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DIGITIZATION OF KNOWLEDGE MANAGEMENT METHODS: AN ESSENTIAL APPROACH

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Abstract *Initiatives for digitization and knowledge management increasingly go hand in hand in the evolving global information society. While digitization initiatives refer to joint or collaborative efforts to convert existing library holdings, whether in print, graphic, audio, or a combination of all, into digital format commonly known as "electronic resources," knowledge management (KM) refers to a range of practises used by organisations to identify, create, represent, and distribute knowledge. In today's electronic environment, digitization activities have emerged as a pillar of knowledge management. The paper begins by highlighting the challenges that institutions face in transitioning from a physical environment to a digital one. The objectives of the study are then outlined, including providing a clear understanding of digitization, exploring knowledge management strategies, categorising digital tools, analysing digitization processes in KM methods, and examining an example of digitization in a library setting. The future scope of digitization of KM methods in libraries is also discussed, including the potential integration of AI and machine learning technologies, virtual and augmented reality, and more sophisticated analytics and reporting tools. The paper concludes by emphasizing the importance of assessing the current workforce and gradually increasing digitalization with proper support from both employees and management.*

Keywords: *Knowledge Management, KM Strategies, KM Methods, Digitization, Digitalization, Digital Transformation, Knowledge-as-a-Service (KaaS), Digitization Tools, Levels of Digitization*

Introduction

At the start of the twenty-first century, the production of recorded materials has grown at an unprecedented rate in every type of institution. These institutions greatly value the information produced by this process, and the creation of appropriate preservation and conservation strategies is essential to preserving the value of this knowledge over time. However, the transition from a physical environment to a digital one presents significant obstacles to both individuals and institutions.

The three main focuses of digital workplace technology are communication, collaboration, and conferencing. The digital workplace will be the platform through which staff can gain access to all the organizational knowledge they need to carry out their duties. Considering that such a knowledge management system is employed across the organization as a whole rather than just by individuals, it will achieve the goals of digital transformation using knowledge-as-a-service (KaaS) architecture (KNOWMAX, n.d.). The KaaS system incorporates all key components of the digital workplace, such as cloud services, mobility, and artificial intelligence. These technologies will remove geographical barriers to collaboration and processes, ensuring that knowledge is accessible remotely 24 hours a day, seven days a week.

Technological innovation in knowledge management in a library and information centre includes using technology to promote collaboration and user engagement, boost the utilization of library resources, improve the work environment, and provide intelligent transmission of knowledge assets. The current study covers an in-depth comprehension of the information digitization process and its application in knowledge management (KM) techniques, degrees of digitization using IT tools, and the practical application of KM method digitization in the library using an example.

Previous Literature

The research community has not yet given significant attention to digitalization in knowledge management approaches. However, this work is based on a few studies that can serve as the foundation for the current investigation.

Larsson (2018) developed a framework in his project that demonstrates how project-based organisations can enhance their knowledge transfer by implementing more digital solutions. Mittelmann (2022) presented a categorisation of IT tools for KM, explained the procedures, and provided an example of FAQs, along with a step-by-step digitization

approach that includes assigning "knowledge ambassadors" to support the implementation process. Buntak et al. (2020) emphasized the impact of digital transformation and digitalization on organizational knowledge and how organizations manage their knowledge. Their secondary survey illustrated that digitalization offers many opportunities for knowledge creation, but there is a need for different approaches to ensure the safety of generated knowledge. Petana and Rosa (2020) explained that digital transformation requires the adoption of more agile business processes and the development of new customer-facing digital services. Their study highlighted the importance of business process automation for companies to acquire the know-how to implement a just-in-time diachronic dialogue, using a BizDevOps philosophy with references to microservices that allow for rapid adaptations of requirements to fast-changing needs in businesses. Antunes (2022) aimed to deepen the study of knowledge management in the public sector, identify the dimensions of the relationship between knowledge management and the digital transformation of the state, and understand the implications of Portuguese public administration digitalization on knowledge management practices. The study also aimed to determine whether the maturity level of knowledge management in organizations improves process improvement through the use of technology.

