

Research Knowledge Management using Mobile Technologies: Challenges and Solutions at the National Museum of Kenya

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ABSTRACT

Knowledge is widely acknowledged as a pivotal asset, and various perspectives underscore the significance of effectively marshaling, deploying, and sharing knowledge within an organization for achieving organizational success. The National Museum of Kenya (NMK) was established with the primary goal of enriching knowledge and facilitating sustainable utilization of research information resources by stakeholders. However, the increasing diversification of knowledge sources has rendered content creation and knowledge management processes complex and laborious. Consequently, this complexity has resulted in inefficiencies throughout the knowledge management process, leading to inadequacies and disorganization. Despite the adoption of knowledge management systems, the integration of mobile phone technology in research activities at the museum has been neglected. This study aimed to scrutinize knowledge management practices at the NMK through the use of mobile apps, examine the associated challenges, and propose viable solutions. The study's objectives were to investigate the challenges faced by researchers in generating knowledge and recommend feasible mobile technological solutions to address these challenges. The study was guided by the Knowledge Management Process Model, and employed a qualitative case study approach. The target population comprised researchers, knowledge managers, and ICT staff at the museum. Since this study was purely qualitative, data collection was achieved through interviews, and analyzed using narrative methods. The findings indicated that the NMK has implemented web-based systems supporting knowledge management activities. However, mobile phone technology has not been incorporated into any aspect of the museum's knowledge management support tools. The study highlighted challenges such as; delayed data acquisition, misplacement of specimens, time consuming processes, data inaccuracies, and inefficiencies in knowledge management processes. Further, it was established that relying solely on web-based systems limits the flexibility of researchers in adapting to dynamic field conditions. Thus, this study recommends integrating mobile technologies into the knowledge management process at the National Museum of Kenya as a solution to the highlighted challenges. Mobile apps, known for their effectiveness and reliability, particularly in remote areas, offer a practical solution. This integration empowers researchers with more accessible and versatile tools, fostering improved content creation and knowledge management while ensuring inclusivity and efficiency, even in resource-constrained environments.

Keywords: Content, Knowledge, knowledge management, mobile technologies

INTRODUCTION

Background of the study

Knowledge exists in diverse forms, encompassing mental states, beliefs, guidelines for future actions, and

boundaries for information comprehension (Berge & Muilenburg, 2013). Information becomes knowledge when contextualized, sourced from various outlets like documents and people, and fused with the recipient's experiences and judgments (Laal, 2011). This knowledge not only serves as an asset for individuals or institutions but also can be reused by others (Kulakli & Mahony, 2014). Literature distinguishes between 'explicit knowledge' (easily transferable) and 'tacit knowledge' (beliefs and mental capabilities), emphasizing the importance of knowing what one possesses (Hislop, 2018).

In an organizational context, Knowledge Management (KM) is a systematic process involving the creation, capture, sharing, and leveraging of knowledge essential for an organization's success (Laal, 2011). The core aim of KM is to connect individuals with the pertinent knowledge required for productive actions, ensuring that the right information reaches the right people at the right time (Self, Matuszek, Self, & Schraeder, 2014). Ultimately, KM strives to make knowledge usable for multiple individuals, fostering productive sharing (Kucza, 2001). Museums have long been regarded as repositories of cultural heritage and knowledge. They serve as custodians of art, history, science, and various forms of human expression (Ulka & Miland 2012).

Researchers at museums generate knowledge through a multifaceted process that begins with the gathering of information from diverse sources, including documents, databases, and consultations with experts and colleagues (Kibet, 2011). This generated content is then contextualized and synthesized, often through meticulous analysis and interpretation, allowing researchers to extract meaningful insights and generate new knowledge. In the realm of knowledge management within museums, this newly acquired knowledge is systematically organized, captured, and shared to facilitate collaboration and decision-making (Wabuyele *et al.* 2012). The processes of knowledge management in museums encompass activities such as specimen collection, documentation, digitization, database management, and the establishment of mechanisms for knowledge dissemination, ensuring that the wealth of information amassed by researchers is effectively harnessed and made accessible to both internal and external stakeholders (Berge & Muilenburg, 2013).

Traditionally, museums have relied on physical displays, curated exhibitions, and printed materials to disseminate information to visitors (Smith and Johnson, 2018). However, in the digital age, the integration of mobile applications into museum practices has revolutionized the way museums engage with their audiences and manage research knowledge (Brown & Underson 2020). The utilization of mobile applications in museums has expanded significantly in recent years. Museums have recognized the potential of mobile technology to enhance the visitor experience, enabling them to engage with exhibits in a more interactive and immersive manner. Mobile applications provide an avenue for museums to deliver multimedia content, such as audio guides, videos, augmented reality experiences, and interactive maps, directly to visitors' smartphones and tablets (Kaplan & Arnoff, 2016).

Museums generate vast amounts of research data and documentation related to their collections and exhibitions. These data include historical records, conservation reports, catalog entries, and scholarly publications. Mobile technologies are employed as tools for museum professionals to efficiently organize, access, and update this wealth of knowledge (Al-Emran, Elsherif & Shaalan 2016). They serve as repositories for research materials, allowing curators, historians, and researchers to collaborate and share information seamlessly. With the adoption of mobile technologies, researchers can access digitized collections, contribute to ongoing research projects, and communicate with museum staff through these applications (Gerpott, Thomas & Weichert 2016; Sung, Chang & Liu 2016). This collaborative approach promotes the dissemination of knowledge beyond the museum's physical boundaries, contributing to the broader scholarly community's understanding of cultural artifacts and historical contexts.

