data.	4.32	0.649	Highly Observed
5. The availability of data through the DKM system has led to more informed and well-grounded decisions at all levels of the university.	4.36	0.523	Highly Observed
Overall Weighted Mean	**4.35**	**0.375**	**Highly Observed**
Strategic Planning and Resource Allocation			
1. The DKM system has significantly enhanced the university's ability to make data-driven strategic plans.	4.42	0.554	Highly Observed
2. Data from the DKM system is crucial for the efficient allocation of financial and human resources across departments.	4.33	0.604	Highly Observed
3. The DKM system supports long-term planning by providing insights into trends and projections based on historical data.	4.29	0.640	Highly Observed
4. DKM systems have improved the university's ability to allocate resources to high-priority projects based on data-driven assessments.	4.32	0.548	Highly Observed
5. The DKM system facilitates the monitoring and evaluation of strategic goals, improving the university's overall planning processes.	4.44	0.608	Highly Observed
Overall Weighted Mean	**4.35**	**0.370**	**Highly Observed**
Overall Results	**4.35**	**0.301**	**Highly Observed**

Interval: 1.00-1.80, Strongly Disagree/Not Observed; 1.81-2.61, Disagree/Less Observed; 2.62-3.42, Neither Agree not Disagree /Somewhat Observed; 3.43-4.23, Agree/Observed; 4.24-5.00, Strongly Agree/Highly Observed

On access to data and information, an average score of 4.35 (SD = 0.375) indicates the ability of the systems to deliver timely, structured, and aggregated institutional information. Salient features of the application included enhancing recall of outcome measures (WM = 4.41), and improving interdisciplinary data integration (WM = 4.31). This is consistent with the conclusion by Liu et al. (2022) and Xu et al. (2023), who highlighted that digital knowledge management (DKM) systems improve transparency and access to data, facilitating more responsive and coordinated decision-making.

In terms of quality decision-making, the mean of the scores on the DKM systems was the same with 4.35 (SD = 0.375), which emphasizes their role in facilitating accurate, efficient, and evidence-based decision-making. They also reported fewer decision errors (WM = 4.26) and more advantages in using real-time information (WM = 4.45), consistent with Chen and Liu (2021) and the Technology-Organization-Environment (TOE) model and their claim that organizational digital integration improves institutional judgment and performance.

Once more, with regard to strategic planning and resource allocation, the mean exceeds that of the others, with 4.35 (SD = 0.370). The DKM systems were perceived to improve longterm planning (WM = 4.29), and the evaluation of strategic targets (WM = 4.44). It is nice to note that this type of observation corroborates with the work by Wang et al. (2021) and the RBV theory, which emphasizes the role of data-driven tools for the enhancement of institutional planning and resource utilization.

Thematic Analysis of DKM Systems Enhance Data-Driven Decision-Making Processes

The findings presented in Table 18 reveal that Digital Knowledge Management (DKM) systems play a crucial role in enhancing data-driven decision-making across three core dimensions: Access to Data and Information, Quality of Decision-Making, and Strategic Planning and Resource Allocation. Participants affirmed that these systems improve responsiveness, accuracy, and strategic foresight within universities.

Table 18.
Description of DKM Systems Enhance Data-Driven Decision-Making Processes.

Theme	Description	Exemplar
Access to Data and Information	The availability of real-time, accurate, and centralized data through Digital Knowledge Management (DKM) systems. This ensures that decision-makers can retrieve and utilize comprehensive datasets, facilitating better insights and timely responses to institutional needs.	"Access to data has transformed decision-making in our institution. With centralized DKM systems, administrators can retrieve accurate, real-time data to identify patterns and make informed decisions, particularly in areas like student enrollment and resource allocation." *Dr. Ming Zhao, Yunnan University (ICT Director)* "With enhanced access to data, we've seen significant improvements in strategic planning. For instance, identifying underperforming departments is now faster, allowing us to allocate resources where they are needed most, ensuring institutional growth." *Dr. Wei Zhang, Dali University (Vice President for Technology and Innovation)* "Access to real-time information allows us to adjust policies and initiatives quickly. For example, tracking student engagement data through our DKM system has enabled us to refine our online learning strategies to better meet students' needs." *Ms. Yun Xia, Yunnan Agricultural University (Digital Resource Manager)*
Quality of Decision-Making	The quality of decision-making improves with the integration of reliable data analytics and validation processes within DKM systems. This allows for evidence-based decisions, reduces reliance on assumptions, and enhances the accuracy and relevance of institutional strategies.	"The quality of our decision-making has improved because the data we rely on is now integrated and validated through DKM systems. For example, when assessing the impact of new academic programs, we can base our decisions on comprehensive data rather than isolated reports." *Ms. Liying Chen, Kunming University of Science and Technology (Head of Knowledge Management Division)* "The integration of DKM systems has elevated the quality of our research decisions. By analyzing data on past publications, collaborations, and funding outcomes, we can strategically focus on areas with the highest potential for impact." *Dr.*