Objective

The objectives of this study are as follows:

- To provide a clear understanding of the concepts of digitization, digitalization and digital transformation.
- To explore the field of knowledge management (KM), including its strategies and methods.
- To categorise digital tools based on their functionality in KM.
- To analyse the use of digitization processes in KM methods.
- To describe the levels of digitization in KM methods.
- To examine an example of the use of digitization in a KM method in a library setting.

By achieving these objectives, this study aims to contribute to the existing body of knowledge on the relationship between digitization and KM and to provide valuable insights for organizations looking to implement digitization processes in their KM practices.

Digitization, Digitalization and Digital Transformation

Information has a massive value to any institution and its management. It brings efficiency and quality which every managerial needs in modern-day challenging times. To maintain information's value over time, developing proper preservation and conservation techniques is vital. This process will enhance information's value for a longer duration and guide insights development. One way of doing so is through digitization, digitalization and digital transformation (Ali, 2019).

Digitization is the process of converting analog data into digital form without making any changes to the underlying process. For example, converting a printed document into a digital format using scanning technology.

Digitalization, on the other hand, generally involves the use of digital technologies to process and analyse digitized data for a specific purpose or benefit. For instance, sharing, editing, or archiving multimedia documents in the cloud.

Digital transformation, in essence, involves adopting new approaches to digitization by leveraging modern information and computer technologies. For example, optimizing a digital document for accessibility to a specific group of users.

All the above three stages of digitization, with the inclusion of the primary information collection stage, can be plotted in a single framework (Fig. 1) to explain their relationship to each other.

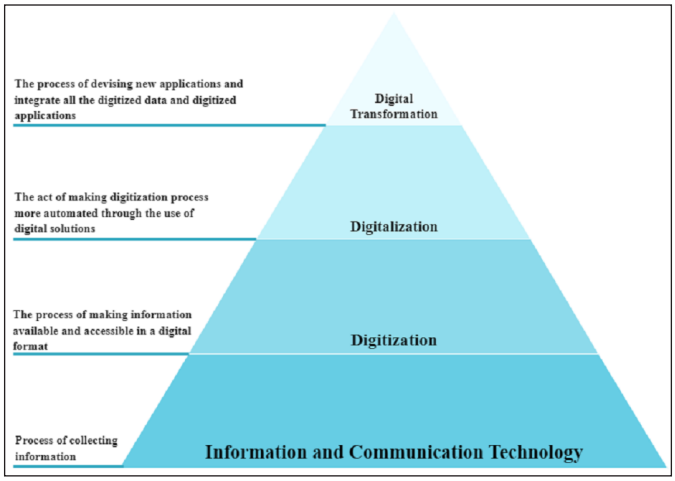

Fig. 1: Digital Transformation Pyramid (Sen Gupta, 2020)

Knowledge Management

The art and science of maximising knowledge flow within an organisation is referred to as knowledge management. It entails the effective management of resources and information within an institution, which is essential to digital transformation. Managing knowledge clarifies the best ways to learn, the processes for creating new information, and the ways in which the learning process is used in practise. This is especially helpful today when dealing with users who are

more comfortable utilising various devices and are more digitally savvy than ever.

