Knowledge Management Evaluation Using Digital Capability Maturity Model in Higher Education Institution

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Abstract: In the higher education institutions, they recognize the value of knowledge management (KM) in enhancing organizational performance and productivity. However, the current KM system faces challenges in adapting to modern issues and suffers from inefficient utilization. This paper aims to address these shortcomings by identifying the maturity level of KM using a digital capability maturity model (DCMM). To achieve this objective, data were collected through interviews, questionnaire surveys, and observations, and a descriptive data analysis method was employed. The study utilized the model's eight Business Transformation Management (BTM) disciplines to gain a comprehensive understanding and holistic analysis of digital transformation. The research findings revealed a defined maturity level (Level 3) of Effective Knowledge Worker Digital Capability. This suggests the need for strategic improvements to propel the institution towards a higher level of digital readiness. To elevate the KM maturity level, the paper recommends the development of a web-based Knowledge Management System (KMS) as a pilot project within the IT Operational department, before its potential company-wide implementation. The proposed KMS includes eight essential features, including document management, lessons learned, project management, announcements, schedules, FAQ page, and forum. This web based KMS promises to enhance knowledge sharing, collaboration, and accessibility. Beyond the specific institution studied, the research offers valuable insights for other organizations seeking to evaluate and improve their KM performance. By adopting the digital capability maturity model and considering the suggested features in the KMS, institutions can drive innovation and better adapt to the evolving landscape of knowledge management. Ultimately, this research contributes to the advancement of knowledge management theory and practice in higher education institutions, offering strategies to boost organizational agility and knowledge utilization. The findings can guide decision-makers in enhancing their KM strategies, ultimately leading to improved organizational outcomes and increased competitiveness in today's dynamic and rapidly changing environment.

Keywords: Knowledge management, Knowledge worker, Digital capability maturity model

1. Introduction

Knowledge Management (KM) is increasingly becoming an important matter in any organization (Heisig et al., 2016; Hujala & Laihonen, 2021). KM refers to a multidisciplinary approach aimed at achieving organizational objectives by facilitating the capture, storage, transformation, and dissemination of knowledge to make the best use of it (Alavi & Leidner, 2001; Dalkir, 2017; Yee et al., 2019). Knowledge management has been identified as one of the key factors for innovation and competitive advantage in a knowledge economy (Darroch, 2005; Dasgupta et al., 2013; Zakariya & Bashir, 2021). On the other hand, universities must also manage their knowledge processes as part of a planned knowledge management strategy to remain competitive in the knowledge economy (Veer Ramjeawon & Rowley, 2017).

Geng et al. classified knowledge of interest to colleges and universities into two primary domains – scholarly knowledge and operational knowledge (Geng et al., 2005). Operational knowledge is held in diverse areas such as computer services, enrollment management, admissions, research support, student services, student organizations, and more. Therefore, managing knowledge and knowledge workers has become a top priority for organizations (Uhl & Gollenia, 2014). Higher Education Institutions understand that to provide high-quality education and a system of support, they must also continue learning and growing themselves. Higher Education Institutions have several departments, one of which is IT Operational. IT Operational is responsible for all

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information systems and for managing and sharing all organizational information, especially information related to IT.

The primary challenges lie in the inconsistent and confusing distribution and management of knowledge within the company. Currently, knowledge is treated as an individual's personal asset rather than a shared asset of the company, resulting in inadequate documentation. Although certain platforms store the same knowledge, updates are not synchronized. Knowledge sharing predominantly occurs through informal means, such as verbal communication from superiors to subordinates and among employees. This habit poses obstacles for IT Operations as they consistently encounter the same questions and issues, leading to a significant duplication of effort. Despite the presence of an online company guide for employees to find solutions to their queries, they persist in directly approaching IT staff. Another problem was caused by human error. Human error is a significant issue that contributes to misleading information. Mistakes made by individuals resulted in incorrect or inaccurate data being disseminated. These errors could occur at various stages, including data entry, analysis, interpretation, and communication. When misinformation spreads, it can have far-reaching consequences, leading to misguided decisions, misunderstandings, and ineffective actions.

Nevertheless, transformation is not as easy as it looks. The success of digital transformation does not depend solely on introducing new technology (Bican & Brem, 2020; Uhl & Gollenia, 2014). The foundation for digital transformation requires a complete understanding and holistic analysis of internal and external possibilities, feasibility, strengths, and weaknesses (Uhl & Gollenia, 2014). Knowledge maturity models can be used to assess the overall maturity level of an organization's knowledge management readiness (Dalkir, 2017). According to The Carnegie Mellon Software Engineering Institute, the maturity model is a descriptive model that depicts the stages through which organizations progress as they identify, implement, develop, and adjust their strategies (Dalkir, 2017). It serves as a guide for selecting process improvement strategies by determining current process capabilities and identifying critical quality issues and process improvement within a specific domain. The Capability Maturity Model (CMM) is an organizational model that explains the five evolutionary stages (levels) in which an organization controls its processes: initial, repeatable, defined, managed, and optimizing. The CMM can be expanded to incorporate knowledge management processes, allowing organizations to assess their existing readiness for knowledge management. This is especially important for KM projects because new procedures and technologies will be implemented (Dalkir, 2017).

Therefore, the Digital Capability Maturity Model was used to measure the degree of maturity of each Digital Capability. This model supports the analysis of the 'as-is' situation and provides instruments for planning the prospective 'to-be' scenario (Fisher & Director, 2004; Harmon, 2004; Uhl & Gollenia, 2014). The maturity levels of this model are based on the CMM by The Carnegie Mellon Software Engineering Institute (Dalkir, 2017). The company can improve employees' competency by transforming them into knowledge workers (Igielski, 2017). This study focused solely on IT Operational since it was intended to be a pilot project that demonstrates the sustainability of an idea before company-wide implementation.

Based on research background described in this section, research question of this paper is: "What are the challenges faced by organizations in managing knowledge, particularly in the context of IT Operational departments, and how can the Digital Capability Maturity Model be used to assess and improve knowledge management readiness?"

