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# Knowledge management used in technology operations for innovations and value creation

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## Abstract

*Knowledge Management (KM) facilitates organizations with critical business decisions for competitive advantage. However, organizational leaders and technology teams still struggle with understanding how KM strategies and practices can help the company with innovations and business value additions. Therefore, this qualitative descriptive case study was performed in 2021 to examine KM's capability maturity in creating business value and innovation for a large financial institution in Texas, headquartered in Virginia. The population sample consisted of one director, two Technology Operations Center Managers (TOCMs), and 10 power users (non-managers). The problem addressed by this study was understanding and describing the KM capability maturity and its relationship with leadership's perceptions of KM value to determine how different features have impacted value creation and innovation. The two guiding research questions were: 1) How do KM administrators and senior leadership understand and describe KM related to creating business value and innovation in financial technology operations? 2) Why do TOCMs and power users understand and use KM the way they do? The conceptual framework was KM, business value, and innovation. Tools like Capability Maturity Models of Knowledge Management (CMM of KM) helped the researchers and TOC participants assess their current level of KM use and areas for improvement. Data collection was completed through a qualitative questionnaire after eligibility checks against company intranet profiles. Data analysis used NVivo 1.5 coding to identify themes from the TOCM participants' perspectives to compare with archival and historical data. This study's results contributed to the existing body of knowledge about KM from a technology operations perspective, including gaps in alignment and communication.*

**Keywords:** Knowledge management, innovation, value, technology, capability, maturity, leaders.

## Introduction

In industries worldwide, a need exists for an understanding of Knowledge Management (KM), the relationship between business value and innovation, so continuous improvements to productivity, quality, and value can occur to remain competitive (Torabi & El-Den, 2017). However, Technology Operations Center Managers (TOCMs) and power users take longer to respond to critical incidents because of a need to reference daily process documentation without effective KM. In addition, the achievement of business objectives can be impacted by uncaptured knowledge resulting in inefficiencies, customer satisfaction issues, lack of employee engagement, and intellectual property loss. In contrast, organizational leaders can seek to meet business

objectives using knowledge-creation strategies in innovations through the appropriate technology platforms (Chen & Tsai, 2020). Therefore, this descriptive qualitative case study aimed to describe the capability maturity relationships with business value and innovation for KM administrators, senior leadership, TOCMs, and power users in a large financial institution in Virginia and Texas during 2021. Additionally, this study was guided by these two research questions:

*RQ1. How do KM administrators and senior leadership understand and describe KM related to the creation of business value and innovation in financial technology operations?*

*RQ2. Why do TOCMs and power users understand and use KM the way they do?*

This article reviews the conceptual basis, methods and designs, key literature, data analysis, and study results of KM use in technology operations. We employed tools like the Capability Maturity Model of Knowledge Management (CMM of KM) level ranking and assessment (see also in Figure 2 and Figure 3) to better understand the Technology Operations Center (TOC) team's use of KM and help answer the research questions. The research questions helped us uncover four themes through literature reviews and participant feedback found in the

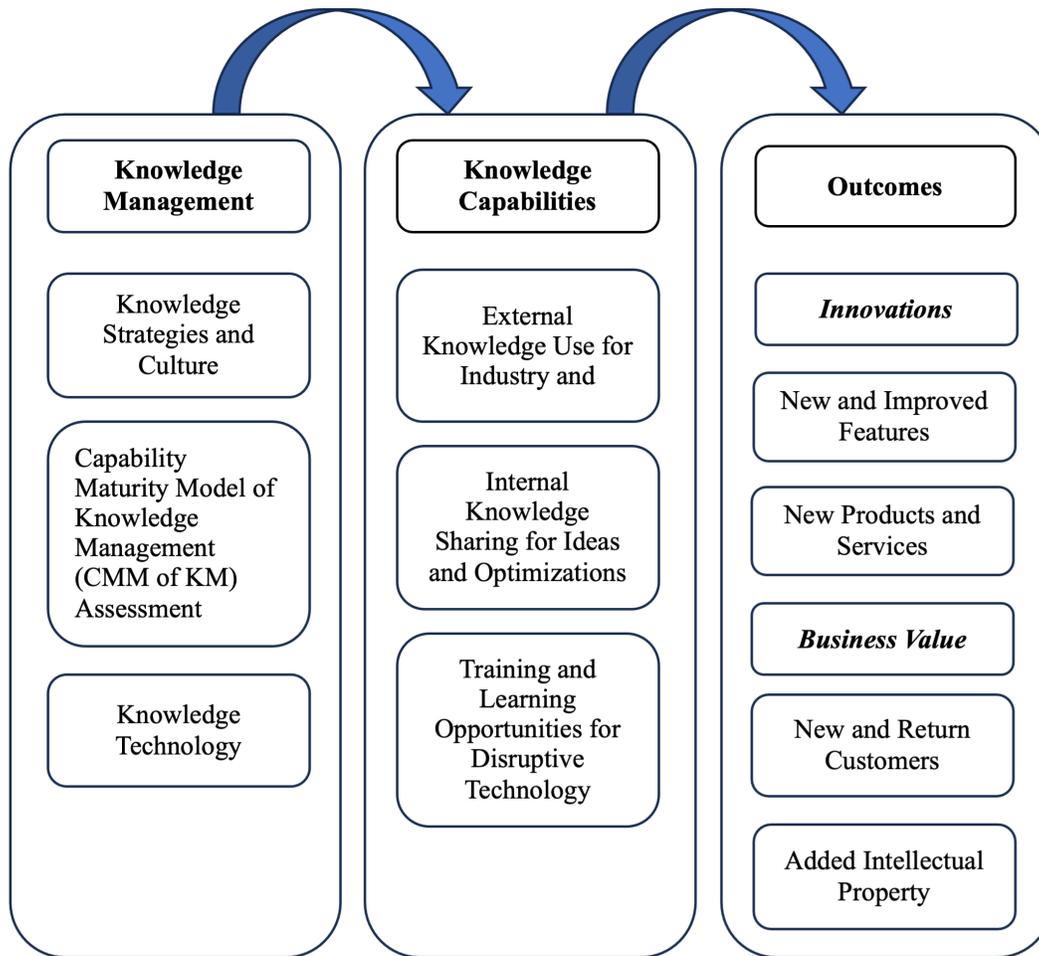
Results section. The four themes discussed in this article are:

1. KM culture must be aligned with the organization's mission, vision, and goals for success.
2. Embracing modern knowledge technology helps teams access and share critical knowledge and make informed decisions.
3. Business value and innovative opportunities occur through knowledge-based collaborative efforts.
4. Organizational learning provides a way to disseminate knowledge to individuals and teams.