Knowledge Management Strategies

Cawthorne has written extensively on knowledge management, and his views on the topic have evolved over time. Here are two different knowledge management strategies (Fig. 2a and Fig. 2b) that Cawthorne proposed in 2009 and 2021:

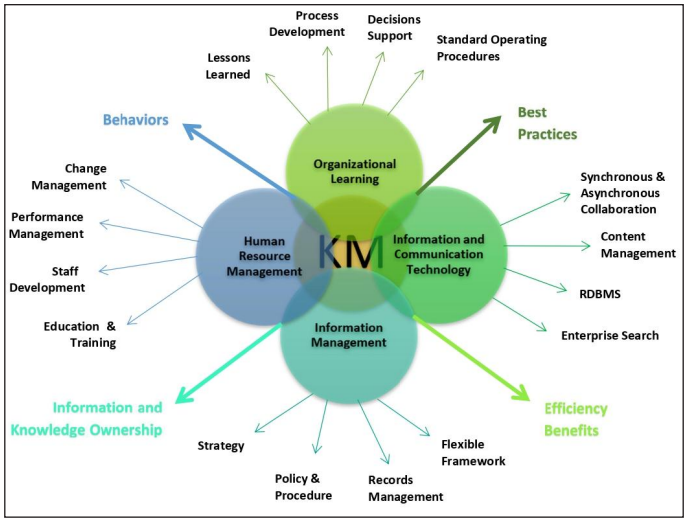

Fig. 2a: Knowledge Management Strategies (2009 Model) [©Cawthorne, 2009 as mentioned in (Grafe, 2015)]

The primary elements of both 2009 and 2021 elements consist of four key elements: Organizational Learning, Human Resource Management, Information and Communication Technology and Information Management. However, these two models only differ in terms of coverage. The 2021 model is just an extension of the 2009 model with further inclusion of possible elements that are linked with the base model. The four main elements of Knowledge Management Strategies are:

- *Organizational Learning:* This refers to the processes and strategies used by organisations to promote continuous learning and improvement. It includes activities such as process development, decision support, change management, knowledge sharing and lifelong learning.
- *Human Resource Management:* This element focuses on the role of HR in managing the organisation's knowledge assets. It includes recruiting, training, performance management, and carrier development as well as creating a culture that values knowledge sharing and collaboration.
- *Information and Communication Technology:* This element refers to the tools and technologies used to support knowledge management. It includes document management, social collaboration, and other software and hardware used to manage and share knowledge.
- *Information Management:* This element focuses on the processes used to manage and organise information within the organisation. It includes activities such as data classification, metadata management, analytics, policy & procedure and information governance.

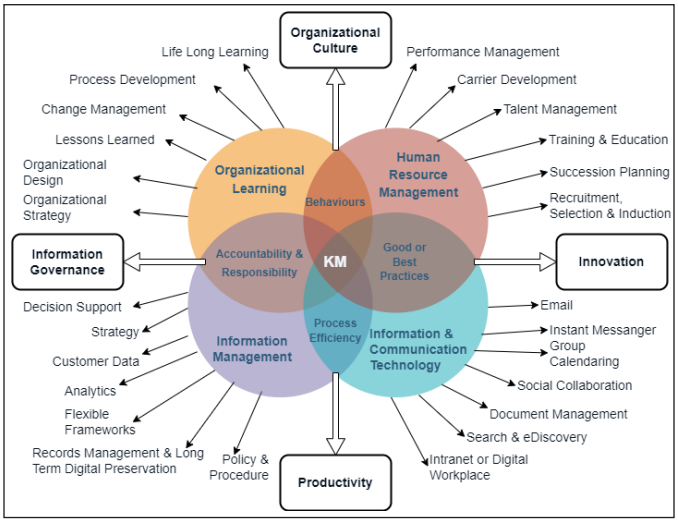

Fig. 2b: Knowledge Management Strategies (2021 Model) (Cawthorne, 2021)

Knowledge management can be accomplished using a variety of techniques and methods, including knowledge mapping, the operation of knowledge cafés that encourage unrestricted and open discussion, and the development of communities of practise that foster the interactions required to explore potential solutions to unanticipated customer requirements (Kumar, 2021).