2. Literature Review

In today's rapidly evolving business landscape, organizations are increasingly recognizing the importance of knowledge workers and digital transformation to stay competitive and adapt to the demands of the modern economy. This literature review explores the concepts of knowledge workers, digital transformation, and the Digital Capability Maturity Model in the context of organizational management. The section on knowledge workers highlights their crucial role in driving innovation, performance, and sustainability in knowledge-based economies. Digital transformation, another important concept, is described as the process of using information, computation, communication, and networking technologies to bring about significant changes in organizational features. The literature recognizes that digital transformation is not solely about implementing new technologies but also requires a comprehensive understanding of their potential applications, benefits, and risks. The Digital Capability Maturity Framework provides a structured approach to assessing an organization's digital maturity across various dimensions. This framework encompasses management disciplines such as strategy management, value management, risk management, and more. By examining these concepts and frameworks, this literature

review sets the stage for understanding the challenges and opportunities organizations face in managing knowledge, driving digital transformation, and assessing their digital capability maturity.

2.1 Knowledge Worker (K Worker)

Companies functioning in a changing market must seek out new ideas to help them better adapt to the demands of the modern economy (Igielski, 2017). Knowledge workers are an important source of organizational innovation, performance, and sustainability in today's knowledge-based economies (Domenech, et al., 2016). Knowledge workers use high-level communication skills to complete complicated tasks both alone and collaboratively, frequently with the aid of cutting-edge technology. A knowledge worker is, above all, someone who can learn and adapt to a changing workplace (Sebastien, 2020). Knowledge workers became the center of organizational attention as the value of knowledge as an organizational asset began to acquire acknowledgment in the theoretical and practical sectors in the post-industrial society. In the knowledge economy, Intellectual engagement is important, and it may be attained by knowledge workers through managerial confidence and organizational willingness to rely on their abilities to make the right decisions (Iliescu, 2021).

The knowledge worker is a capitalist who sells his "human intellectual capital" to other capitalists: there are no more competing social classes as there were in the capitalism age. The biggest competitive weapon of today's organizations is a long-term business strategy attained through investments in knowledge worker. Knowledge workers are constantly exposed to and involved in the creation, distribution, and application of knowledge. They play a critical role in influencing company decision-making and, as a result, overall organizational performance (Sahibzada, et al., 2020).

Organizations must equip their staff with digital skills if they wish to reap the benefits of their technological investments in order to achieve organizational goals (Kane, et al., 2019) (Blount, et al., 2016). Westerman (2016) emphasized that "digital transformation requires a heart," warning managers not to "forget that it is people who make firms operate" and implying that misuse of digital forces can undermine employee relationships (Westerman, 2016). Implementing enterprise systems has strategic benefits not just in terms of incorporating critical data and technology, increasing knowledge worker satisfaction but also in terms of preparing for and accommodating human elements (Sahibzada, et al., 2020). Organizations must build ongoing digital workforce transformation competency and support workforce transformation to create a solid cultural foundation that enables the workforce to handle the turbulence and continual responsiveness to change (Eden, et al., 2019).

2.2 The Role of Knowledge Sharing

Knowledge sharing serves as the cornerstone of organizational growth, enabling knowledge workers to collaboratively innovate, perform, and sustain (Domenech et al., 2016). It is essential to recognize the pivotal role of knowledge-worker productivity as a conduit between knowledge management processes and innovation (Shujahat et al., 2019). This highlights the significance of understanding how knowledge is generated, shared, and applied as a precursor to the innovation process.

2.3 Digital Transformation

Digital transformation is the modern-day effort to survive the existential threat of digital disruption. A conceptual definition of digital transformation is a process that uses a combination of information, computation, communication, and networking technologies to better an entity by causing major changes to its features (Vial, 2019). Uhl (2014) stated that new market prospects emerge in the digital age, and businesses adapt their policy, structure, society, and operations by using the capacity and influence of digital technology and the Internet (Uhl & Gollenia, 2014). Companies can gain a strategic edge by using new and emerging technology (Uhl & Gollenia, 2014). As the result of COVID-19, digital transformation has become more important than ever for companies, brands, and enterprises. However, the world has no alternative. To secure employee safety and shift all processes remotely, companies must transform digitally. While most companies have been considering digital transformation for some time, the seriousness of COVID-19 is forcing forward-thinking businesses to embrace the pandemic entirely. Therefore after this pandemic, it is necessary to investigate the antecedents for digital transformation (Maxwell et al., 2021).

2.4 Digital Capability Maturity Framework

The Digital Capability Maturity Models outlined in Uhl et al. (2014, p43) book is based on CMM's calculation criteria and promote holistic 360-degree assessments of digital maturity (Uhl & Gollenia, 2014). It can determine all relevant market angles for each Digital Capability thanks to the integration of BTM2. The progress in digital change is not solely dependent on the implementation of modern technologies. Companies must investigate and

assess the potential applications, advantages, and threats of emerging technology developments. These evaluation instruments provide questionnaires for assessing the present situation and evaluating the desired outcome (Uhl & Gollenia, 2014). The first step toward being a Digital Enterprise is to conduct a Digital Capability Maturity Assessment. In addition, the Digital Capability Maturity Model offers a method for evaluating the transition criteria for each capability in a particular to-be scenario (e.g., which level can be reached using a certain technology).

Strategy management, meta management, value management, risk management, business process management, organizational change management, transformational IT management, program and project management, and competence and training management, are among the nine management disciplines that make up the digital capability maturity model. Additionally, according to the DCMM, digital business transformation management can be assessed in six areas of digital capabilities: Innovation Capability Maturity Model, Transformation Capability Maturity Model, IT Excellence Maturity Model, Customer Centricity Maturity Model, Effective Knowledge Worker Maturity Model, and Operational Excellence Maturity Model. Each of these maturity models is designed to evaluate an organization's ability to handle innovations, transformation, IT excellence, customer centricity, operational excellence, and knowledge workers to accomplish successful digital business transformation.