The National Museum of Kenya (NMK) is a state corporation established by an Act of Parliament, the National Museums and Heritage Act, 2006 No. 6 of 2006. NMK is a multi-disciplinary institution whose

role is to collect, preserve, study, document and present Kenya's past and present cultural and natural heritage. This is for the purposes of enhancing knowledge, appreciation, respect and sustainable utilization of these resources for the benefit of Kenya and the world, for now and posterity (Kibet, 2011). The main function of NMK in general, is to serve as a center of excellence in the dissemination of research knowledge, information and services that ultimately enhance decision-making in biodiversity conservation, ecosystem management, and preservation of cultural and natural heritage.

The National Museum of Kenya (NMK) has a historical origin dating back to the East African Herbarium, established in 1902, which, along with the Nairobi Botanic Gardens, has evolved into the present Botany Department (Kibet, 2011). The East African Herbarium, now a part of NMK, continues to serve as a crucial reference for plant and fungi collections, aiding species identification and authentic name arbitration. Its functions encompass seven sections, with Taxonomy and Curation being pivotal. This section, alongside mycology, conducts fundamental taxonomic and evolutionary research, contributing to regional floras like the Flora of Tropical East Africa (FTEA) through diverse taxonomic evidence (Kibet & Nyamweru, 2008).

The Taxonomy and Curation section oversees routine curation tasks, manages nearly a million voucher collections, and supports various fields, including species conservation and phytochemistry. The rich botanical collection attracts global researchers, fostering collaborations and national plant explorations in diverse ecosystems since the 1970s. Recent focus on cryptogamic plants and fungi promises a substantial increase in collection numbers (Kibet & Nyamweru, 2008). The sections on Economic Botany and Information and Documentation play pivotal roles in gathering and disseminating plant data. A user-friendly software, the Botanical Research and Herbarium Management System, holds a field label database of around 80,000 plant specimens, aiding in planning botanical explorations, biodiversity conservation studies, and predicting climatic patterns. The Education and Training section coordinates specialized courses in herbarium techniques and student attachments (Wabuyele *et al.*, 2012).

Purpose of the study

The purpose of this study was to examine content generation and knowledge management challenges at the National Museum of Kenya, and how these challenges can be resolved using mobile technologies.

The main question of focus was:

What are the challenges affecting content generation and knowledge management at the National Museum of Kenya and how can these challenges resolved using mobile technologies?

To answer this question, three sub-questions were addressed:

1. What are the challenges facing researchers while collecting data/specimens and compiling knowledge at National Museum of Kenya?
2. What are the viable technological solutions to address these challenges?
3. How do mobile technologies address the shortcomings of the current knowledge management processes at National Museum of Kenya?

Problem statement

In the National Museum of Kenya (NMK), the current practice of manual specimen collection presents significant challenges for researchers. This manual approach requires researchers to spend extensive time in the field collecting specimens, which are then physically transported to the research center for digitization

and subsequent storage in a knowledge database. As a consequence, the entire process of capturing, organizing, storing, and disseminating research knowledge becomes laborious and intricate. This inefficiency within the knowledge management process results in outdated and insufficient sharing and distribution of knowledge. Despite the growing ubiquity of feature-rich mobile phone hardware and powerful software platforms that have transformed mobile phones into multitasking devices, research institutions in Kenya, including NMK, have not fully embraced this technology. Notably, NMK lacks any knowledge-based system that operates on mobile phone technology. Recognizing this gap, the present study aimed to investigate the challenges faced by researchers in generating knowledge and recommend feasible mobile technological solutions to address these challenges. The motivation behind this exploration stems from the pervasive and convenient nature of mobile technology, particularly for users who are geographically dispersed. The study sought to assess the potential benefits and challenges associated with integrating mobile applications into the research knowledge management process at NMK.

Significance of the study

This study holds immense significance for various stakeholders. For the National Museum of Kenya, it offers insights into improving the preservation and accessibility of cultural heritage, enhancing visitor experiences, and fostering digital engagement. Research institutions in Kenya benefit from methodological advancements and applied solutions, contributing to the broader field of museum studies. Policy makers gain a foundation for crafting informed strategies, aligning cultural preservation with national development goals. Knowledge managers acquire digital solutions to streamline content curation and dissemination, while scholars/researchers gain a framework for leveraging mobile technologies to advance cultural research, facilitating a dynamic exchange of ideas and fostering academic progress.

LITERATURE AND THEORETICAL REVIEW

The Concept of Knowledge Management

Knowledge management is a multifaceted concept that encompasses the creation, processing, dissemination, and utilization of knowledge and technological know-how within organizations (Laudon & Laudon, 2010). At its core, a knowledge management system establishes an environment conducive to enhanced knowledge sharing and experience exchange, allowing organizations to harness their collective intellectual assets, both explicit (recorded) and tacit (personal expertise). The primary goal, as articulated by Darroch (2015), is to increase, capture, refine, share, and apply knowledge as a valuable information asset. This asset comprises databases, documents, policies, procedures, and the often-unnoticed tacit knowledge residing within individuals' minds. The overarching objective is to enhance the acquisition, integration, and utilization of knowledge (Jelena, Vesna & Mojca, 2012).