## **Conceptual Framework**

The conceptual framework for this study was KM, business value, and innovation. These concepts informed the study of KM by identifying integrative relationships among the KM strategies, concepts, and tools by understanding how senior leadership perceived knowledge. TOCMs and power users also employed knowledge to create business value through innovation because of effective KM. Thus, KM is defined in this paper as a systematic process that combines innovation and individual creative capacity within the TOC and organizations, adding to business value (Jaca et al., 2016). Organizational leadership promoted innovative change by using KM to increase business performance and overall value by offering ease of use in tools, new products, and services, improved technology, etc., gained from shared knowledge (O'Dell & Grayson, 1998). Understanding how KM administrators, including senior leadership, helped encourage and work with their employees to use shared knowledge toward innovations increasing the power of the business to earn money and improve daily processes resulting in more efficient and effective operations (Barton, 1995; Davenport & Prusak, 1998; Nonaka & Takeuchi, 1995). The TOC team helps the financial institution's internal and external customers by using acquired knowledge to support and innovate technology that drives new and existing business value. Value creation occurs when the TOC team innovates new products or features based on customer feedback. For example, the TOC team members created a new ticketing system for their customers to report

major impacts and get critical incident management assistance faster than waiting in a queue with other customers. They could select their line of business, the priority of their impact, and provide details to engage the respective parties. The conceptual framework (described in Figure 1) shows the process flow of KM assets and capabilities that allowed the TOC team to provide improvements to the business.



**Figure 1.** Knowledge Management Conceptual Framework

Feedback and knowledge gained from these interactions using KM strategies helped the TOC team partner with other organizational units to improve customer experiences. Finally, leadership and employees' perceptions of knowledge can change when information accumulation occurs from different resources over time. Therefore, CMM of KM and corresponding assessments can help teams like the TOC better understand their KM capabilities and where to make improvements. These customer-facing improvements, including new feature innovations or updates to existing processes, help build customer trust for repeat business, customer referrals, and new business opportunities (O'Dell & Grayson, 1998).

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## Definition of Terms

Some terms in this study used explicit definitions as theorists, researchers, and experts determined to apply them to KM, organizations, and business strategy. Other terms are specific to this study and may use abbreviations. The purpose of this section is to provide clear and concise descriptions of keywords and phrases used throughout the study.

*Knowledge Management (KM)*. KM is defined as an operational process used in conjunction with technology tools to acquire, store, share, understand, and exploit knowledge to be used by businesses for decision-making and strategic alignment for this study (Byukusenge & Munene, 2017).

*Technology Operations Center Manager (TOCM)*. TOCM is an individual that manages roles, functions, or employees of technology operations within the technology operations space.

*Power Users*. Power users included technical experts, escalations, engineers, developers, support teams, etc. Power users who worked in the TOC or shared technology space are considered Code Red, or always-on, mission-critical, employees either on call or in a 24x7 capacity to keep technical operations running. These non-manager users do not decide what KM strategies or tools exist in the infrastructure but implement, use, and support them.

## Literature Review

Organizational knowledge is multi-faceted, including processes, successes, failures, or any information recognized by the organization (Dasgupta & Gupta, 2009). The business value gained through knowledge-based innovations helps a company outperform its competitors (Dewing, 1953; Muniesa, 2016). KM helps store, use, acquire, share, and transfer knowledge. TOCMs and other technology power users employ knowledge through communication and collaboration to assist with critical incidents and help the organization remain competitive. Perceptions of KM resources can potentially alter the application of KM technologies. Understanding how KM concepts work concerning business valuation and innovations helped TOC senior leaders understand gaps in using the systems, strategies, and training to accelerate incremental improvements (Nickerson & Zenger, 2004). The decision-making process begins and repeats with shared technology using organizational knowledge repositories. Alternately, TOCMs and power users must understand how senior leadership intends them to utilize KM resources to realize value and innovation benefits.

Researchers like Nahapiet and Ghoshal (1998), Dasgupta and Gupta (2009), as well as Muniesa (2016) studied KM and organizational learning to understand the human relationship with knowledge technology better. Knowledge was determined to help employees learn through experience (Argote et al., 2003; Davenport & Prusak, 1998). Leaders used organizational structure and social structure to aid in adopting KM strategies to further assist in technological innovations (Nahapiet & Ghoshal, 1998; O'Hara, 1994; Schumpeter, 1911). KM practices such as making information readily available for individuals to grow their knowledge and apply it during daily activities help support customers. Similarly, the financial institution in this study shared knowledge through annual business strategy sessions and technology-specific training to align with the organization's mission, vision, and objectives based on participants' feedback discussed

later in this article. Additionally, TOC team members share knowledge through process and procedure runbooks, chat channel discussions, and archives.

Organizational leaders have found it challenging to transform firms through KM practices. Depending on whether an organization was previously successful in becoming a knowledge-based organization, staff may find it challenging to align with KM practices and culture (Dilmaghani et al., 2015). KM provides the capabilities to help gather, solicit, distribute, and foster collaborations (Gold et al., 2001). Additionally, capability maturity is the defined level at which a company uses KM Systems (KMSs), like in the TOC case. KM strategies were incorporated into leadership strategies to align with the mission and vision to provide disruptive financial technology for customers. Generally, capability maturity refers to the defined level of maturity a company uses specific software processes, systems, and strategies (Ply et al., 2012). Leaders may choose to employ capability maturity models to measure KM maturity. KM and corporate learning span information systems, organizational behavior theory, economics disciplines, sociology, and strategic management. The rapid advancement of specialized areas and simultaneous inquiry developed to investigate KM and organizational learning attributed to diversity across companies (Argote et al., 2003). Furthermore, the demands to meet industry changes in a demanding market require new techniques, strategies, and technologies to help continuously improve, monitor the growing environment, and contribute to innovations to remain competitive (Akdere, 2009; Dasgupta & Gupta, 2009). Therefore, using capability maturity models to understand and improve software adoption and processes helps organizations thrive.

## **Capability Maturity Models**

New concepts, variable amounts of information, threats, and different models are influencers for organizations of daily life. Adapting to new realities requires intelligence, depending on the ability to process information and transform perceptions into challenge responses. Adapting is achievable by employing a combination of systematic approaches that help the knowledge and information get to the right people at the right time (Jääskeläinen et al., 2022). Theme 1 (described in Results) aligned with the TOC leadership's sentiment of wanting to ensure technology teams had access to knowledge through KMS, learning systems, and strategy sessions. Additionally, an organization's effort to effectively and efficiently operationalize software process maturity takes place using a CMM. Capability maturity is the level of ability an organization has for its software process (Ply et al., 2012). The set levels of efficiency and effectiveness of the processes indicated by the model show the organization's capability to execute operations (Kaner & Karni, 2004). TOC benefited from similar matrixed models to the CMM of KM Assessment to understand how well KMS was integrated into the organization as discussed in the Results section of this article.

Organizations acquire knowledge in many ways through daily operations. Each department and employee contributes knowledge to the business in some way. Most companies grow knowledge exponentially and store it in several tools the organization provides. Understanding business processes, including day-to-day operations, governance, vendor relations, contracts, employee relations, and other types of knowledge gathered and stored. Critical awareness drives business decisions and allows for future innovations. Employing tools like the CMM of KM and corresponding assessment in Figure 2 and Figure 3 helped teams understand which areas of KM

need to be prioritized. The use of CMM of KM helped leaders uncover knowledge for improvements that lead to innovative ideas and process changes. While KMS was considered necessary by senior leadership, other competing business tasks caused KM to be ranked lower on the company's project list (Byukusenge & Munene, 2017). KMS concepts have existed in business to gather information and structure it as needed in a consumable way. Organizations began to require KMS to continuously evolve with the conceptualization of knowledge and use information technology, including big data and analytics, to efficiently present the experience (Masic et al., 2017). Organizations look to innovations for better business performance as a byproduct of effective KMS and employing tools like CMM of KM.