		Qiang Huang, Yunnan Normal University (Director of Research Knowledge Systems)
Strategic Planning and Resource Allocation	Strategic planning and resource allocation are optimized through the use of predictive analytics and data-driven insights provided by DKM systems. Institutions can simulate scenarios, identify areas of priority, and allocate resources effectively to maximize efficiency and achieve organizational goals.	"Strategic planning has become more precise due to the predictive analytics capabilities of our DKM systems. We can simulate different resource allocation scenarios, which helps us plan effectively for the academic year while minimizing waste." *Mr. Jian Li, Yunnan University of Finance and Economics (Director of Digital Transformation)* "DKM systems have enhanced our ability to link data across departments, ensuring decisions are based on holistic insights. This has been particularly valuable in budgeting, where we need to balance priorities across academic, administrative, and infrastructural needs." *Ms. Mei Lin, Yunnan Minzu University (Chief Knowledge Officer)* "Strategic planning and resource allocation have been revolutionized by DKM systems. By analyzing usage patterns of campus facilities, we can optimize scheduling and maintenance, reducing operational costs while enhancing efficiency." *Dr. Lei Feng, Southwest Forestry University (Head of Smart Campus Initiatives)*

With regards to Access to Data and Information, respondents highlighted that the availability of real time, centralized access to institutional data has massively improved the speed and quality of decision making. In one example, Dr. Ming Zhao cited benefits in the allocation of resources and student monitoring. These findings are in line with Liu et al. (2022) and Xu et al. (2023) which found that real-time access exhibits a reduction of redundancy and therefore increased responsiveness from the institutions.

In the area of Quality of Decision-Making, the pooling of credible and verifiable information has raised the valence and fidelity of university strategies. Ms. Liying Chen noted that decision-making has switched from disparate reports to integrated data and Dr. Qiang Huang said that there was improvement in research planning. These results complement Chen and Liu's (2021) conclusions and, consistent with the Diffusion of Innovations Theory (Rogers, 2003), they connect instances of digital adoption with evidence-based practice and errors prevention.

With Respect to Strategic Planning and Resource Allocation: Predictive Analytics and Scenario Simulation has helped in Better Budget Planning and Prioritization. Jian Li on the uses of forecasting tools, and Mei Lin on aligning data across departments for well-informed decision-making. This echoes Wang et al. (2021) as well as the Resource-Based View (RBV) theory that stress the strategic importance of digital systems in efficient management of resources.

Overall, the thematic analysis supports the contention that DKM systems greatly enhance institutional decision-making through data access, the encouragement of evidence-based practice, and strategic alignment. These results are in close accordance with the Technology-Organization-Environment (TOE) theory and demonstrate the positive systemic implications arising from digital integration in higher education.

Conclusion

Universities in China experience consistent, persistente, and formidable obstacles to the implementation of DKM systems that are both technological, such as technostress, cultural (e.g. resistance to change at an organizational and individual level) and regulatory (e.g. red tape). But despite these obstacles, companies with DKM systems have been successful in speeding up digitization,

improving operationalizing efficiency, fostering communalism of knowledge and aiding data-driven decision-making. Integrating them has significantly enhanced operations, administrative openness, and strategic planning, as well as advancing a more collective and inclusive academic community.

Given these results, it is advised that the institutions invest in faculty development, technical support, and leadership as strategies to help overcome implementation barriers. This consolidation of digital resources and strengthening of the infrastructure will also help enhance digitalization attempts. Automated systems and performance analytics need to be employed by institutions in order to streamline business processes. Cultivating inclusive knowledge-sharing climates and working with externals will enhance innovation and research. Adding AI-driven analytics to DKM systems and putting in place strong data governance frameworks will assist to encourage more strategic, data-driven decisions. Recent studies should look more widely at different institutional contexts and burgeoning technologies and digital equity to develop the field.

Future research should investigate the process of DKM implementation in diverse institutional context types involving vocational colleges, private colleges and rural universities to reveal the character of digital transformation of Chinese HEI. In addition the lessons concerning best practice and policy at a national level, comparative studies across regions or countries also appeared potentially useful.

Longitudinal research may further contribute to the development of the field by examining the effects of DMS on firm performance, academic collaboration, and strategic decision-making that have long been the subject of interest in management studies. For example, further exploration of the organizational culture, user attitudes and change management mechanism would be useful for understanding how to encourage sustainable digital transformation.

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