Abdul and Muhammad (2015) emphasize that the process involves capturing, refining, sharing, and applying knowledge. Capturing knowledge encompasses the recording of both audio and visual information, while refining it involves verification, correction, updating, and generalization. Sharing knowledge includes presentation, publication, distribution, and discussion, and applying knowledge comprises planning, decision-making, design, construction, and problem-solving. Wellman (2017) underscores the transformative power of an effective knowledge management system within an organization, enabling the conversion of employee knowledge into corporate knowledge through organizational learning. While individual learning occurs through activities like training and formal education, organizational learning arises from the interactions among individuals. A learning organization actively generates, captures, transfers, and mobilizes knowledge to adapt to a dynamic environment (Mills & Smith, 2011).

In the context of museums, knowledge management plays a pivotal role in preserving and disseminating

cultural heritage. Museums employ diverse strategies to curate, share, and exploit their extensive collections effectively. Smith (2018) highlights the implementation of knowledge management in museums through structured categorization, metadata tagging, and digital archives, ensuring the accessibility and retrieval of artifacts and information. Johnson and Brown (2019) stress the significance of staff training and collaboration in promoting knowledge sharing, fostering a culture of continual learning within the museum environment. Additionally, technology, as exemplified by digital asset management systems and interactive exhibits, facilitates knowledge dissemination to diverse audiences, as emphasized by Green (2020).

Thus, knowledge management is a vital component of organizational success, enabling the acquisition, refinement, sharing, and application of knowledge assets. Museums, as custodians of cultural heritage, leverage knowledge management strategies involving categorization, staff collaboration, and technology to effectively manage and share knowledge, thereby enriching cultural understanding and preserving heritage for future generations.

Challenges in Knowledge management at the Museums

Museums serve as custodians of cultural heritage, housing invaluable collections that require effective knowledge management for preservation and public engagement. One of the primary challenges identified in the literature is the management of diverse collections (Smith, 2017). For instance, natural history museums must handle specimens ranging from fossils to taxidermy, each requiring specific knowledge and care protocols. This diversity complicates the creation and organization of knowledge. Brown's (2019) study revealed that capturing and preserving institutional expertise is challenging. Museum experts, including curators and conservators, possess tacit knowledge that may not be adequately documented.

This expertise is crucial for understanding the historical context and significance of objects in the collection. Jones *et al.* (2020) investigated the digitization efforts in museums and found that this process presents technical and resource-related challenges. While digitization enhances accessibility, it requires substantial investments in technology and skilled personnel. Furthermore, Gupta and Lee (2018) emphasized the importance of accurate metadata and cataloging for efficient knowledge retrieval. However, maintaining consistent standards across diverse collections can be problematic. Smith and White (2016) conducted a study highlighting the challenges of interdisciplinary collaboration within museums. The need to bring together experts from various fields, including history, art, and science, can result in divergent knowledge management practices and communication gaps.

In their research, Johnson (2019) discussed the tension between public engagement and knowledge preservation. Museums are increasingly expected to make their collections accessible to a broader audience, but this must be balanced with the imperative to conserve delicate artifacts. Therefore, the empirical review highlights the multifaceted knowledge management challenges faced by museums. Museums must adopt tailored strategies to address these challenges, ensuring the preservation of cultural heritage while enhancing accessibility to the public.

Technological solutions to the challenges

Museums often struggle with managing diverse collections, encompassing everything from ancient artifacts to contemporary art (Smith, 2017). To tackle this challenge, they can adopt advanced digitization technologies such as 3D scanning and high-resolution imaging. These technologies enable museums to create comprehensive digital records of their artifacts, enhancing the management and accessibility of knowledge about diverse items. For instance, 3D scanning can provide detailed 3D models of objects, facilitating in-depth study and analysis (Johnson & Davis, 2018). In addition, preserving institutional expertise is paramount for accurate interpretation of museum artifacts (Brown, 2019). Knowledge capture

and management systems offer a technological solution to this challenge. Such systems can include databases of curatorial decisions, digital repositories of expert interviews, and knowledge-sharing platforms that enable staff to document their expertise in a structured manner (Smith & White, 2016).

Digitization is a crucial step in improving knowledge storage and accessibility (Jones et al., 2020). Museums can invest in state-of-the-art digitization infrastructure, including high-quality cameras, scanners, and archival-quality storage solutions. Implementing cloud-based storage systems can further enhance accessibility and collaboration among museum professionals (Gupta & Lee, 2018). These cloud-based systems enable secure, remote access to digitized collections, facilitating research and knowledge sharing across the institution. Metadata and cataloging are essential for efficient knowledge retrieval in museums (Gupta & Lee, 2018). Leveraging advanced metadata and cataloging software can streamline this process. Automation tools integrated into these systems can ensure consistent application of metadata standards, even for diverse collections (Brown & Smith, 2021).