Knowledge Management Methods

Knowledge management methods refer to a set of practices, processes, and techniques that organisations use to identify, capture, store, share, and effectively use knowledge and information to achieve their goals and objectives. These methods encompass a wide range of activities such as creating knowledge repositories, managing intellectual assets, and promoting knowledge sharing and collaboration among employees. The ultimate goal of knowledge management methods is to enhance organizational performance, innovation, and competitiveness by leveraging the knowledge and expertise of individuals within the organisation (Garfield, 2021).

There are various knowledge management methods that an organisation can implement to effectively manage its knowledge. Some examples of these methods are as follows:

- *Communities of Practice:* A community of practice is a group of people who share a common interest or profession and who interact regularly to learn from one another.
- *After-Action Review:* An after-action review is a structured process for analysing an event or project in order to learn from successes and failures.
- *Expert Systems:* An expert system is a computer program that uses artificial intelligence to make decisions based on rules and data.
- *Benchmarking:* Benchmarking is a process of comparing an organisation's performance against that of other organisations in the same industry or field.
- *Best Practice Transfer:* Best practice transfer involves sharing best practices between different parts of an organisation or between different organisations.
- *Knowledge Cafés:* Knowledge Cafés are informal gatherings of people who come together to share knowledge and ideas.
- *Knowledge Mapping:* Knowledge mapping is a process of visualizing an organisation's knowledge assets and how they relate to one another.
- *Co-Creation:* Co-creation involves working collaboratively with customers or other stakeholders to develop new products or services.
- *Storytelling:* Storytelling is a technique for sharing knowledge and experiences through the telling of stories.
- *Learning Histories:* Learning histories are narratives that describe an organisation's learning experiences over time.
- *Knowledge Fairs:* Knowledge fairs are events that bring together people and knowledge resources from across an organisation to share knowledge and ideas.
- *Peer Assists:* Peer assists are structured conversations in which colleagues share their experiences and knowledge to help solve a problem.
- *Mentoring:* Mentoring involves pairing a more experienced person with a less experienced person to help the latter develop skills and knowledge.
- *Social Networking:* Social networking involves using online tools to connect people with similar interests or expertise.
- *Simulation:* Simulation involves creating a virtual environment to test out ideas or scenarios.
- *Action Learning:* Action learning is a process of learning by doing, in which participants work on real-life projects while receiving guidance and support from others.

Digital Tools

Properly implementing software systems with the right tools can digitize KM methods. Since there are currently no measuring or testing tools for KM, it's best to avoid the term "instrument." The software market provides a vast selection of tools that can be used for digitizing KM methods, with new tools added regularly and unsuccessful ones removed. To avoid singling out specific tools, a categorised list of IT tools is provided below, which can be utilized for the digitalization of KM approaches.

Table 1: Categorisation of the Digital Tools

Sr. No.	Name	Icons*	Function
1	Networking		Networking tools support the creation and maintenance of online relationships. e.g. Social Media.
2	Communicating		Users can send text, audio, and/or video messages in real-time or asynchronously using tools in the genre of communicating. e.g. Instant messaging, Video conference (real-time); Email (asynchronous).
3	Collaborating		Content can be generated, discussed, modified, and adjusted synchronously or asynchronously in accordance with objectives thanks to collaborative category tools. e.g. social bookmarking.
4	Sharing		Sharing tools give users the ability to share any resources (such as papers, presentations, and videos) with others online in self-selected groups and to comment on their content. e.g. whatsapp or telegram groups, Box.

Sr. No.	Name	Icons*	Function
5	Publishing		Users may simply generate content from scratch and publish it online using tools in the publishing area. e.g. wikis, blogs.
6	Distributing		The ability to make any documents (such as papers, presentations, photos, music, and videos) or references to the documents publicly available on the internet is provided through tools in the distributing category. A field for short remarks and a feedback option is included in the majority of these tools. e.g. video podcasting, sharing platforms.
7	Learning		Tools in the learning category assist in creating educational materials in accordance with pedagogical-didactic principles (authoring systems). e.g. learning analytics, learning platforms.
8	Gaming		Tools for category gaming enable the creation and distribution of educational games for energising the education system.
9	Survey		Online surveys can be created, carried out, and evaluated using tools from the category survey. e.g. Google forms, Survey monkey.
10	Visualizing		Tools in the domain of visualising make it easier to manipulate data, organise information visually, and/or present content. e.g. Mapping.
11	Searching		Tools from the area of searching assist in finding essential information online and in databases. e.g. meta search engines.
12	Curating		Information selection, organisation, and reprocessing are made easier by tools in the curating domain. e.g. RSS feeds.