Businesses expand operations regionally, nationally, or globally, equipping themselves with business management practices. KM must scale and adjust to environmental changes, language, and culture (Abhishek & Divyashree, 2019). Technological advancements allow certain business activities to occur within minutes. Adopting a KMS to accompany business applications and manage knowledge is vital to help managers make informed decisions and knowledge workers meet demands. The complex and dynamic business environment requires a separate workforce to handle the subjective experience. For example, incoming phone calls, voicemails, emails, etc., need analysis and potentially add to business decisions. Managing multiple tasks while listening to message notifications and phone ringing can stress workers' minds. KM practices are critical to workers' ability to handle subjective functions and reduce these types of problems in facing complex situations (Abhishek & Divyashree, 2019). In this case study, the financial institution's mission was to provide disruptive technology for banking customers using online and mobile apps with interactive features like chatbot assistants, loan processing, and car buying help that used new and stored knowledge. Therefore, the company's leadership needed to understand their level of KM use across the organization. Data was key for their business to succeed. Therefore, starting with the TOC team members' perspectives of KM technology use compared to senior leadership perspectives, we used CMM of KM as a guide to better describe gaps in communication, areas for improvement, and any barriers to KM. These discoveries are mentioned in this article's 'Discussions' section below.

Organizational leaders used the CMM of KM to improve KM processes by diagnosing the current organizational situation to understand the KMS's capabilities and measure the organizational impact of KM implementation on business success. These capabilities when understood and maximized led to innovations through new products, automation, and other improvements that increased business value. However, the challenges employees faced stemmed from resistance to knowledge sharing and leadership, which are identified and removed using KM maturity models (Marques et al., 2019). Additionally, leadership and TOCMs in the TOC sought a clearer understanding of KM technology capabilities available to TOC power users who had not been used to their full potential or needed additional training. KM strategy is precise and systematic. Using a CMM of KM to determine an organization's status quo provides an awareness of the potential to progress to KM adoption and optimization strategy (Akhavan & Philsoophian, 2018). Figure 2 provides the CMM of KM levels (APQC, 2020; Raza, 2019), while Figure 2 provides a generic KM CMM assessment based on Hart and Amos (2018)'s library templates. Both Figure 2 and Figure 3 were created based on APQC's (2020), Raza's (2019), as well as Hart and Amos (2018)'s models.

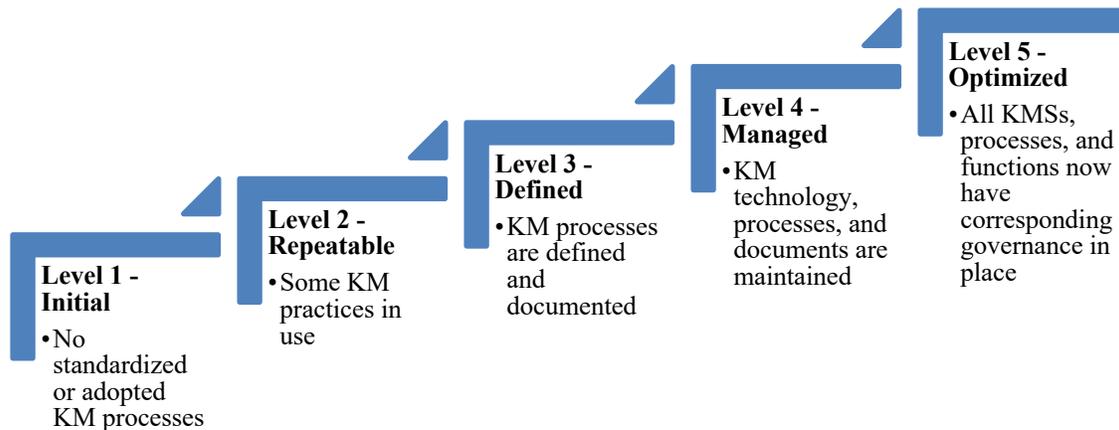


Figure 2. Capability Maturity Model of Knowledge Management (CMM of KM)

Capability Maturity Model of Knowledge Management Assessment						
Stages of KM Maturity		Level 1 – Initial	Level 2 - Repeatable	Level 3 - Defined	Level 4 - Managed	Level 5 - Optimized
Capabilities	Knowledge Management Technology					
	People					
	Processes					

Figure 3. Capability Maturity Model of Knowledge Management Assessment

### Knowledge Management Capabilities versus Perspectives

Organizations of varying sizes have KM administrators, senior leadership, TOCMs, and power users who struggle to understand KM strategies and technologies for innovation and business value creation (Heisig et al., 2016). However, few scholarly and peer-reviewed studies included study participants from large financial institutions for KM administrators, senior managers, and power users in technology operations that implement, support, and maintain KM. Furthermore, most relevant research studies focused on KM issues in Small and Medium Businesses (SMB) from the business perspective (Singh et al., 2019). As a result, senior leaders and knowledge workers in SMBs lacked the focus or struggled with innovation and business value creation.

Senior leadership, TOCMs, and power users strive to effectively support fully functional business operations. Therefore, KM and strategies understanding become vital in building knowledge-based organizational culture values (Arias-Pérez et al., 2019). Furthermore, innovations are also part of technology operations center support as improvements occur during daily activities or knowledge transfers. The individual perceptions of KM implementations may vary and alter the effectiveness of technology use, knowledge sharing, innovation, and value creation (Singh et al., 2019).

The problem addressed by this study was understanding and describing the CMM of KM and its relationship to the perceived value by KM executives in a large financial institution determining how differences may have impacted value creation and innovation in Virginia and Texas headquarters during 2021. The perspectives of TOCMs and power users (non-managers) for capabilities and KM use provided insight into KM technologies' understanding and actual capabilities. Researchers comparing perspectives between roles in the TOC allowed for KM understanding among senior leadership, power users, and TOCMs. TOCMs and power users understood how they influenced knowledge sharing, innovations, and business value, which also increased their understanding of how business interaction breaks down silos that once existed. Establishing research studies in large enterprises on the lack of KM helps future knowledge seekers sustain knowledge creation for innovation and business value creation for technology users by enriching previously used models and strategies (Singh et al., 2019).

## **Methodology**

This study fits a pragmatist epistemology that assumes single and multiple realities exist based on experience through knowledge sharing. It focused on real-world problems occurring in real time instead of philosophical positioning. Therefore, pragmatism in KM research can be used for qualitative, quantitative, or mixed methods depending on study requirements and limitations. The importance of pragmatic research focused on problems like understanding existing KM practices in daily technology operations that also used the findings for forecasting and strategic planning (Held, 2019; Mabunda & Du Plessis, 2022). A descriptive qualitative case study research design worked well to focus on the financial institution and the participants' perceptions of KM value concerning the CMM and use. Case studies capture real-world experiences and build theories for organizations' opportunities to generate new ideas, decision-making, and improvements (Fiss, 2009; Mabunda & Du Plessis, 2022). Hence, we compiled a qualitative questionnaire (See Appendix A) relevant to issues TOC participants faced daily to collect data compared with historical and archival data for analysis (Creswell & Creswell, 2018). The qualitative questionnaire sought human experiences from the TOC leadership and power users (non-managers) to compare their perspectives on KM (Sandelowski, 2004).