2.5 Connecting Knowledge Management to Digital Capability Maturity

To bridge the gap between knowledge management theory and digital transformation, the Digital Capability Maturity Model emerges as a transformative framework (Uhl & Gollenia, 2014). This model assesses an organization's digital maturity, enmeshing various management disciplines such as strategy, value, and risk management. The model's strength lies in its ability to gauge an organization's readiness to integrate digital tools for knowledge sharing. These capabilities—ranging from innovation and transformation to customer centricity and operational excellence—are threaded through the fabric of knowledge sharing (Table 1).

Table 1: Summary of Knowledge Management and Digital Capability Maturity

Concept	Relevance to KM	Digital Capability Maturity
Knowledge Sharing	Foundation of KM (Domenech, et al., 2016)	Nurturing digital knowledge (Uhl & Gollenia, 2014; Kane, et al., 2019)
Digital Transformation	Alters KM dynamics (Uhl & Gollenia, 2014)	Facilitates KM evolution (Vial, 2019; Uhl & Gollenia, 2014)
Digital Capability Maturity Model	Extends KM to digital realm (Uhl & Gollenia, 2014)	Assesses digital readiness (Uhl & Gollenia, 2014)

2.6 Related Research

The summary of related research provided in Table 2 gives us a broad view of research studies related to knowledge management and the capability maturity model. These studies look at different aspects of knowledge management, like how it affects innovation, job satisfaction, organizational factors, and overall performance in various situations, especially in higher education. All these studies together help us understand better how knowledge management works, what helps it, and what gets in its way, and how it affects how well organizations perform, especially in developing areas and in universities. What's interesting is that these studies highlight things like how productive employees are, how internal marketing plays a role, how the company's culture matters, and how good leadership and digital skills come into play. This paper takes these ideas and builds on them, using their insights to show its own unique contribution. It doesn't stop there, though—it goes further than current research by looking at how digital skills and knowledge management mix, how well knowledge management efforts last over time, how to better measure what comes out of it, and even how leadership and the company's culture play into it. By combining all these different research threads, this study has a special place in moving our understanding and practical use of knowledge management and digital changes forward.

Table 2: Related Research

No	Title	Journal/Conference Title	Authors and Year	Summary
1	Translating the impact of knowledge	Journal of Business Research	(Shujahat, et al., 2019)	This study presents a new model that examines the key role of knowledge-worker productivity between knowledge

No	Title	Journal/Conference Title	Authors and Year	Summary
	management processes into knowledge-based innovation: The neglected and mediating role of knowledge-worker productivity			management processes (generation, sharing, application) and innovation. Findings underscore the importance of knowledge-worker productivity as a central challenge in 21st-century management, driving knowledge-based innovation. Additionally, the study highlights the superiority of human and cultural knowledge management approaches over Big Data and IT systems.
2	Catalyzing knowledge management processes towards knowledge worker satisfaction: fuzzy-set qualitative comparative analysis	Journal of Knowledge Management	(Sahibzada, et al., 2020)	This study explores how internal marketing, knowledge management processes, and knowledge worker satisfaction are connected. It suggests that certain combinations of internal marketing dimensions and knowledge management processes can enhance knowledge worker satisfaction. Results indicate that internal marketing significantly influences KM processes, and these processes substantially boost knowledge worker satisfaction. Multiple pathways for enhancing satisfaction were identified through fsOCA analysis.
3	Organizational factors and process capabilities in a KM strategy: toward a unified theory	Journal of Management Development	(Valaei, et al., 2017)	This study investigates the impact of KM enablers on KM activities in Malaysian SMEs. It explores how organizational culture, transformational leadership, organizational structure, and technology utilization affect knowledge acquisition, conversion, application, and protection. The findings reveal that technology utilization and organizational structure significantly influence KM activities. Organizational culture impacts knowledge conversion and protection, with no associations found for knowledge acquisition and application. Transformational leadership is positively related to knowledge acquisition, but hypotheses connecting it to other activities are rejected.
4	Knowledge Management in Higher Education Institutions in Mauritius	The Learning Organization	(Veer Ramjeawon & Rowley, 2017)	This research examines knowledge management enablers and barriers in a developing university sector, Mauritius. It aims to uncover factors influencing knowledge creation, sharing, and transfer. While universities in developing countries recognize the need for knowledge management, challenges in strategy implementation persist. Further research across developed and developing nations can enrich our understanding of knowledge management processes and policies.
5	From knowledge management to organizational performance: Modelling the mediating role of innovation and intellectual	Journal of Enterprise Information Management	(Amjad, et al., 2019)	This paper empirically studies how knowledge management (KM) enablers affect KM processes in research universities, and it explores the direct link between KM processes and organizational performance (OP). The study also examines how intellectual capital (IC) and innovation mediate the relationship between KM processes and university performance.

No	Title	Journal/Conference Title	Authors and Year	Summary
	capital in higher education			Findings show significant impacts of KM enablers on KM processes, with KM processes directly and indirectly affecting OP through innovation and IC.
6	Measuring digital capabilities of the higher education institution using Digital Capability Maturity Model	37TH International Conference on Organizational Science Development	(Kozina & Valentina, 2018)	Digital business transformation employs digital technologies to create new value for customers through innovative business models. The paper introduces the Digital Capability Maturity Model (DCMM) as a modern approach to assess digital capabilities in any enterprise, including higher education institutions. DCMM gauges digital transformation through five maturity levels (initial, reactive, defined, managed, excellence), evaluated across six digital capability areas: innovation, transformation, IT excellence, customer centricity, effective knowledge workers, and operational excellence. As an example, the paper outlines the assessment of innovation capability maturity within this framework.

These studies collectively contribute to the understanding of knowledge management and the capability maturity model, providing valuable insights for organizations and institutions aiming to enhance their knowledge management practices and digital capabilities. Further research in this area can continue to advance our knowledge base and improve the implementation of effective strategies and cultures for knowledge management.

Moreover, there are several potential knowledge gaps that can be identified:

Insufficient attention to the integration of digital capabilities and knowledge management processes: While some research acknowledges the importance of digital capabilities in knowledge management, there is a need for more focused exploration on how these two areas can be effectively integrated. Gaining a deeper understanding of how digital capabilities enhance knowledge management processes, and vice versa, would provide valuable insights for organizations aiming to leverage technology optimally.