*(Flaticon, n.d.).

There are some digital tools that offer numerous categories of functionality. Due to the reduction of interfaces, such "universal tools" are typically preferred to specialise individual ones.

Digitization Procedure for KM Methods

It is essential to realise that digital transformation is made possible by digitization and digitalization. Even though these procedures are expensive, they might not be enough to properly implement digital transformation. It is important to first educate oneself on the information that has to be digitized, as well as the processes that must be followed and when. This knowledge is acquired through approaches for knowledge sharing with pertinent parties or from experience made available by specialists.

In an institution before starting the digital transformation of ongoing KM methods, several factors need to be considered. Not only cost but the availability of tools that fit with the method, selecting or developing a procedure, level of using IT tools, analyse the success rate, calculating return on investment (ROI), and so on are part of it.

The process outlined below can be used to determine whether deploying IT technologies within the context of a KM method application is feasible and to make the necessary preparations (see Fig. 3).

- Search for already available methods or procedures and identify if the process fits with the context of the selected KM method.
- If a resolution is not found, create a method and list all potential stages for effectively digitising the KM technique.
- Now review each individual process step or the entire description to see if the adoption of an IT tool would be feasible, beneficial, and appropriate. For this, users can refer to the descriptions of the different tool categories.
- As a good foundation for the ensuing implementation, describe the use and requirements of the chosen tool category in this process step.
- At the time of implementation, choose or create a digitising tool in the relevant category.
- The archetypal tool implementation then occurs within the scope of the application of the KM paradigm. The digitalized method is improved using the lessons learned from these initial applications. The application of the method to the entire organisation or the right target groups can only be taken into consideration if a steady operation is provided.

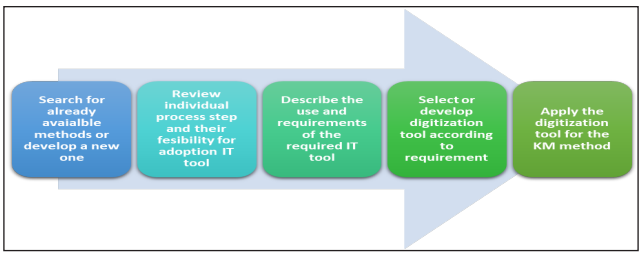

Fig. 3: Steps of Digitalization Procedure for KM Methods

Levels of Digitization for KM Methods

To introduce digitization to a traditional knowledge management method, it's important to recognize that it cannot be fully digitized at once, especially without the use of IT tools. Instead, it's recommended to gradually increase the level of digitization over time. The degree of digitization can be categorised into the following levels, based on the use of IT tools:

Table 2: Levels of Digitization of KM Methods

Level	IT Tool Requirement	Training Requirement	Tools Category*
0	Not required	Not required	word processor, spreadsheet, PowerPoint presentation
1	Using simple and self- explanatory IT tools	Not required	networking, communicating, searching, distributing
2	More than one step of the method is supported by an IT tool	Required some application expertise	sharing, publishing, visualizing
3	Over half of the method steps are performed by applying various IT tools	Required in-depth understanding of the application of IT tools	survey, collaborating
4	All the process steps are supported by IT tools (fully digitized)	Required high-level expertise, understanding and problem-solving capabilities of IT tools	learning, gaming, curating

*Reference: Table 1.