## **Study Sample**

The sample for this study came from a large organization within the financial industry that already had KM implemented. The TOC team averaged 99 total team members throughout the year. Purposive sample selection criteria included TOCMs, senior leaders, KM administrators, and power users who met a combination of the following:

- Were assigned to the primary work location of Richmond, Virginia, or Plano, Texas.
- Owned KM within technology operations.
- Had teams who used KM for innovative development.
- Used and supported KMSs and technology tools frequently.

**Table 1.** Participant Demographics

Roles	Job Level	Total No. of Participants	Participant No.
Automation & Applications Support Lead	Director	1	A1
Production Support Manager	Technology Operations Center Manager (TOCM)	2	B1; B2
Production Support	Non-Manager (Power Users)	5	C2; C4; C5; C9; C10
Major Incident Manager	Non-Manager (Power Users)	5	C1; C3; C6; C7; C8

The sample consisted of 13 participants across two geographical locations in Virginia and Texas-based headquarters conducted through qualitative questionnaires. The population sample size follows previous related KM research with 10 to 16 participants (Al Nahyan et al., 2019; Brandi & Elkjaer, 2019; Memon et al., 2020), approximately 13% of the total TOC population. The respondents established in this qualitative descriptive case study were identified using purposive sampling to limit the number of respondents to those who worked out of the two headquarters locations because of their level of organizational IT knowledge (Dey & Mukhopadhyay, 2018). NVivo was used to track participant demographics. The total TOC population between Texas and Virginia headquarters averaged 99 employees. Based on previous studies, we aimed for between 13 to 16 participants or at least 13% minimum. Recruitment messages were sent through TOC's internal Slack channels to target those individuals. Table 1 includes the roles and job levels of the participants. The research, including field tests and qualitative questionnaires, was collected through Google Forms between July and October 2021.

**Instrumentation, Data Collection, and Data Analysis**

Field tests were conducted with three TOC experts who provided feedback on the reliability, credibility, and quality of the qualitative questionnaire. The three experts qualified based on their level and time in technology operations experience, experience creating and administering data collection tools like surveys, questionnaires, quizzes, and leaders in their teams or departments. After they provided their feedback, necessary changes were made to the questionnaire prior to data collection. We chose qualitative questionnaires to gather data from the financial institution participants because the high demands in technology operations did not allow for virtual interviews using Zoom. The participants supported the organization in an *always-on* fashion, which required 24x7 coverage of the operations center. We considered these scheduling challenges when selecting instrumentation and creating data collection strategies. Qualitative data collection strategies included steps to contact the participants and distribute instruments. In this qualitative descriptive case study, permission to conduct the research and data collection through the financial institution was granted. The research data collection took place between July to October, 2021. Participants were gained through technology team-designated Slack channels with a short description of the case study, including the purpose and participant criteria. After identifying qualified participants, the qualitative questionnaire link was shared for completion through Google Forms. Google Forms allowed the qualitative questionnaire creation and compilation online, sent through email, including the form hyperlink, or directly provided the hyperlink to the participant (Raju & Harinarayana, 2016). We then tracking participation, setting data collection dates, and keeping responses for specific time frames. Document analysis was completed for historical KM repositories, and tools search for the organization’s five most critical knowledge-sharing resources.

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The search consisted of primary Slack channels for technology teams participating in this study to understand where most data was stored and searched by questions or posts for knowledge versus the perspectives gained from the qualitative questionnaires. Additionally, archival data helped provide triangulation to the case study. Therefore, we compiled archival data from different organizational perspectives in previous studies to compare with the current research study's data. Once we collected all the information, the data analysis compilation began. Data analysis was completed using NVivo software for coding, identifying themes or patterns, and interpreting data.

## Results

The problem addressed by this study was understanding and describing the CMM of KM and its relationship to the perceived value by KM executives in a large financial institution determining how differences may have impacted value creation and innovation in Virginia and Texas headquarters during 2021. The following two research questions guided this study:

*RQ1. How do KM administrators and senior leadership understand and describe KM related to the creation of business value and innovation in financial technology operations?*

KM administrators did not have a governance-type role in the TOC at this large financial institution. Senior leadership made critical business decisions with TOCMs, site reliability engineers, and subject matter experts to a different extent. The senior leadership in this study provided a clear overview of KM practices that aligned with the organization's mission, vision, and goals. Participant A1 stated:

*"Each of our objectives and key results are based on business initiatives driven through data."*

The leaders emphasized the need for embedded knowledge strategy, technology, and culture within the TOC and its people. Therefore, when the TOC team employed the CMM of KM to gain insight into actual KM use and areas of improvement to add innovations and business value realigning strategies with the organization's goals. Another quote from Participant A1 was:

*"Our organization has a knowledge-sharing culture and believes in sharing the stories of each of our associates, there are ample opportunities created across the org where we empower our associates to share just that. For example, we have a process visualization session that our associates use to share their processes, we have our knowledge sharing platform that enables a log of the tacit knowledge sharing and multiple avenues for our associates to share it."*

A highlighted sentiment from Participants A1 and B2 included having the knowledge accessible by the teams and individuals who need it to help create business value and innovate.

*RQ2. Why do TOCMs and power users understand and use KM the way they do?*

The TOCMs had power users as direct reports. They may not make the final decisions but influence technologies and strategies used in the TOC. TOCMs used KM and sharing resources in some way as power users. However, power users stayed hands-on with the technology tools and used knowledge to support daily operations. Participant C5 stated:

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*“Knowledge-sharing sessions are done regularly by various means, including knowledge transfer sessions, meetings, shift turnovers, and Agile process stand-ups.”*

The TOCMs and power users had many similarities in understanding KM strategies. They agreed that KM, tools, sharing, communication, and collaboration provided could add business value and innovations. TOC team members were encouraged by senior leadership to add business value through innovations from knowledge acquired through CMM of KM, knowledge-sharing sessions, and found in KMS. Participant C8 stated:

*“Enterprise innovation relates to knowledge management in terms of the patent program.”*

The organization has an internal innovations team that oversees the patent program and works with employees to gain patents for their innovations through the United States (U.S.) Patent Office. The patents protect the intellectual property of the company and inventor credit goes to the employees. The TOCMs and power users could help foster an environment conducive to using and getting the knowledge across groups to allow the business to make critical decisions, fix issues during incidents, and create innovations to add more value to the company. This information aligns with the senior leadership feedback. However, the power users and TOCMs find training a vital source of knowledge overall, with no designated or standardized training on KM strategies, tools, and best practices. The upcoming knowledge themes discussion contains similarities, such as TOC participants’ perspectives aligned with senior leadership on knowledge culture, communication, and technology importance for KM adoption in Theme 1 and Theme 2. Theme 2 and Theme 3 include the participants’ agreeance on the need for modern technology to promote KM, sharing, and innovation adoption. However, some participants stated that leadership did not mention innovations or value creation in Theme 3. Theme 4 discusses how the TOC shares knowledge through learning strategies.