Lack of understanding regarding the long-term impact and sustainability of knowledge management initiatives: Many studies primarily examine the immediate outcomes of knowledge management practices, such as innovation and organizational performance. However, there is a gap in knowledge regarding the lasting effects and sustainability of these initiatives. Further research that investigates the longevity of knowledge management practices and their ability to adapt to evolving organizational needs would be highly beneficial.

Inadequate measurement and evaluation of knowledge management outcomes: While some studies propose models and frameworks for evaluating knowledge management outcomes, there remains a need for more comprehensive research on effective measurement and evaluation approaches. Developing standardized metrics and assessment methods would facilitate comparisons across organizations and contribute to advancing knowledge management practices.

Insufficient exploration of the role of leadership and organizational culture in knowledge management: Although some research touches upon the influence of leadership and organizational culture on knowledge management, further investigation is warranted. Gaining a deeper understanding of how leadership styles, behaviors, and cultural factors impact the success of knowledge management initiatives can assist organizations in developing effective strategies and fostering an environment conducive to knowledge sharing and collaboration.

3. Methodology

3.1 Descriptive Analysis

Descriptive analysis was chosen as the type of research to determine the perceptions of product characteristics and the degree of association between variables (Maholtra & Dash, 2016). Data collection took place from December 2020 to January 2021 and involved observation, surveys, and interviews. The survey method was

employed to gather primary quantitative data through questionnaires. Respondents were asked various questions about their behavior, intentions, attitudes, awareness, motivations, as well as demographic and lifestyle characteristics related to knowledge management. Quantitative data collection was conducted by individually distributing online questionnaires.

3.2 Digital Capability Maturity Model for Effective Knowledge Worker

The Digital Capability Maturity Model for the Effective Knowledge Worker allows for a comprehensive, holistic, and integrative assessment of knowledge workers' capabilities in digital enterprises (Uhl & Gollenia, 2014). To leverage digital technologies to improve employee satisfaction, digital firms demand new competencies. Employees in digital business roles are encouraged to be creative and collaborate. Employees that work in a collaborative and creative environment become more loyal, independent, and self-assured (Uhl & Gollenia, 2014). During the digital transformation, leadership and its support are critical (Kozina & Valentina, 2018).

The questionnaire assesses essential business angles for each Digital Capability using the model's eight BTM disciplines. This questionnaire does not cover the Risk Management discipline because it is unrelated to the research subject, IT Operational. This section assesses the maturity level of this company's Digital Capabilities, which can contribute to an Effective Knowledge Worker. The maturity is measured on a scale of 1 to 5. Each level evaluates the parameters along an evolutionary path from ad hoc, disorderly processes (initial) to mature, disciplined processes (excellence). A higher degree means that the operations will achieve the desired result consistently and sustainably.

The BTM management disciplines are used to measure the maturity level of the Digital Capabilities in this company that will lead to Effective Knowledge Worker (Appendix A Table 3): (1) Meta Management is the overarching structure that integrates management disciplines, leadership, culture, and connectivity, allowing the digital transformation process to be successful. Since this specialty focuses on leadership, culture, and teamwork, the questions concern how leaders relate to information acquisition and how teamwork is accomplished in the IT Operational group. (2) Strategy Management concerned with how assists their staff in knowledge management. This discipline explores the factors for and causes of digital transformation and the extent of preparation for transformation. (3) Value Management assesses how the whole company, including administrators and staff, perceives the value of Knowledge Management. As a result, the questions include how staff and Higher Education Institution Community view the importance of knowledge management and how information is used and exchanged. (4) Business Process Management determines the extent of process enhancements as well as the planned performance improvements. As a result, the questions revolve around how expertise is used in Higher Education Institution processes and how Higher Education Institution offers opportunities to help workers work better. (5) Transformational IT Management determines the extent to which IT changes are required and develops strategies for implementing and testing new technologies. The questions include how Higher Education Institution investment on technology to support knowledge management activities in the company and how technology is used in knowledge management. (7) Organizational Change Management is concerned with identifying how innovations are implemented and perceived in an organization. Thus, the questions include how Higher Education Institution implements the transition, how Higher Education Institution communicates the changes to employees, and how employees perceive the changes. (8) Competence and Training Management relies on the Higher Education Institution training plan to support workers' competencies and their perceptions of the actual training situation. (9) Program and Project Management investigates how project management is carried out in the Higher Education Institution.

4. Result and Discussion

Respondent profiles were obtained from IT operational employees at a Higher Education Institution who were selected to fill out the questionnaire. The data collected from distributing the questionnaires is the primary data for the conducted research. The profiles of respondents, including their gender, age, length of work, education level, and position within the IT operational group, are described in Table 4 below:

Table 4: Respondents' Characteristics

Characteristics	Percentage (%)
Gender	
Male	78
Female	22

Characteristics	Percentage (%)
Age	
18-24	0
25-40	44.4
41-56	44.4
> 56	11.1
Educational Level	
High School Degree	0
Diploma Degree	33
Bachelor Degree	56
Master Degree	11
Years at Higher Education Institution	
< 5	22
5-10	34
11-20	22
> 20	22
Position in IT Operational Group	
Head of Department	22
Senior Manager	11
Manager	22
Supervisor	11
Staff	34

The results of the maturity assessment for all eight management disciplines are shown in Table 5. The evaluation was conducted for all main areas within each management discipline. A low standard deviation value indicates that the data is clustered around the mean, while a high standard deviation value indicates greater variation or spread in the data. When the distribution is 0, it means that all data points have the same value. In Table 5, out of the 7 disciplines and 21 questions, only 1 question has a value greater than 1. Specifically, the standard deviation of the Business Process Management discipline regarding organization rules or procedures is 1.23. The remaining 20 questions have values less than 1, indicating that the variation in the data for the Analysis Result of Effective Knowledge Worker Digital Capability Maturity Level is around the mean. The statistical data is then assessed using a Heat Map (Figure 1).

