The Influence of Information Technology on Knowledge Management in Organizations: a Comprehensive Review

Amjed Ahmed Srasyih, Zainuddin bin Hassan

Abstract: Knowledge management (KM) is the driving force for economic and social progress in organizations. The growth of any organization in any sector depends on the application and improvement of knowledge management. It is not easy to implement knowledge management as a task of an organization due to the culture of the individual, the roles of the organization and the lack of infrastructure available to support the processes of knowledge management. Besides, the application of knowledge management in an organization requires expert in human resource development and strong managers to encourage employees to adopt the processes of knowledge management. For this reason, this review attempts to review the use of IT tools in the knowledge management process. This improves the organization's culture, the organization's performance, and the organization's infrastructure. This paper also discusses the KM model of each organization to apply KM in its work. This model can be generalized to any organization that wants to improve its work. The impact of the model can be seen on the financial issues of the organization, leadership and innovation within the organization, and improving productivity. The advantages of using IT in KM are mentioned and discussed. This review shows that there are six advantages of applying IT tools with knowledge management in organizational work and that is to improve understanding of data, especially when dealing with decision-making and data management. At the end of this paper, tools commonly used in knowledge management are discussed. Applying IT tools to the work of an organization can enhance knowledge sharing among employees. It can also enhance productivity and innovation in the organization.

Keywords: Knowledge Management, IT, Organizational Performance, knowledge sharing.

I. INTRODUCTION

Knowledge is the oil of this century. This means that there is a huge amount of data that human can use to manage, control, and improve their skills and knowledge. This is for a person's improvement and also for the organization to improve where hard competition between them appears year after year [1]. The winners in general in these competitions are those who used the big data available to manage their work and improve their employee skills [2].

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To deal with the available data in the organization, improving techniques and tools should use in an organization's knowledge which is told Knowledge Management (KM). KM is the key factor for any organization to face the indoor and outdoor environment and challenges [3]. It includes several things to think about such as employee skills and experiences, technological tools used, leadership, creativity and innovations, and the eco-system within the organization which means the communication skills between employees and their ability to exchange information and knowledge between them [4].

However, it is important to say that KM is not restricted to the human mind but also to improve the KM within the organization, the organizational norms and actions, work procedures, and Information Technology (IT) tools are also important. There are four main sources of knowledge gaining which are as shown in Fig. 1.

- Prior knowledge: this is the source of the individual learning, thinking, and reading for each one related to the organization [5].
- Development studies: this is the ongoing source of learning and gaining knowledge. The organization that has a recent development study for its work is capable to have KM.
- Organization's experience: past works and their documents improve the experience of the organization and allow it to be more confident when working on a new project [6].
- Transfer activities: the cooperation between everyone in the organization is very important to transfer knowledge between them. This transferring process reduces the time required for gaining new knowledge. Besides the four mentioned sources, technical sources are also required to facilitate gaining new knowledge such as:
- IT infrastructures: developing the IT infrastructure of the organization allows the employee to search for topics and knowledge. IT infrastructure contains Internet access and its speed, applications used, and IT devices such as laptops and their peripherals.
- Organization environment: existing of a research and development department in the organization helps in the ongoing improvement of the organization's knowledge [7].
- Innovation and leadership: any organization that wants to win in the competitive world is required to adopt a policy of innovation and leadership.

However, in the big data world where reaching new knowledge and information is very easy, there is a need of applying intelligent procedures to audit this information according to the organization's needs. To apply intelligent techniques, Information Technology (IT) should be used within the organization's work. Availability of the IT tools and the ability to use them is important to improve KM. this review paper aims to:

- Review the importance of the IT sector in the KM field.
- Discuss the KM model that each organization should apply.
- Discuss the challenges of using the IT sector in organizations.

The rest of this paper is organized as section II gives the literature review about KM. section III gives a general discussion about the KM model in organizations. Section IV discusses the use of the IT sector to improve the KM. IT tools that are used in the KM have been discussed in section V. At the end of this paper, the conclusion of this paper is mentioned.
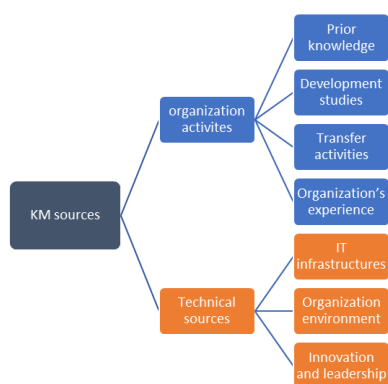