### **Theme 1: Knowledge Management Culture Must Be Aligned With The Organization’s Mission, Vision, and Goals For Success**

Participants who completed the qualitative questionnaire stated that the organizational knowledge culture drives overall business, team, and individual performance successes when aligned with the company’s mission, vision, and goals. KM culture included any activities and resources that assisted in knowledge practices. Participants like A1 in a senior leadership role stated:

*“Knowledge is intrinsically connected to get our mission achieved through our vision and goals.”*

B2, as a TOCM, answered about how the:

*“company-wide discussions on the value of data to grow the business [occurred].”*

and B3 stated:

*“Organizational knowledge is very important to the long-term success for any organization.”*

These senior leadership and manager participants agreed on the value of knowledge across the organization. Perspectives of power users like C3 stated:

*“Organizational knowledge represents the culture of an organization.”*

Alternately, C4, C6, and C8 participants said either no awareness of knowledge vision or strategy alignments with the organization's culture to help drive knowledge culture. Thriving knowledge culture, collaboration, and communication in the data analysis did lead back to relationships with senior leadership influence and empowerment to add or use knowledge across the TOC or organization. For example, Participant A1 mentioned:

*“ample opportunities created across the org where we empower our associates to share [tacit knowledge to others].”*

Knowledge-sharing sessions mentioned by participants occur yearly for the enterprise and quarterly and weekly for the departments. Nine participants said senior leadership efforts to share knowledge about organizational objectives, goals, vision, and performance directly affected projects and daily operations. Participants C4, C5, and C7 responded similarly with perspectives about senior leadership not promoting knowledge vision or strategic alignment to the organization and them not being aware of KM efforts.

## **Theme 2: Embracing Modern Knowledge Technology Helps Teams Access And Share Critical Knowledge and Make Informed Decisions**

The TOC teams used different tools to collaborate, communicate, and share knowledge. Modern technology enables organizations to automate and streamline daily processes, collaborate across groups, communicate with customers, and remain competitive through innovations. The senior leadership encouraged using these tools to help aid in getting, according to Participant A1:

*“the right knowledge to the right people and the right time.”*

Senior leadership continues to:

*“update our IT infrastructure to empower our associates.”*

and Participant A1 confirmed that:

*“regularly, knowledge is the basis of all our decisions.”*

The knowledge gathered from KM and sharing tools, as stated by Participant C7, provides:

*“the technology to facilitate the vision and mission which eventually leads to business value.”*

The technology helps bring teams together by allowing for open communication and collaboration. TOC teams used tools like Slack for collaboration, Jira, and Confluence to facilitate knowledge exchange, project planning, and storage for future use. Knowledge came from *“incident records, dashboards, and queries.”* Slack usage helped teams gain historical documentation, archived conversations, and communicate with one another to gain tacit knowledge. Participant C4 stated:

*“We have several intranet sites that allow for end-users to search through our knowledge base.”*

Senior leadership encouraged collaboration using the knowledge resources to communicate through tooling during process improvement activities and business value support and creation.

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### **Theme 3: Business Value and Innovative Opportunities Occur Through Knowledge-Based Collaborative Efforts**

Business value components include resources, people, knowledge, technology, and not just monetary assets that add to the overall business value. Innovations can be new ideas or modifications to existing ideas. Business value can be part of daily processes and procedures or geared toward a company's vision through innovations. While these two topic categories exist separately, relationships bring value to the business and drive competitive advantage. Participant C10 stated that teams used:

*“Jira stories and overarching goals to understand the value and innovation achieved on the team.”*

Participant C9 said:

*“When everyone knows where and how to use KM tools, it streamlines the process for delivering value and a consistent and sustainable way.”*

Also, Participant A1 stated:

*“For example, one of the tools used was Jira, which clearly states the value and innovation built across the organization.”*

Jira consists of various agile, project, and collaboration tools to help the TOC with its technology development and innovative efforts. Participant A1 also responded:

*“Knowledge management is key in all of our innovations.”*

Participant C1 agreed:

*“enterprise innovation efforts are encouraged.”*

Some participants, like Participant C8, said the:

*“patent program is the organization's primary tool for tracking and managing ideas and innovation.”*

These innovations are incentivized along with other knowledge-sharing sessions across the organization when ideas get recognition. Participants mentioned cash bonuses, gift cards, performance recognition like social awareness, and promotions. Most participants reported being aware of agile-related tools and processes like Jira and Kanban boards to document projects that added business value and process improvements. However, four participants noted not being aware of senior leadership having tools to assist or track business value creation. One TOCM and three power users responded similarly:

*“I do not think that they use these tools to recognize value creation.”*

### **Theme 4: Organizational Learning Provides A Way To Disseminate Knowledge To Individuals and Teams**

The company provides a learning environment on the organizational level for knowledge sharing to occur. Information spreads through an organization in many ways. Data turns into knowledge based on acceptance for use with systems, tools, and human experiences for value added in its

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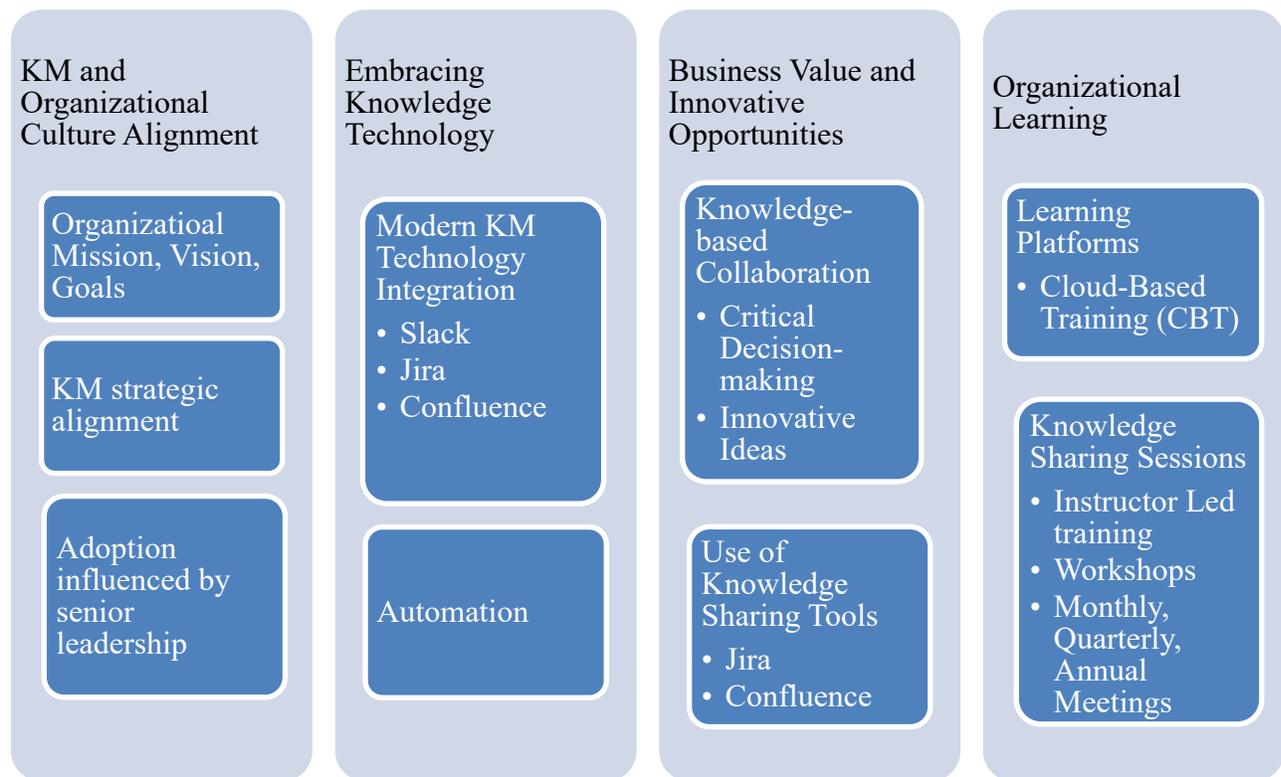
understanding to be accurate and meaningful. Organizations train individuals and teams about knowledge pertinent to the organization. When people learn, they use the knowledge gained to add value, support, maintain, and innovate for competitive advantage. Organization-wide or department-wide learning provides additional capabilities for teams to support customers collectively. However, training that adds to knowledge capabilities like technical certifications and coding can be done alone or with others. Some participants, like senior leadership Participant A1, said:

*“We use our learning platform to perform these training programs, and there begin with our onboarding training, some are selective, and some are compliance related.”*

Participants B1 and B2, TOCMs, C5, and C10, power users, reported being unaware of KM or sharing training. The remaining participants had heard of or used formal and informal learning tools. Awareness appears to be primarily compliance-based like Cloud-Based Training (CBT) taken quarterly or upon hire. Training lessons with workshops and third-party partner learning platforms resided in a collective, internal tech college learning site, as mentioned by participants. While the participants reported an abundance of training options, participants seemed unclear about standardization for daily knowledge-sharing across teams for efficiency.

## **Discussions**

This discussion included a summary of thematic findings. NVivo 1.5 release software for Mac allowed the interpretation of themes found from qualitative questionnaire responses. Four themes emerged after analyzing the content regarding KM perspectives from participants in the large financial institution’s TOC department. The adoption of a KM culture in the TOC helped contribute to the business value by adding innovations through disruptive technology using acquired knowledge. The knowledge-related themes are outlined in Figure 4, created and participant feedback, and discussed further in the following analysis. Organizational culture focuses on basic assumptions, artifacts, and values. In the workplace, individuals and teams take their human assumptions and beliefs to interpret events, information, relationships, and activities to make sense of these interactions. For example, senior leadership provides specific details on the organization’s mission, vision, and goals so departments may align strategies for overall success (Alavi et al., 2005). The qualitative descriptive case study participants provided feedback about the TOC and organizational culture. One theme became clear upon reading, reviewing, coding, and interpreting the findings. A knowledge culture did exist in the organization as a whole and within the TOC. Responses ranged from organizational knowledge repositories and sharing sessions like annual meetings with the CEO and senior leadership, to the intranet portal, including an alphabetized list of apps, corporate and departmental news, and departmental items like runbooks and Standard Operating Procedures (SOPs). A knowledge-based view historically allowed companies to foster a culture of sharing like the TOC participants (Arias-Pérez et al., 2019).



**Figure 4.** Knowledge-Related Themes

Three of the eight non-manager power user participants stated they did not know of senior leadership efforts in promoting KM vision and strategy, which would be part of the knowledge culture. The one director participant emphasized the knowledge and vision strategies had followed:

*“Objectives and Key Results (OKRs) based off business initiatives driven through data.”*

Knowledge drives culture, according to the senior leader. KM also assists in distributing and fostering collaborations between teams to achieve alignment (Gold et al., 2001). The two TOCMs had similar responses mentioning the OKRs, with one TOCM adding the:

*“awards and incentives for people that develop or contribute to the organization’s visions, mission, and goals.”*

Governance controls like KM processes and procedures, including admin roles and document maintenance, get omitted or seen as not critical to the business (Byukusenge & Munene, 2017). Other businesses use controls as needed for their company. Therefore, KM administrators did not exist specifically because no governance for KM existed in the TOC. Instead, KM roles are combined within each team’s leadership, subject matter experts, and senior leadership.

Knowledge-Based Theory (KBT) aligns the organization with the KMSs, tools, resources, and strategies to build a culture that fosters continual knowledge exchange and abilities to grow value through learning, innovations, and critical decision-making. Leadership and power users had varying perspectives on the need for KM and how communication, collaboration, and training factor into the rate of change in the organization (Jeannerat & Kebir, 2016). The analysis identified

cultural norms for the TOC around continuously sharing knowledge but lacked precise knowledge vision. Participant C6, two TOCMs, and two other power users did not know KM training existed. However, other team members, including the senior leader, found e-learning, CBT, and knowledge training sessions among the usual ways senior leadership raised knowledge awareness for adoption. Knowledge workers throughout the organization drive value based on their ability to learn and transfer knowledge using social facilitation, creating new intellectual capital. Themes followed a similar pattern as this knowledge-based theory and value creation conceptual framework (Nahapiet & Ghoshal, 1998). In addition, businesses use knowledge as a vital, valued resource that managers can support by enabling and supporting knowledge transfer through learning, training, and documentation (Akhavan & Philsoophian, 2018; Jeannerat & Kebir, 2016). Finally, the TOC participants mentioned their current learning platforms and abilities for knowledge dissemination.

### **Modern Technology, Business Value, and Innovation**

Strategies implemented with ideas from both the business and technology teams provide a way to complete tedious processes and decisions with the help of KM tools (Venkitachalam & Ambrosini, 2017). KM technology and resources enable organizations to improve operations and communication when recognized and used as a critical resource for communication, collaboration, and knowledge sharing (Sayyadi, 2020). Additionally, maintained, and innovative knowledge can keep employees transformative and creative (Rasmussen & Neilsen, 2011). The technology operations participants had varied responses on knowledge technology, but all agreed that resources existed to help foster knowledge sharing, business value, and innovation. The patent program existed to drive innovation throughout the TOC. Although using CMM of KM and reviewing KMS through this study with participants' feedback, innovations tracked did not provide participants a way to understand the monetary value of their contribution over time. Alternately, technology innovations that solved a problem or capability issue in the TOC, like a customer intake automation form for business users, could be tracked as an improvement using the CMM of KM in Figure 2 and Figure 3.