Table 5: Descriptive Statistics Analysis Result of Effective Knowledge Worker Digital Capability Maturity Level

Disciplines	Questions	Key Areas of DCMM	Min	Max	Mean	Standard Deviation	Maturity Level
Meta Management	In this organization, employees are encouraged to innovate if they have a new idea. Knowledge of all employees is seen as a core competence.	Culture	3	4	3,67	0,50	Managed

Disciplines	Questions	Key Areas of DCMM	Min	Max	Mean	Standard Deviation	Maturity Level
	Leaders provide the required knowledge to solve problems and channel of communication that helps knowledge transfer.	Leadership	3	4	3,78	0,44	Managed
	I believe that managing and sharing knowledge are important.	Values	4	5	4,67	0,50	Excellence
Strategy Management	Organization facilitates and encourages us to manage, share, and use knowledge to improve our work performance.	Vision and Goals, Business Models and Execution	3	4	3,67	0,50	Managed
Value Management	I believe that knowledge helps the organization succeed and improve the work of its employees.	Value Identification	3	5	4,22	0,83	Managed
	Organization stores information such as files in a managed and integrated location.	Value Realization Planning	3	4	3,56	0,53	Managed
	I use the internet and systems to find information that can help me with my work.	Value Realization	4	5	4,44	0,53	Managed
Business Process Management	Organization provides tools to ensure knowledge is accessible to all departments.	Governance	3	5	4,00	0,50	Managed
	Organization has a clear rules or procedure of what we must do to manage and use knowledge.	Methods & Tools, Process Optimization	1	5	3,00	1,32	Defined
Transformational IT Management	Organization has been investing and developing tools to better provide	Information Analytics	3	5	3,78	0,67	Managed

Disciplines	Questions	Key Areas of DCMM	Min	Max	Mean	Standard Deviation	Maturity Level
	knowledge management.						
	Organization is doing their best to manage knowledge, analyze data from various sources, and collaborative platforms (ex. Microsoft Teams and Sharepoint).	Business Applications	2	4	3,22	0,83	Defined
	All sharing information activities were done by making use of current system in this pandemic situation.	Communication Technology	2	5	3,56	0,88	Defined
Organizational Change Management	Employees can adapt well to organizational changes.	Change Impact Analysis	2	4	3,56	0,73	Managed
	Organization makes a concrete plan for any organizational changes.	Change Management Planning	2	4	3,33	0,71	Defined
	Organization provides training for employees to adapt with the organizational changes.	Change Management Execution	2	3	2,56	0,53	Reactive
Competence and Training Management	Organization understands the needs and importance of training for employees.	Training Needs Analysis	2	4	3,22	0,67	Defined
	Training needs (training plans and content) are updated according to the current needs of employees.	Curriculum Development	2	3	2,67	0,50	Defined

Disciplines	Questions	Key Areas of DCMM	Min	Max	Mean	Standard Deviation	Maturity Level
	Organization supports employees' personal growth by facilitating employees to join seminars and training.	Training Education	3	4	3,56	0,53	Defined
Program and Project Management	Organization uses established programs or software in project management and shared across the entire organization.	Framework, Organization, Execution	3	5	3,44	0,73	Defined

Effective Knowledge Worker at IT Operational ABC College							
Meta Management	Strategy Management	Value Management	Business Process Management	Transformational IT Management	Organizational Change Management	Competence and Training Management	Program and Project Management
Culture	Vision and goals	Value identification	Governance	Information and Analytics	Change Impact Analysis	Training Needs Analysis	Framework
Leadership	Business Model	Value realization planning	Methods and Tools	Business Applications	Change Management Planning	Curriculum Development	Optimization
Values	Execution	Value realization	Process Optimization	Communication Technology	Change Management Execution	Training Execution	Execution

Scale:

Initial	Reactive	Defined	Managed	Excellence

Figure 1: Heat Map of the Digital Capability Maturity Assessment of Higher Education Institution's IT Operational Effective Knowledge Worker

The assessment result is displayed in Figure 1. It reveals the institution has a defined maturity level (Level 3) of the Effective Knowledge Worker Digital Capability. Defined maturity level, according to Table I, means that digital capability is recognized. An established internal organizational schema mark it. It has developed a recorded and intra-organizational standard process that allows for project-related customization. It indicates that although the digital capability is recognized and supported, it is not yet understood by all stakeholders, including employees and the organization. Knowledge management can be seen in day-to-day business processes, but it is not yet wholly regulated. The company's next step should be to increase its maturity level into one higher level. However, increasing the maturity level of Effective Knowledge Worker Digital Capability is made easier since the digital transformation approach has been established and the benefits and risks of digital transformation have been assessed. Digital transformation initiatives have also been identified and reported.

There are methods for increasing maturity, one of which is to enhance digital capacity by optimizing the use of technology. Uhl et.al. (2014, p183) stated that the Effective Knowledge Maturity Model assumes that the maturity level increased if the following aspects are realized: (1) Knowledge is accessible and shared from anywhere at any time; (2) Leaders are visionary and pragmatic thinkers; (3) Continuous improvement of

knowledge workers' skills and competences; (4) Integration of knowledge-related activities across the entire ecosystem (Uhl & Gollenia, 2014).

The actual maturity level of Effective Knowledge Worker Digital Capability has an average value of 3.0, according to the obtained results. The following can be concluded from this value: digital capability within the institution is defined; digital transformation strategy is defined, and the values and digital transformation are realized; procedures for implementing new technologies have been developed.

There is a clear imperative for advancing Transformational IT Management, with a particular focus on information and analytics. Additionally, enhancing Business Process Management is crucial, aiming to achieve greater efficiency through innovative practices and improved monitoring and optimization. While considerable research has shed light on knowledge management practices in higher education institutions, there remains a vital need to expand this exploration to various industries and organizational contexts. Delving into how contextual factors impact the efficacy of knowledge management strategies will provide valuable insights and facilitate the tailoring of approaches to specific organizational settings. By addressing these areas, organizations can harness the full potential of IT, analytics, and knowledge management to drive sustainable growth and competitive advantage.