Interdisciplinary collaboration is vital within museums, but it often presents challenges (Smith & White, 2016). To overcome these challenges, museums can employ digital collaboration and communication tools. Virtual workspaces, video conferencing platforms, and project management software facilitate real-time collaboration among experts from various fields. These tools promote knowledge sharing and collaborative problem-solving, ensuring that expertise is effectively harnessed across the institution. In the context of public engagement, museums can harness multimedia and interactive technologies (Johnson, 2019). Virtual reality (VR) and augmented reality (AR) experiences, for instance, provide innovative ways to engage the public while preserving artifacts. AR apps can overlay historical information and interactive elements on physical exhibits, offering visitors a richer educational experience (Smith & Davis, 2020).

Furthermore, mobile technologies have significantly aided researchers in museums, addressing various challenges in content generation and knowledge compilation. The ubiquity of smart-phones and tablets has allowed researchers to capture and document artifacts, exhibits, and historical sites swiftly and efficiently. For instance, Martin and Abbott (2018) noted that mobile devices equipped with high-quality cameras and GPS capabilities facilitate the creation of multimedia content, including photos, videos, and location-specific information, enhancing the depth of museum exhibitions. Moreover, mobile apps and augmented reality tools, as suggested by Hashim *et al.* (2020), have been instrumental in delivering interactive and immersive experiences, enabling museums to convey knowledge in engaging and informative ways. These technologies have democratized access to museum content, making it more inclusive and accessible to diverse audiences, thereby resolving the challenges faced by researchers in disseminating knowledge effectively.

Theoretical Review

The Knowledge Management Process Model

This model attempts to offer a more realistic overview of the knowledge management processes. This model does include the creation of new knowledge as a specific knowledge management initiative. According to Botha *et al.* (2008) this model focuses on three approaches; human/people oriented, organizational and technology focused. This model asserts that knowledge management processes focuses all the three dimensions: Human focus, organizational focus and technological focus. The three approaches are integrated to yield rich knowledge management solution. The entire knowledge management process involves knowledge creation, capture, organization, sharing and dissemination which touch all the three aspects as illustrated in Figure 2.1 below.

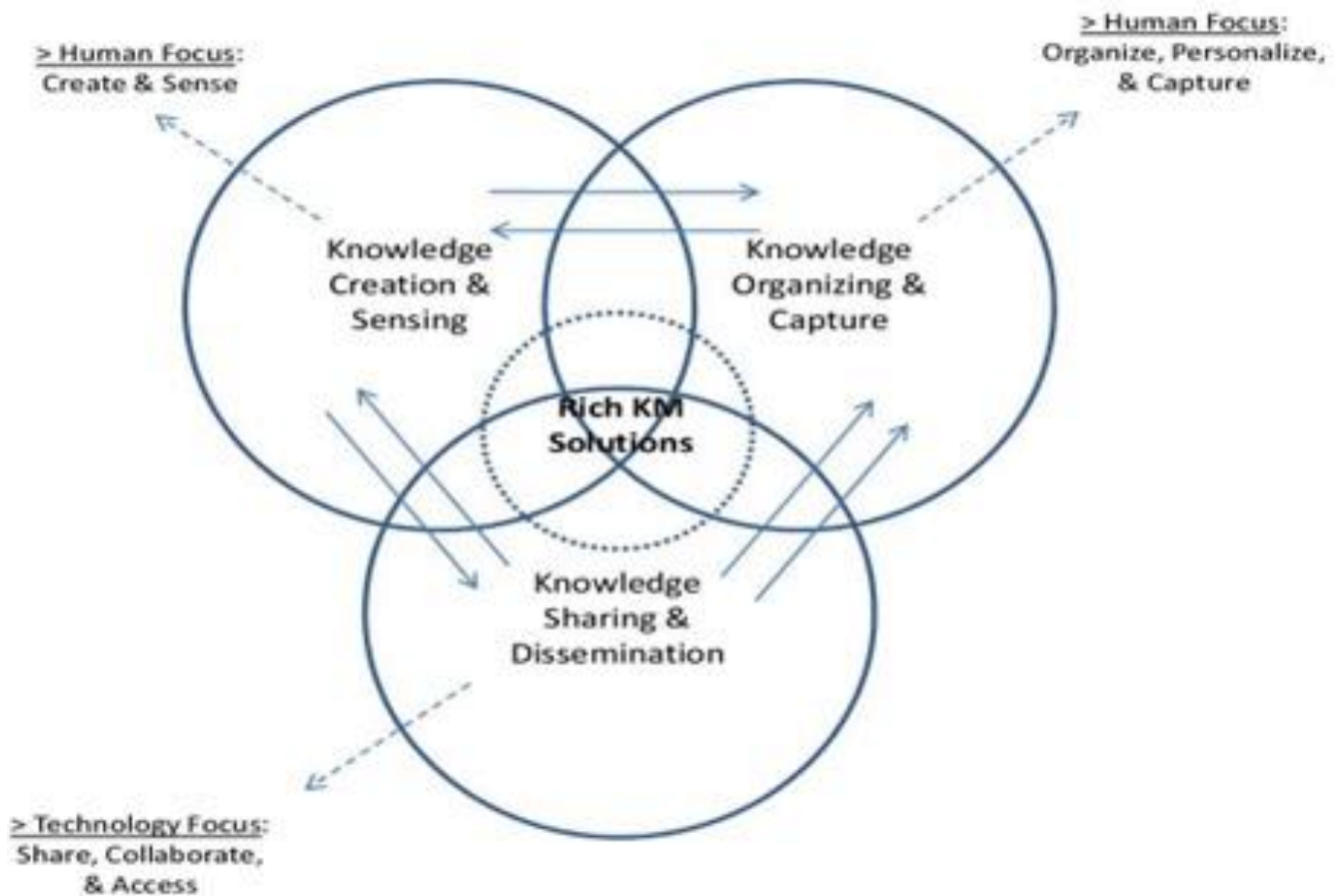


Figure 2.1 – Knowledge Management Process Model

Source: Botha *et al.*, (2008)