Teams use technology to exploit knowledge for business decision-making, business support, and strategic alignment (Byukusenge & Munene, 2017). When asked what tools or resources helped the TOC transfer knowledge, participants mentioned Slack, the intranet portal, Confluence, Jira, and the Internet. Slack chat channels allowed users to search for archived content, including images and pinned documentation. TOC users could also seek tacit knowledge from others as a widely used resource. The intranet portal page contained links to many internal and external apps relevant to employees and vendor partners necessary to conduct Human Resources (HR) operations, training, support customers, etc. The TOC participants mentioned collaborative learning sessions that helped transfer knowledge throughout the organization and the department, which played a vital role in the business's overall success. For example, Participant A1 stated:

*“Through culture and continuous improvement, the knowledge-driven learning is dispersed across our people, processes, technology and what content is created to enable our people, process, and technology.”*

Participant B1 stated:

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*“Internal training makes the team members interchangeable so that excellent customer service is provided, and the transition is invisible.”*

A deviation from the other participants included participant A1’s response as a senior leader that all aspects of technology were used actively and provided efficient KM in the TOC and organization. Four of the participants stated no KM tools existed to their knowledge. The remaining participants noted that software, like Confluence, G-Suites, runbooks, and the intranet, actively helped teams with daily knowledge searches. Senior leadership uses the compiled knowledge to decide on products, services, and resources. Employees also added to innovations by noting inefficiencies, making suggestions, and creating new products based on historical and current shared knowledge. The TOC participants mentioned multiple technical tools to support the business through knowledge sharing and fact-finding (Rasmussen & Neilsen, 2011). An understanding of innovations is necessary to create value (Torabi & El-Den, 2017). Four participants, one TOCM, and three power users mentioned not being aware of any innovation or business value creation directly tied to KM efforts. The remaining participants’ perspectives aligned with Participant A1’s senior leadership perspective that knowledge assets:

*“are leveraged to help us differentiate with our competition in our industry.”*

Participant C1 stated:

*“Newer applications with new requirements are seamlessly implemented into existing documentation resources.”*

in response to technology teams using KM integration for continuous improvements to help the business. The participants understood that some value additions came from technological advancements helping effectively service the customer (Eriksson et al., 2007). Value creation and innovation opportunities in the TOC were understood and known to some participants more than others. Therefore, there was less value and emphasis placed on innovations. The individuals who participated in innovations and value-creation programs understood the processes and incentives. The perspectives of individuals seemed influenced by their understanding of an ability to add value to the organization, manager influence, and incentives. The results coincide with the conceptual basis that while knowledge-based theory can determine what drives the value perception of KM, the manager or team’s collective perception may determine the resource and tools value of end users’ reactions (Nickerson & Zenger, 2004).

## **Barriers**

Organizational knowledge assets being available, along with knowledgeable team members sharing those resources, make up a rich knowledge culture (Dilmaghani et al., 2015). According to the perspectives of most participants, knowledge culture was embedded in the TOC in different ways, including senior leadership influence, incentives, training platforms, knowledge-sharing tools, etc. However, a specific KMS or governance did not exist. Consuming massive amounts of big data presents an issue for any organization (Masic et al., 2017). Additionally, KM administrators did not exist subsequently because of the lack of governance. The most consistent perspective on having a solid alignment in the TOC for KM vision and mission to create business value and innovations came from Participant A1, the senior leadership. Even the TOCMs, as

manager influencers over their teams, lacked awareness of critical expert roles and knowledge inventory accessible to individuals and groups when needed. While governance stood as guidance, having something understood for the larger audience helped alleviate data loss, gaps, and security issues. Table 2 below shows participants’ concerns about perceived barriers in the TOC.

**Table 2.** Perceived Barriers in the TOC

Barriers	Participants	Total No. of Participants	Participant No.
Silos in Support/Teams	Director; TOCMs; Non-Manager (Power Users)	5	A1; B2; C7; C10
Lack of Knowledge Management Culture Adoption	Director; Non-Manager (Power Users)	2	A1; C7;
Lack of Communication and Collaboration including Critical and Tacit Knowledge	TOCM; Non-Manager (Power Users)	4	B1; C3; B2; C5;
Lack of Standardization (Processes and Tools)	Non-Manager (Power Users)	6	C4; C5; C6; C7; C8; C10
Competing Priorities	Non-Manager (Power Users)	2	C8; C10

Silos between teams that supported different Lines of Businesses (LOBs) created duplicate documentation by similar processes that overlap in their separate groups. The lack of KM culture adoption mentioned by a senior leader and a power user historically hindered knowledge sharing in organizations of various sizes (Alavi et al., 2005). Societal cues came from senior leadership on whether KM should be prioritized, including alignment, incentives, sharing, and storing documentation. For example, Participant C1 stated:

*“Senior leadership would determine critical knowledge, and tacit knowledge is encouraged to be documented and shared.”*

While Participant C3 also added:

*“Managers are the experts with critical knowledge and tacit knowledge.”*

Other participants included senior leadership, managers, Site Reliability Engineers (SREs), and subject-matter experts who provided knowledge. Based on the various perspectives, employees relied heavily on leadership directives before adopting organizational knowledge initiatives in the TOC. Therefore, a lack of communication and collaboration between teams might be a secondary byproduct of team members following leadership examples or waiting for advice to share certain information instead of voluntarily coordinating. This interpretation came from collective responses and comparisons of leadership and power user perspectives. Competing priorities and lack of KM standardization added to the barriers participants mentioned in the TOC. According to participants, each team had practices that might not align with others. When teams had differences in documenting similar duties, the previously mentioned silos, lack of communication and collaboration, and duplication occurred, costing time, money, and resources.

### Suggested Improvements

The TOC capability maturity of KM processes fell into Level 3, defined by the CMM of KM in Figure 2. We examined the TOC’s agile processes with TOC leadership and reviewed all participant feedback to understand the capability maturity of KM existing in this financial institution’s technology operations center. Although some knowledge documentation existed, and tacit knowledge sharing occurred based on the participants’ feedback, qualitative KM showed room for improvements in documentation and communication. The participants provided suggested improvements where they believed the TOC could better align KM culture across the organization to increase business value and add to innovations. Table 3 shows the compiled suggested improvements along with associated sub-tasks. The TOC team members across role levels agreed that standardization should take place as a priority. The sub-tasks included implementing tools, processes, procedures, and strategies that helped foster alignment and adoption across the TOC. These standardizations would also assist in gathering tacit knowledge by using an offboarding strategy to capture additional information potentially omitted during other knowledge-sharing sessions. Training makes up an essential component of knowledge sharing within the TOC. A suggested improvement to trade roles or shadow other support teams within the TOC to gain hands-on or gather tacit knowledge for qualitative documentation provided another approach to training. Finally, the TOC leadership understood the CMM of KM assessment example in Figure 3 to complete again after improvements occurred.