Table 2 clearly demonstrates the crucial role of IT tools in digitising the knowledge management process, thereby improving its efficiency and effectiveness. As mentioned earlier, different categories of IT tools can be used at each level of digitization to support the knowledge management process. At Level 0, where no tool support is needed, basic IT tools such as word processors, spreadsheets, or PowerPoint presentations can be used to document and present information. However, higher levels of digitization (Levels 1-4) require more advanced IT tools to support the knowledge management process. Using appropriate IT tools at each level of digitization can help organizations improve their knowledge management capabilities, enhance their competitiveness, and drive innovation and growth.

Nevertheless, there are situations where certain methods cannot be fully digitized, and the use of tools is limited to specific actions. For example, when exchanging knowledge and expertise, face-to-face interaction can greatly improve the quality of the outcomes. This is because face-to-face interaction enhances neural stimulation of cerebral regions, which can trigger better outcomes.

Example of Digitization of KM Method in Library

In libraries, the "Reference Services" is a commonly used service, which assists users in finding information with the help of library staff. However, as new technologies are developed and the demands of library users change, traditional services are evolving to meet their needs.

In the present scenario, if step-by-step digitization of reference services is visualized under the above category levels, the following results can be shown:

- *Level 0*: When the reference desk staff member (the reference manager) personally assists a user in locating a document or meeting their informational needs. It is the first method of delivering reference services without the aid of tools.
- *Level 1:* At this level, the reference librarian responds to users' short- or long-range reference requests through phone, message, or email without the user physically visiting the library.
- *Level 2:* The reference librarian will frequently use video podcasting to try to address the user's question face-to-face if messages or emails are unable to do so. In cases where a person is not physically present, video conferencing can frequently be appropriate in aiding and comprehending their genuine problems.
- *Level 3:* When a library introduces new services or subscribes to new databases, some problems may arise that require support. Video conferencing can be helpful in resolving these issues, but it can also

be time-consuming. An alternative solution is to use screen-sharing technology, which allows the reference librarian to access the user's device and guide them step-by-step through the process.

- *Level 4:* Each of the aforementioned reference service levels calls for some level of human involvement. However, by implementing a chatbot in a library, it is feasible to provide a fully automated reference service that runs continuously 24*7, without the need for any staff. A chatbot is an AI-powered tool that stores frequently asked questions, analyses user inquiries, and responds to them using the information in its knowledge base. The chatbot's knowledge base grows as it gradually accumulates more and more frequently asked questions (FAQs) submitted by students.

Future Scope of Digitization of the KM Method in Libraries

The future scope of digitization of KM methods in libraries is vast and promising. As the world becomes increasingly digitized, libraries must keep up with the pace of change in order to remain relevant and useful to their patrons. The digitization of KM methods will enable libraries to provide better services, more efficiently manage their resources, and stay up-to-date with the latest technology trends.

Some of the potential future developments in this area include the integration of artificial intelligence (AI) and machine learning (ML) technologies into KM processes. This could lead to the creation of more intelligent and automated systems that can better assist patrons in finding the information they need. Additionally, the use of virtual and augmented reality technologies could provide new and exciting ways for patrons to interact with library resources.

The development of more sophisticated analytics and reporting tools could also help libraries to better understand and utilize their data, allowing them to make more informed decisions about resource allocation and service provision. This could help libraries to optimize their operations, reduce costs, and improve the overall patron experience.

Conclusion

The field of knowledge management has been transforming rapidly in response to changing trends and advancements in technology. The digitization and digital transformation of data have become inevitable components of knowledge management methods in order to keep up with the evolving landscape. This paper has discussed how the planned digitization process, along with the integration of IT tools, can effectively improve knowledge management. However, it is crucial to first assess the current workforce and determine how much digitization is required in the existing knowledge management techniques. A gradual rise in digitalization and proper support from both employees and management will be key to achieving long-term success.

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