Thus, KM Process Model serves as a valuable framework to understand and address knowledge management challenges and solutions within the context of a museum setting. Human, organizational, and technological aspects are integral components of this model, each playing a unique role in shaping knowledge practices.

From a human perspective, museums often have diverse teams of curators, historians, and educators, making effective communication and knowledge sharing vital. The model emphasizes the need for clear roles and responsibilities, training programs, and a culture that encourages knowledge sharing among staff. On the organizational front, museums must create structures and processes that facilitate the capture, storage, and retrieval of valuable knowledge assets, such as archival materials and exhibition plans. This involves defining knowledge repositories, establishing taxonomy systems, and aligning knowledge management efforts with strategic objectives.

In terms of technology, the model underscores the importance of robust information systems, digital archives, and content management tools to support knowledge management. Additionally, leveraging emerging technologies like augmented reality or AI-driven search can enhance visitor experiences and knowledge dissemination. By applying the Knowledge Management Process Model in this holistic manner, museums can better identify and address their unique knowledge management challenges while fostering a culture of continuous learning and innovation.

Conceptual framework

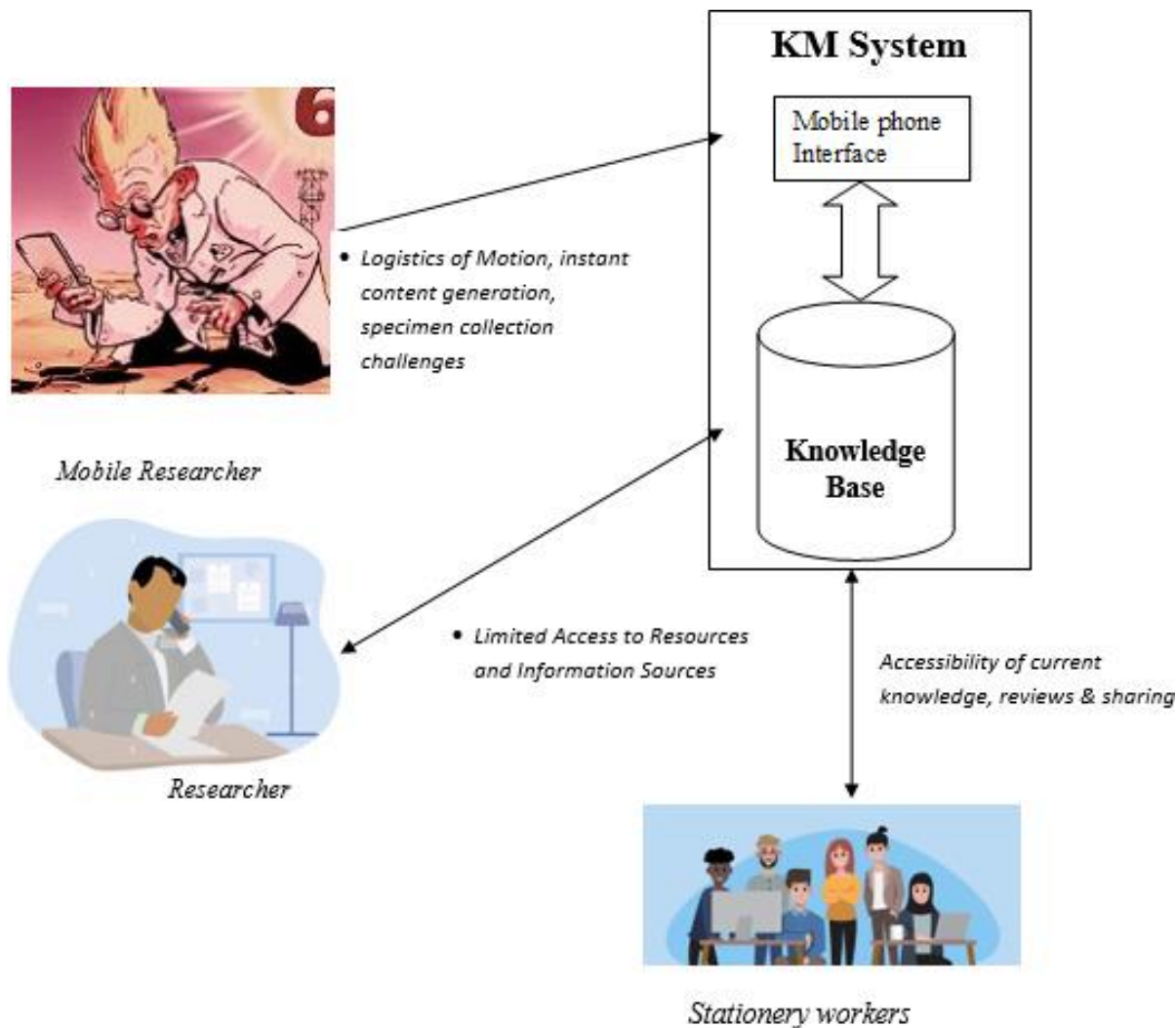


Figure 2.2 – Knowledge management challenges

Source: (Author, 2023)