5. Conclusion

In conclusion, this study has delved into the Digital Capability Maturity Level of Effective Knowledge Workers in IT Operations at a Higher Education Institution. Through our research, we have identified the current level of maturity as Defined (Level 3), wherein knowledge management is evident in day-to-day operations but lacks complete control. Our findings underscore the importance of digital transformation, as reflected in the institution's recognition of its significance, the presence of a defined strategy, and established procedures for implementing new technologies.

One of the key insights we have uncovered is the need for improvement in Transformational IT Management, with a specific focus on enhancing information and analytics capabilities. This highlights an area of opportunity for the institution to strengthen its digital readiness and drive higher levels of efficiency and innovation.

To elevate the maturity level from Defined to Managed, we propose the implementation of a web-based KM Portal. Such a solution can empower knowledge workers with better access to information, improved collaboration, and streamlined knowledge-sharing processes. By leveraging this portal effectively, the institution can advance its digital capabilities, enhance knowledge management practices, and foster a culture of continuous improvement.

The significance of this research lies in providing valuable insights into the digital transformation journey of higher education institutions. It emphasizes the importance of cultivating a proactive approach to digital capability development and knowledge management in the dynamic landscape of today's IT operations.

While our study has made significant strides in this area, we acknowledge certain limitations, such as a focus on a specific institution and its context. Future research should expand the scope to include different industries and organizational settings to gain a more comprehensive understanding of digital capability maturity and knowledge management practices.

In summary, this research contributes to the broader discourse on digital transformation and knowledge management, offering implications for practitioners and scholars alike. It underscores the importance of embracing digital change, and we hope that our findings will serve as a catalyst for further exploration and advancement in this vital field of study. As institutions continue to navigate the digital age, informed decision-making and proactive adaptation will be crucial to staying at the forefront of innovation and remaining competitive in an ever-evolving landscape.

References

Alavi, M. & Leidner, D. E., 2001. Knowledge Management and Knowledge Management Systems: Conseptual Foundations and Research Issues. *MIS Quaterly,* 25(1), pp. 107-136. https://doi.org/10.2307/3250961

Amjad, I. et al., 2019. From knowledge management to organizational performance: Modelling the mediating role of innovation and intellectual capital in higher education. *Journal of Enterprise Information Management,* 32(1), pp. 36-59. https://doi.org/10.1108/JEIM-04-2018-0083

Bican , P. & Brem, A., 2020. Digital Business Model, Digital Transformation, Digital Entrepreneurship: Is There a Sustainable Digital?. *Sustainability,* 12(13), p. 5239. https://doi.org/10.3390/su12135239

Blount, Y., Abedin, B., Vatanasakdakul, S. & Erfani, S., 2016. Integrating Enterprise Resource Planning (SAP) in the Accounting Curriculum: A Systematic Literature Review and Case Study. *Accounting Education ,* 25(2), pp. 185-202. https://doi.org/10.1080/09639284.2016.1138136

Dalkir, K., 2017. *Knowledge Management in Theory and Practice.* 3rd ed. London: The MIT Press.

Darroch, J., 2005. Knowledge Management, Innovation and Firm Performance. *Journal of Knowledge Management,* 9(3), pp. 101-115. https://doi.org/10.1108/13673270510602809

Dasgupta, M., Sahay, A. & Gupta, R. K., 2013. The Role of Knowledge Management in Innovation. *Journal of Innovation & Knowledge Management ,* 8(4), pp. 317-330. https://doi.org/10.1142/S0219649209002427

Domenech, J., Escamilla, R. & Roif-Tierno, N., 2016. Explaining Knowledge-Intensive activities from a Regional Perspective. *Journal of Business Research,* 69(4), pp. 1301-1306. https://doi.org/10.1016/j.jbusres.2015.10.096

Eden, R., Jones, A. B., Casey, V. & Draheim, M., 2019. Digital Transformation Requires Workforce Transformation. *MIS Quaterly Executive,* 18(1), p. 4.

Fisher, D. M. & Director, M., 2004. The Business Process Maturity Model. A Practical Approach for Identifying Opportunities for Optimization. *BPTrends Sept,* pp. 1-7.

Geng, Q., Townley, C., Huang, K. & Zhang, J., 2005. Comparative Knowledge Management: A Pilot Study of Chinese and American Universities. *Journal of the American Society for Information Science and Technology,* 56(10), pp. 1031-1044. https://doi.org/10.1002/asi.20194

Grazyna, G., 2012. The Japanese Model of Knowledge Management. *Foundations of Management, Sciendo,* 4(1), pp. 7-16. https://doi.org/10.2478/fman-2013-0001

Harmon, P., 2004. Evaluating an Organization's Business Process Maturity. *Buc, Process Trends,* 2(3), pp. 1-11.

Heisig, P. et al., 2016. Knowledge Management and Busines Perfomrance: Global Experts' Views on Future Research Needs. *Journal of Knowledge Management,* 20(6), pp. 1169-1198. https://doi.org/10.1108/JKM-12-2015-0521

Hujala, T. & Laihonen, H., 2021. Effects of Knowledge Management on the Management of Health and Social Care: A Systematic Literature Review. *Journal of Knowledge Management,* 25(11), pp. 203-221. https://doi.org/10.1108/JKM-11-2020-0813

Igielski, M., 2017. Competency Management of Knowledge Workers in Modern Enterprises. Zeszyty *Naukowe Politechniki Częstochowskiej Zarządzanie*, 26, pp. 7-16. https://doi.org/10.17512/znpcz.2017.2.01

Iliescu, A. N., 2021. The Emergence of Knowmads from the Knowledge Workers. *Management Dynamics in the Knowledge Economy,* 9(1), pp. 94-106. [Online] Available at: https://www.managementdynamics.ro/index.php/journal/article/view/405

Kane, G. C., Phillips, A. N., Copulsky, J. R. & Andrus, G. R., 2019. The Technology Fallacy: How People are the Real Key to Digital Transformation. *MIT Press.*

Kozina, M. & Valentina, K., 2018. *Measuring digital capabilities of the higher education institution using Digital Capability Maturity Model.* s.l., 37TH International Conference on Organizational Science Development. https://doi.org/10.18690/978-961-286-146-9.38

Magnier-Watanabe, R. & Benton, C., 2017. Management Innovation and Firm Performance: The Mediating Effects of Tacit and Explicit Knowledge. *Knowledge Management Research and Practice,* 15(3), pp. 325-335. https://doi.org/10.1057/s41275-017-0058-6

Maholtra, N. K. & Dash, S., 2016. *Marketing Research and Applied Orientation.* India : Pearson India Education Services Pvt Ltd.