**Table 3.** Suggested Improvements

Improvement	Sub-Task	Participant	Participant No.
<b>Standardization</b>			
	Inventory and organization of knowledge assets	Non-Manager (Power Users)	C4; C7
	Alignment of knowledge to strategy	Non-Manager (Power Users)	C6; C8
	Knowledge risk management for agility improvement	Director	A1
	Standardization to gather tacit knowledge from departing employees	Non-Manager (Power Users)	C3
	More intelligent search algorithms; tools	Non-Manager (Power Users)	C5; C9; C10
<b>Training</b>			
	Trade roles/shadowing to gain tacit or hands-on knowledge	Non-Manager (Power Users)	C1

### Limitations, Practical Implications, and Future Research

Participant time limitations to complete qualitative questionnaires existed based on being critical business employees in a 24x7, always-on capacity. However, expanding the study populations to other technology teams might have provided additional perspectives. Another limitation noted by previous research found that Information Systems (IS) employees are limited in learning, advancing, and growing when not working in the Information Technology (IT) industry. As a

result, the IS employees became limited to the organization's industry, technological advancements, and available knowledge. Limitations kept these IS workers from career advancement, and they lacked updated IT industry-related knowledge or ability (Zhi-Qin et al., 2020). Delimitations for power users are non-managers who have no primary influence on what software and systems to use. Although TOCMs can make proposals to acquire technology. Including additional senior managers and reaching director or executive levels in technology-related departments may help with a broader understanding of KM practices. Based on the findings, we found practical implications that some TOC participants did not understand or define KM formally, but they did use knowledge practices in their duties. The TOC participants would not have their KM capabilities or utilized the CMM of KM to understand ways to improve the KM technology, processes, and adoption culture. Additionally, examining the capabilities of KM helped uncover ways to add business value and innovation through acquired knowledge. Based on these implications, continuous improvements to KM can be made by using the model and assessment. A byproduct of improved knowledge practices is adding business value by assisting organizations with decision-making and innovations. Research implications for this study included the need for understanding KM use in the financial institution's TOC versus leadership's understanding of its capabilities. Based on research, many similar studies were conducted in SMBs enterprises that strategize by following larger enterprises' processes and practices. By showing the successful use of CMM of KM, SMBs can use the model and assessment as examples for their different software, systems, or development processes. This study used the qualitative portion of the CMM of KM by seeking the perspectives of TOC participants. Future researchers need to perform qualitative and quantitative research of the target population in a complete assessment, as in earlier images like Figure 3. By conducting mixed methods research or obtaining qualitative perspectives, returning for quantitative results would provide a complete view of the KM landscape. Regardless of the choice in methodology at the time of this study, additional research in KM with technology participants helps close the gap.

## **Conclusion**

The study's significance was to provide organizational senior leadership and information systems and technology management with current research on KM perspectives versus the actual capabilities and use of KMS and resources. We provided findings to TOC leadership regarding different perspectives across the technology teams and feedback from participants on improvements. We provided an example of the CMM used for KM in Figure 3. In contrast, studies focused at large enterprises on the business's use of knowledge instead of how the technology leadership and teams perceived and used KM to help the organization innovate to add value (Brunswick & Chesbrough, 2018; Dell'Anno et al., 2018; Singh et al., 2019). Therefore, this study helped bridge gaps in research by conducting a study within a large enterprise with technology staff as the targeted population. The 13 technology participants who used and supported the company's disruptive technology shared their experiences through qualitative questionnaires. Participant feedback from the senior leaders and the TOCMs stood consistent with the financial institution. The findings and literature aligned with the financial institution's mission and vision of serving customers with disruptive technology. The participants felt they could meet

team objectives, learn, add to business value, and innovate by further aligning with the organization's culture using KM strategies (Akhavan & Philsoophian, 2018).

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## Appendix A - Knowledge Management Perspectives Questionnaire

Questions
What is your current role? (Added by researchers)
What is your level in the organization? (i.e., Power Users (Non-Manager), Manager, Senior Manager, Director/Senior Director, VP, etc.) (Added by researchers)
How is organizational knowledge recognized in the long-term success for the organization? (Pee & Kankanhalli, 2009)
How does senior leadership promote Knowledge Vision and Strategy contributions linked to the organization's vision, mission, and goals? (Added by researchers)
How often do employees communicate an interest in managing knowledge in the organization or technology space? (Pee & Kankanhalli, 2009)
How is critical knowledge identified and documented within your organization, division, or department for knowledge sharing and collaboration? (Young, 2020)
How does senior leadership use knowledge management tools and resources to track and recognize value creation and innovation? (Young, 2020)
What type of incentives are in place to actively encourage knowledge sharing across departmental boundaries, if any? (Young, 2020)
What designated knowledge management roles are defined with the appropriate degree of authority for the organization or within divisions? - CKO (Chief Knowledge Officer), Workers, etc. (Pee & Kankanhalli, 2009)
How are knowledge-sharing sessions conducted, and are they held regularly? (Pee & Kankanhalli, 2009)
How does the IT infrastructure align with Knowledge Management Vision and Mission for creation of business value? (Young, 2020)
Is there a rigorously maintained knowledge inventory that clearly identifies knowledge owners and accessible when needed? If so, who creates and manages knowledge for the organization or department? i.e. knowledge admins, managers, workers, power users
Which roles are considered experts in determining critical knowledge, and how is tacit knowledge captured? (Young, 2020)
What knowledge management training programs, awareness campaigns, or learning tools are you aware of or have used? e.g. introductory/specific workshops for contributors, users, facilitators, champions (Pee & Kankanhalli, 2009)
How do knowledge management, sharing, and tools improve the quality and efficiency of work? (Pee & Kankanhalli, 2009)
What are the processes for collecting and sharing formalized information? - like best practices and lessons learned being documented (Pee & Kankanhalli, 2009)
What parts of the existing knowledge management systems and tools are actively and effectively utilized? (Pee & Kankanhalli, 2009)
What type of infrastructure (website, intranet, internet) and developed capabilities has been established by leadership to help facilitate knowledge management across the organization or in your area? (Young, 2020)
Have knowledge roles been identified and assigned, and are all senior leadership and employees trained in knowledge management, sharing, and collaboration? (Young, 2020)
How are knowledge assets leveraged for competitive advantage? (APQC, 2020)
How is the knowledge management infrastructure (i.e., people, process, and technology) responsive to increased demand and evolving business needs? (APQC, 2020)
How is knowledge management aligned with enterprise innovation efforts? (APQC, 2020)
How is knowledge management integrated with an enterprise excellence framework (i.e., quality, continuous improvement programs)? (APQC, 2020)
What are knowledge-sharing barriers in your organization, and how do you believe they can overcome them? (Young, 2020)
What knowledge area(s) would make a difference to organizational performance if they could better manage it? (Young, 2020)
What do you think is the most successful factor in knowledge management? (Mason & Pauleen, 2003)
Please provide any additional feedback you believe relevant to the topic of knowledge management within your organization not covered in this section. (Optional) (Added by researchers)

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## **Authors Biographies**

**James C. Rice, DM/IST** studies and applies information technology governance processes to efficiently realize tactical and strategic business goals. His studies include businesses in a variety of industries, including financial services, healthcare, and retail. He explores how traditional enterprise and information technology governance frameworks are affected by increasingly diverse organizational models. His goal is to reduce the often-underestimated agency problem in organizations by challenging assumptions created by the traditional application of the philosophy of management control. His current areas of research include data security, governance, and privacy in digital services.



**Michelle Reeves, DM/IST** is an incident management engineer for a global platform provider. She is a Fellow in Residence at the University of Phoenix's Center for Leadership Studies & Organizational Research. Additionally, Michelle is a University of Phoenix alumna where she obtained a Doctor of Management in Organizational Leadership with a specialization in Information Systems and Technology. She has 20 years of information systems and technology practitioner experience across healthcare, finance, and technology industries. Her primary interests include organizational leadership, culture, knowledge management, innovation, business, and technology alignment. Specifically, Michelle is interested in better understanding business and technology process gaps through leaders' versus technology teams' perspectives.