Researchers working separated from their colleagues often have no access to the resources they would have in their work stations. Instead, mobile researchers for example have to rely on email services to receive materials from their work stations. In case of time-critical data, this way of communication with the knowledge base is insufficient. The current KM system provides knowledge exchange in a way that it is difficult for mobile researchers to generally stay in touch, resulting to challenges related to content and knowledge generation. This means there is lack of collaboration among researchers as content creators and shared platform for sharing current knowledge. This constrains the exchange of knowledge among knowledge teams and mobile researchers. In addition, mobile researchers have to deal with different work settings and coordination of their travelling to remote research centers. This result to challenges related to inaccessibility of knowledge and danger of information saturation and discrepancies in knowledge management process. Mobile apps for knowledge management is an approach to overcome these challenges. Rather than duplicating the content/information generation to the knowledge base, researchers and knowledge workers, can adopt mobile apps to: provide mobile access to Knowledge base and other information resources; to generate content and share between mobile and stationary workers by linking them to each other; and provide mobile app services that support knowledge workers in dealing with their tasks.

RESEARCH METHODOLOGY

Research design

This study employed a qualitative research design to scrutinize knowledge management challenges at the National Museum of Kenya, situated in Nairobi City. The chosen methodology facilitated in-depth exploration and understanding of the existing knowledge management systems, challenges encountered by researchers in knowledge generation, and viable technological solutions. Qualitative methods, in particular, the use of interviews and narrative analysis, were deemed appropriate for capturing nuanced insights and perspectives, providing a comprehensive understanding of the intricacies involved in research knowledge management. This design allowed for a rich exploration of the contextual factors influencing knowledge practices, offering valuable insights for implementing effective solutions at the museum.

Study population and sample

The research centered on a specific and essential target population at the National Museum of Kenya, encompassing management representatives (n = 3), heads of research units (n = 7), ICT staff (n = 5), librarians (n = 8), and researchers (n = 14), totaling 33 respondents. Recognizing the organization's lean staff, a census approach was adopted to include the entire population. This method ensured that all relevant stakeholders were subject to the study, providing a comprehensive understanding of knowledge management challenges and potential technological solutions. In employing this sampling procedure, the study aimed for an exhaustive examination of the identified roles, enhancing the validity and relevance of its findings.

Data collection instrument

To gather qualitative insights for the study, semi-structured interviews were conducted with all 33 respondents. The use of open-ended questions in brief, 30-minute sessions aimed to explore participants' perspectives on current Knowledge Management (KM) systems, challenges faced by researchers, and the potential of mobile technologies as a solution. This approach was chosen for its capacity to elicit detailed, context-rich responses. Interviews were audio-recorded for accuracy and later transcribed to narratives, ensuring a thorough analysis of participants' views. The interactive nature of interviews allowed for in-depth exploration of nuanced issues, making it a suitable method to capture diverse insights on KM challenges and mobile technology adoption.

RESULTS

Challenges facing Researchers at the Museum

One of the objectives was to establish challenges facing researchers while collecting data/specimens and compiling knowledge at National Museum of Kenya. The results showed that researchers and staff have challenges in compiling research data and managing knowledge at the institution. It involves long processes in specimen collection, digitization and organization/storage of knowledge. Most of the research specimens and artifacts are collected and brought to the research unit within the museum for further investigation and processing.

This was evident from the following responses from respondents:

".....Researchers experience a lot of challenges during specimen collections due to distance from their research sites, it takes them a long process to digitize collected data and to put them in a form that can be

utilized for research.....” Participant2

“.....The technology adopted to collect and process research data is still wanting; it takes a lot of time to transform specimens into a digital form; specimens are first sorted out, classified, preserved and later digitized through a long process of scanning and storing them in a common database.....” Researcher1

“.....most researchers at the museum encounter various challenges, including limited funding for extensive fieldwork, misplacement of specimens and discrepancies in specimen collection. This constraint can hinder scientific exploration and the expansion of our knowledge base.....” Participant1

“One major challenge for museum researchers is the preservation of delicate specimens in changing environmental conditions. Maintaining optimal storage conditions for a diverse range of specimens can be resource-intensive and demanding.....” Participant5

On whether adoption of modern technologies like mobile apps has any significant impact on knowledge management activities, one of the researchers had to say this:

“.....Despite the availability of modern technologies, NMK has not taken advantage of such technologies to enhance efficiency and effectiveness of its products and services through adoption of new technologies like mobile computing.....” Researcher2

From the above findings, it was evident that the NMK has systems that facilitate knowledge management activities which involve knowledge creation, codification, storage, utilization and sharing. However, it was established that the National Museum of Kenya has not explored possibility of adopting modern technologies and specifically mobile based applications in research knowledge management. Most of the researchers utilize stored knowledge by use of web-based systems that run in their desktop computers. Therefore, it becomes difficult for researchers who travel to remote areas to carry out research activities.