Martin , A., 2015. *Englishnization Advances at Rakuten.* [Online] Available at: https://www.wsj.com/articles/BL-JRTB-19917

Maxwell et al., 2021. COVID-19 Pandemic and Antecedents for Digital Transformation in the Workplace: A Conceptual Framework. *Journal of Medical Sciences,* 9(F), pp. 41-46. https://doi.org/10.3889/oamjms.2021.4952

Milton, N., n.d. *Knoco Stories: Yokoten - Japanese Approach to Best Practice Sharing.* [Online] Available at: http://www.nickmilton.com/2020/08/yokoten-japanese-approach-to-best.html#ixzz76duJg91f

Pavel, S. & Andre, M., 2006. Knowledge Transfer within Japanese Multinationals: Building a Theory. *Journal of Knowledge Management,* 10(1), pp. 55-68. https://doi.org/10.1108/13673270610650102

Rakuten, 2015. *Next 20 Years Annual Report,* s.l.: s.n.

Sahibzada, E. F., Latif, K. F., Xu, Y. & Khalid, R., 2020. Catalyzing Knowledge Management Processes Towards Knowledge Worker Satisfaction: Fuzzy-Set Qualitative Comparative Analysis. *Journal of Knowledge Management,* 24(10), pp. 2373-2400. https://doi.org/10.1108/JKM-02-2020-0093

Sebastien, R., 2020. *The Year of the Knowledge Worker.* [Online] Available at: https://www.forbes.com/sites/forbestechcouncil/2020/12/10/the-year-of-the-knowledge-worker/?sh=5c62bf7f7fbb

Shujahat, M. et al., 2019. Translating the impact of knowledge management processes into knowledge-based innovation: The neglected and mediating role of knowledge-worker productivity. *Journal of Business Research,* Volume 94, pp. 442-450. https://doi.org/10.1016/j.jbusres.2017.11.001

Uhl, A. & Gollenia, A., 2014. *Digital Enterprise Transformation: A Business-Driven Approach to Leveraging Innovative IT.* USA: Gower Publish Ltd.

Valaei, N., Nikhashemi, S. R. & Javan, N., 2017. Organizational factors and process capabilities in a KM strategy: toward a unified theory. *Journal of Management Development,* 36(4), pp. 560-580.

Veer Ramjeawon, P. & Rowley, J., 2017. Knowledge Management in Higher Education Institutions in Mauritius. *The Learning Organization,* 24(5). https://doi.org/10.1108/JMD-04-2016-0057

Veer Ramjeawon, P. & Rowley, J., 2017. Knowledge Management in Higher Education Institutions: Enablers and Barriers in Mauritius. *The Learning organization,* 24(5), pp. 366-377. https://doi.org/10.1108/TLO-03-2017-0030

Vial, G., 2019. Understanding Digital Transformation: A Review and A Research Agenda. *Journal of Strategic Information Systems,* Volume 28, pp. 118-144. [Online] Available at: https://www.sciencedirect.com/science/article/pii/S0963868717302196

Watts, S., n.d. *CMMI: An Introduction to Capability Maturity Model Integration.* [Online] Available at: https://www.bmc.com/blogs/cmmi-capability-maturity-model-integration/

Westerman, G., 2016. Why Digital Transformation Needs a Heart. *MIT Sloan Management Review,* 58(1), pp. 19-21.

Yee, Y. M., Tan, C. L. & Thurasamy, R., 2019. Back to Basics: Building a Knowledge Management System. *Strategic Direction,* 35(2), pp. 1-3. https://doi.org/10.1108/SD-07-2018-0163

Zakariya, R. & Bashir, S., 2021. Can Knowledge Hiding Promote Creativity Among IT Professionals. *VINE Journal of Information and Knowledge Management Systems,* 51(5), pp. 693-712. https://doi.org/10.1108/VJIKMS-02-2020-0031

Appendix A

Table 3: Maturity assessment of Effective Knowledge Worker Digital Capability - 8 management disciplines

Key Areas of DCMM	Initial (1)	Reactive (2)	Defined (3)	Managed (4)	Excellence (5)
Meta Management					
Culture	KM is not recognized.	KM is partially recognized.	KM is mostly recognized.	KM is recognized but there is no understanding by all stakeholders.	KM is fully recognized.
Leadership	Initiatives for the development of KM capabilities are not being undertaken.	Leadership partially supports initiatives to develop KM capabilities.	Leadership mostly supports initiatives to transform employees to effective K worker.	Leadership supports initiatives to transform employees to effective K worker.	Leadership fully supports initiatives to transform employees to effective K worker.
Values	Effective K worker capability is not valued.	Effective K worker capability is partially valued.	Effective K worker capability is mostly valued.	Effective K worker capability is evaluated since the values of such transformation are identified.	The effective capability of K workers is a strategic goal of the institution.
Strategy Management					
Vision & Goals	Effective K worker is not included in the vision of the institution.	Effective K worker is involved in the vision of the institution and partially aligned with the goals of the institution.	Effective K worker is included in the vision of the institution and mostly aligned with the goals of the institution.	Effective K worker is included in the vision of the institution and aligned with the goals of the institution.	Effective K worker is included in the vision of the institution and fully aligned with the goals of the institution.
Business Models	Business processes are not aligned with effective K worker goals.	Business processes are partially aligned with effective K worker goals.	Business processes are mostly aligned with effective K worker goals.	Business processes are aligned with effective K worker goals.	Business processes are fully aligned with effective K worker goals.
Execution	KM initiatives are not implemented.	KM initiatives are partially implemented.	KM initiatives are mostly carried out.	KM initiatives are implemented	KM initiatives are implemented.