The findings highlighted a multitude of challenges in the realm of knowledge management, especially concerning specimen collection, digitization, funding constraints, and the preservation of delicate specimens. These challenges are compounded by the limited adoption of modern technologies, such as mobile apps, to streamline and improve knowledge management activities. While there is an acknowledgment of the potential benefits of technology in enhancing efficiency and effectiveness, it appears that the museum has not fully harnessed these tools to address its unique knowledge management challenges. Therefore, there is a clear opportunity for the museum to explore and embrace innovative technological solutions to optimize its research processes, improve access to digitized data, and overcome resource limitations, ultimately enhancing its role as a hub of scientific knowledge.

Viable technological solutions to the challenges

In response to the Museum of Kenya’s knowledge management challenges, researchers and knowledge managers proposed innovative mobile solutions. First, a dedicated mobile app facilitates artifact cataloging, ensuring staff efficiency with real-time updates and minimizing errors. See comments:

“.....it is imperative to implement a mobile app for staff to easily catalog artifacts. Streamlining data entry on smartphones enhances efficiency, ensuring real-time updates and reducing errors in the Museum Of Kenya’s knowledge management system... ..” Participant 22

Additionally, implementing QR code scanning on a mobile platform enhances visitor engagement, providing instant access to detailed exhibit information for an interactive learning experience. See comment:

“.....introduce QR code scanning through a mobile platform for visitor engagement. Enable seamless

access to detailed information on exhibits, enhancing the Museum of Kenya's interactive learning experience and promoting knowledge retention” Participant 26

Furthermore, embracing mobile-based virtual tours with augmented reality extends the museum's educational outreach, transcending geographical constraints. These technological interventions not only streamline internal processes but also elevate the museum's accessibility, fostering a richer and more globally inclusive knowledge-sharing environment, as elaborated below:

“.....explore mobile-based virtual tours for remote learning. Utilizing augmented reality on smartphones allows the Museum Of Kenya to extend its educational outreach, fostering a global audience and enriching knowledge dissemination beyond physical boundaries..... ” Participant18.

Thus, the responses above showed that leveraging mobile technologies presents a dynamic solution to optimize knowledge management practices at the Museum of Kenya.

Mobile Ingenuity: Enhancing Knowledge Generation and management at the Museum of Kenya

Objective three of the study was to suggest solutions to the challenges faced by researchers while collecting and compiling research knowledge at the National Museum of Kenya. It was established that modern and more efficient mobile technologies are the best solution to the challenges faced by researchers while compiling research knowledge.

Mobile app in specimen collections

The findings of this study underscored the transformative potential of mobile apps in revolutionizing specimen management within the museum context. Researchers expressed optimism that mobile technologies can significantly expedite the digitization process, simplify field data collection, minimize errors, and enhance global accessibility to the museum's valuable collection. This shift towards mobile apps integration not only promises to benefit researchers by improving efficiency but also opens up opportunities for broader public engagement and knowledge dissemination. By embracing these technological advancements, the museum stands to enhance its role as a hub for scientific research and as a valuable resource for knowledge enthusiasts worldwide, marking a positive step forward in the world of knowledge management. The following are responses of the researchers:

“.... mobile apps have ability to transform specimen collections by cutting short long digitization process. This will simplify data collection in the field, reducing errors, and offering easy access to our catalog, benefiting researchers and other knowledge enthusiasts worldwide... ” Researcher 7

“.....Specimen management has evolved with mobile apps; they have streamlined fieldwork data capture and provide global accessibility to our collection, promoting research and public engagement....” Researcher 2

Mobile apps for collaboration and document reviews

Furthermore, the findings of this study highlighted the pivotal role of mobile technologies as facilitators of collaboration and knowledge enhancement. Mobile applications enables real-time document sharing, which empowers experts to engage in collaborative efforts to review, comment, and improve research and exhibits collectively. This not only bolsters the quality of the work but also fosters a dynamic environment for knowledge exchange and co-creation among researchers. The ability to access and discuss online content through these apps further amplifies the collaborative spirit, enabling researchers to seek clarifications and insights from peers.

These are some of the responses:

“.....mobile apps are catalysts for collaboration; they facilitate real-time document sharing, enabling experts to review, comment, and improve research and exhibits collaboratively, boosting overall quality.....”
Participant 12

“.....Whenever I am faced with a difficulty accessing online content, I always use mobile applications to research and to clarify with fellow researchers on topical issues... ..” Researcher 3.

“.....Mobile apps have brought diverse expertise together, to review and share their insights and thus, generate robust knowledge in various fields... ” Researcher 5

Ultimately, mobile apps are proven catalysts for bringing together diverse expertise and generating robust knowledge across various fields, exemplifying their significance in modern knowledge management practices.

Mobile apps for content and knowledge sharing

Similarly, the findings strongly emphasized the transformative power of mobile technologies in the context of content and knowledge sharing within the museum. The interactive features and real-time updates offered by mobile apps engage visitors in immersive and enriching learning experiences, enhancing their understanding and appreciation of the museum’s exhibits and collections. Moreover, the potential for instant access to multimedia content through these apps signifies a significant shift in the way information is disseminated and absorbed by the museum’s audience.

These are some of the responses:

“.....mobile technologies hold immense potential for content and knowledge sharing at our museum. With interactive features and real-time updates, they engage visitors, making learning an enriching experience... ” Participant 13

“.....the adoption of mobile apps can revolutionize content sharing at the museum. They have capability of instant access to multimedia content, fostering a deeper understanding and appreciation of our exhibits and collections... ” Participant 6.

Thus, the adoption of mobile apps has the potential to revolutionize the museum’s approach to content sharing, ultimately fostering a deeper connection between visitors and the wealth of knowledge and culture housed within its walls.

DISCUSSION OF THE FINDINGS

The findings of this study shed light on the significant challenges facing researchers at the National Museum of Kenya (NMK) in their efforts to collect, compile, and manage knowledge. These challenges include the logistical difficulties of specimen collection, the time-consuming digitization process, funding constraints, and the preservation of delicate specimens under changing environmental conditions. These challenges resonate with existing literature on knowledge management in cultural institutions, where resource limitations, data digitization issues, and the need for efficient preservation techniques have been commonly discussed (Smith, 2017; Tan, 2019).

One striking revelation from the study is the limited adoption of modern technologies, particularly mobile

apps, which could potentially address these challenges. The findings align with the broader literature on the role of technology in knowledge management. Scholars have emphasized that leveraging mobile apps can streamline data collection and sharing processes, facilitate collaboration among researchers, and enhance content and knowledge dissemination (Chen & Chiang, 2019; Davenport & Prusak, 2000). However, the reluctance to adopt such technologies at NMK raises questions about the institution's readiness to embrace digital transformation and fully capitalize on the benefits offered by modern tools (Al-Saedi & Shuib, 2019).

In terms of solutions, the study underscores the potential of modern ICT systems, particularly mobile apps, to address the challenges faced by researchers and knowledge management at NMK. The responses from researchers and staff suggest that mobile apps can expedite specimen digitization, simplify field data collection, promote collaboration and document reviews, and enhance content and knowledge sharing. These findings align with the existing literature on the transformative impact of mobile technologies in various sectors, including education, healthcare, and business (Al-Emran *et al.*, 2018; Crompton, 2013).

Moreover, the potential for mobile apps to foster collaboration and real-time document sharing among experts resonates with the principles of collaborative knowledge creation, which have been extensively discussed in the literature (Wenger, 1998). The ability of mobile apps to facilitate access to multimedia content aligns with the growing importance of multimedia and interactive elements in knowledge sharing (Huang & Liaw, 2018). Additionally, the study highlights the significance of mobile apps in engaging visitors and enhancing their learning experiences, consistent with the literature on technology-enhanced learning in cultural institutions (Hsieh *et al.*, 2020).

Therefore, results of this study revealed the pressing challenges facing researchers at NMK and underscored the untapped potential of modern technologies, particularly mobile apps, in addressing these challenges. The study's recommendations align with existing literature on the role of technology in knowledge management, collaboration, and content sharing. By embracing mobile apps and other digital tools, NMK has the opportunity to revolutionize its knowledge management practices, enhance collaboration among researchers, and create enriching experiences for visitors. However, the institution must overcome its resistance to change and invest in the necessary technological infrastructure to fully realize these benefits.

CONCLUSION

In conclusion, this study highlighted the significant challenges faced by researchers at the National Museum of Kenya in the collection, compilation, and management of knowledge, including specimen digitization, funding constraints, and specimen preservation. It also underscored the under-utilization of modern technologies, particularly mobile apps, in addressing these challenges. The findings established that mobile apps have the potential to streamline processes, foster collaboration, enhance content sharing, and engage visitors, aligning with existing literature on technology's transformative role in knowledge management. Embracing these technological solutions could propel NMK into a new era of efficient content and knowledge management, research excellence, and enriched visitor experiences, marking a crucial step towards becoming a leading hub of scientific knowledge and cultural heritage.

RECOMMENDATIONS

Based on the findings of this study, several recommendations emerge to enhance knowledge management at the National Museum of Kenya (NMK).

First and foremost, NMK should prioritize the adoption of modern technologies, particularly mobile apps, to streamline specimen digitization, improve field data collection, and foster collaboration among researchers. Investing in the necessary infrastructure and providing training for staff in utilizing these tools is imperative.

Additionally, NMK should explore partnerships and seek funding opportunities to address financial constraints, facilitating extensive fieldwork and specimen collection.

Lastly, the institution should develop a comprehensive digital preservation strategy to ensure the optimal storage of delicate specimens.

Embracing these recommendations will enable NMK to overcome existing challenges, elevate its research capabilities, and offer enhanced knowledge-sharing experiences to both researchers and visitors.

AREAS OF FURTHER RESEARCH

Further research should delve into the implementation and effectiveness of specific mobile technologies for content generation and knowledge management at the National Museum of Kenya. Assessing the user experience, evaluating the scalability of mobile solutions, and exploring potential collaborations with tech industries could enhance the study's applicability. Additionally, investigating the long-term impact of mobile technologies on cultural preservation, audience engagement, and educational outreach would provide valuable insights for both the National Museum of Kenya and the broader cultural heritage sector.

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