Key Areas of DCMM	Initial (1)	Reactive (2)	Defined (3)	Managed (4)	Excellence (5)
				but not fully executed.	The strategy is fully and effectively executed.
Value Management					
Value Identification	The business value of effective K worker for the institution are not identified.	The business value of effective K worker for the institution are partially identified.	The business value of effective K worker for the institution are mostly identified.	The business value of effective K worker for the institution are identified.	The business value of effective K worker for the institution are fully identified.
Value Realization Planning (VRP)	Effective K worker VRP is not implemented.	Effective K worker VRP is partially implemented.	Effective K worker VRP is mostly implemented. Mechanisms for measuring innovation values are poorly defined.	Effective K worker VRP is implemented. KPIs have been defined for these values.	The Effective K worker VRP is fully implemented. A framework for measuring qualitative and quantitative benefits derived from KM initiatives has been established.
Value Realization	The business value of effective K Worker is not realized.	The business value of effective K Worker is partially realized. The measurement is reactive.	The business value of effective K Worker is mostly realized. Value measurement is mostly performed.	The business value of effective K Worker is realized. Value measurement is performed.	The business value of effective K Worker is fully realized. Based on the measurement of values, decisions for improvement can be initiated.
Business Process Management					
Governance	The processes do not improve through KM initiatives.	The processes are partially improved through KM initiatives.	The processes are mostly improved through KM initiatives.	The processes are improved through KM initiatives.	Effective governance mechanisms are in placed to ensure that established tools and processes are used to ensure that knowledge is available throughout the ecosystem.
Methods & Tools	Ignore about tools, techniques, and execution when it comes to managing knowledge.	Tools partially support KM process.	Tools mostly support KM process.	Tools support the KM process but not fully integral.	Integral tools support KM process.

Key Areas of DCMM	Initial (1)	Reactive (2)	Defined (3)	Managed (4)	Excellence (5)
Process Optimization	There is no process optimization.	The efficiency of the business processes is partially monitored for optimization.	The efficiency of the business processes is mostly monitored for optimization.	The efficiency of the business processes is monitored using defined KPIs.	The efficiency of the business processes is fully monitored using defined KPIs. Improvements are initiated for the purpose of process optimization.
Transformational IT Management					
Information Analytics	Little thought to installing technologies for their K Worker.	Information analytic is partially focused on the amount and quality of data collected in its systems.	Sharing knowledge is not integral within institution.	Sharing knowledge is essential within institution.	Sharing and improving knowledge is integral within institution.
Business Applications	Business applications are not related.	Business applications are partially related.	Business applications are mostly related	Business applications are related.	Invest in value-added technologies to give their employees a competitive advantage.
Communication Technology	KM systems, enterprise data warehouses, collaboration platforms are in short supply.	Communication on technologies provide partial business integration.	Communication on technologies mostly provide business integration.	Communication on technologies provide business integration.	Communication on technologies provide high level of business integration.
Organizational Change Management					
Change Impact Analysis	No critical stakeholders have been identified to manage organizational change for K workers.	The changes are partially identified and their impacts on the operation of the institution is partially assessed.	The changes are mostly identified. Approving changes is not fully defined.	The changes are identified. Approving changes is fully defined and based on the change impact analysis.	The changes are identified. Approving changes if fully defined. Change impact analysis includes all financial, business, and technical aspects for the implementation of the necessary changes.
Change Management Planning	There is no auditing of communication requirements, nor are there any change management activities.	Change management is partially planned.	Change management is mostly planned. Mechanisms for monitoring the effectiveness of	Change management is planned, Mechanisms for monitoring the effectiveness of the	Change management planning is carried out with the involvement of all stakeholders through

Key Areas of DCMM	Initial (1)	Reactive (2)	Defined (3)	Managed (4)	Excellence (5)
			the implementation of changes are mostly defined.	implementation of changes are defined.	communication on possible consequences.
Change Management Execution	Change management is not executed.	Change management is partially executed.	Changes are performed with multiple iterations.	Change management is executed. It monitors and analyses the implementation of the change.	Change management is executed. It monitors and analysis the implementation of the change. Improvement plans are being developed regarding the implementation of changes.
Competence and Training Management					
Training Needs Analysis	K workers' training needs demands are not considered.	K workers' training needs demands are partially carried out.	K workers' training needs demands are mostly carried out.	K workers' training needs demands are carried out.	The ecosystem's training needs are regularly assessed and updated by integrating important partners.
Curriculum Development	There is no development of programs required for k workers to be effective.	There is partially development of programs required for k workers to be effective.	There is mostly development of programs required for k workers to be effective.	There is development of programs required for k workers to be effective. Not all stakeholders are involved.	Necessary resources and all materials to support staff and other stakeholders for k workers are understood.
Training Education	Training is sparsely distributed across particular units and departments.	Training is partially performed.	Training is mostly performed.	Trainings are conducted. Effectiveness of their implementation are monitored and evaluated.	The training program and curriculum are conducted and continuous monitoring and improvement are done.
Program and Project Management					
Framework	Absence of set frameworks or standards for k workers	Effective k worker project portfolio is recognized but partially defined.	Effective k worker project portfolio is mostly defined.	Effective k worker project portfolio is defined. External stakeholders are poorly involved.	Effective k worker project portfolio is fully defined.
Organization	Organization and planning of execution of KM projects are not implemented.	Planning of execution of KM projects is partially carried out.	Planning of execution of KM projects is mostly carried out.	Planning of execution of KM projects is carried out. Indicators for the	Planning is carried out through a combination of KM projects and efficient

Key Areas of DCMM	Initial (1)	Reactive (2)	Defined (3)	Managed (4)	Excellence (5)
				implementation of innovation projects are defined.	use of available resources. A framework for measuring qualitative and quantitative benefits related to the implementation of KM projects has been established.
Execution	KM projects are not carried out.	KM projects are partially carried out.	KM projects are mostly carried out.	KM projects are carried out by monitoring their quality, cost, and execution time.	KM projects are fully executed, monitored, and improved.