Fig. 1.KM sources classification

II. LITERATURE REVIEW

Table I summarizes the review articles related to our review. Several works discuss the KM in organizations. [8] make a comprehensive review of the major approaches for designing the KM system from different perspectives including knowledge representation and organization, knowledge sharing and performance measures for KM has been conducted. For the business environment, [9] conclude that the KM processes ought to be followed by effective knowledge management implementation strategies to avoid knowledge proliferation and structuration. They also mention that modern businesses are gradually evolving from document-based knowledge management systems toward people-based knowledge management systems as a result of higher capacity for improvement and alignment of knowledge management strategies. They propose a modern businesses strategy to improve KM through gamification.

Also, the work of [10] concerns reviewing the importance of KM in an organization's development. They collected data from published journals, conferences paper, and books. Their results show that KM is the main key for organizations to stay competitive. Besides, KM also creates an innovative organization. The use of IT is presented in [11]. They focus on AI and its abilities to improve KM for the construction industry in the UK. They conducted a survey that included 10 managers from different businesses. It is recommended that there is a need of developing a business model canvas for implementing AI to benefit from KM within organizations. This is to identify the difference between the business processes without AI for KM and with AI being used to assist KM. [12] is also reviewed the use of IT in KM. They explore how IT can inform the KM. They explore the theoretical and practical limitations of AI and KM in the jurisdiction field.

Table I: Literature review summary

Reference	Concern on	Methodology	Environment	IT	Remarks
[8]	- Knowledge Representation and organization. - Knowledge sharing	Reviewing articles	Organization	×	- They focus on reviewing all related articles that talked about knowledge representations and organizations. - They reviewed the knowledge-sharing concept and techniques. - They mentioned some performance measures of the organization's KM.
[9]	Allows gamification as a technique for KM improving	- Reviewing articles. - Proposing gamification	Business	×	- They propose a gamification concept to improve KM in a business environment.
[10]	Innovation as a result of applying KM.	Reviewing articles	Organization	×	- They focus on innovation as a key to improving the KM process.
[11]	Applying AI with KM.	Reviewing articles	Business	√	- They performed a survey to evaluate the importance of using AI in KM improvement.
[12]	Applying Ai with KM in the Jurisdiction field.	Reviewing articles	Jurisdiction	√	- They reviewed the use of IT with KM in the jurisdiction field.

III. KNOWLEDGE MANAGEMENT MODEL

Fig. 2 The four KM processes in this model are:

- Knowledge-Creating: the efficient use of internal and external resources belongs to everything related to the organization's work. Documents, multimedia data, images, and focus groups related to the organization's work are sources of internal knowledge-creating while customer feedback and the image of the organization in society are two main sources of the external knowledge-creating. Searching the Internet is also one of the knowledge- creating sources [13].
- Knowledge Storing: this is the most important process

in KM. Keeping a history of every work in the organization leads to having a piece of good knowledge about failure and success during the organization's work. Storing knowledge should be in a secure way using hardware and software tools to protect them from damage and unwanted third-party modification. It is also important to keep this history available for all stockholders and to be accessed every time required [14].

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- Knowledge Sharing: it is very important to share data between employees and stockholders to encourage everyone related to the organization to adopt KM. sharing the annual report and annual statistics about the organization's situation leads to putting the vision and mission of the organization in mind.
- Knowledge Utilization: organizations need to use their data and the related data in making decisions, improving organizational performance, and achieving organizational objectives [15].

However, to make the above sources available, infrastructure factors that help the organization staff to adopt the KM should be available. There are four main infrastructure needs which are:

- Organizational Culture: this is the first and most important infrastructure that managers should concern about. Keeping KM as an organizational culture leads to ensuring that everyone related to the organization follows this culture. This will spread the positive vibe of dealing with knowledge improvement. There are four cultures in minimum that every organization should adopt which are: 1) culture of detecting which type of knowledge is important for the organization, 2) the culture of moderating the relationship between organization and individuals, 3) culture of social interaction between individuals, and 4) culture of creating new knowledge to improve the organization work [16].
- Leadership: no sharing knowledge without leadership personality. Leaders should encourage employees to be leaders and lead the KM process during work. Humans in general face difficulties during knowledge

improvement, so leadership personality helps to overcome these difficulties.

- Information Technology: IT department is a very important department in any organization these days. Hardware and software tools that are used in KM processes come from this department. So if these tools are not sufficient or not updated like using AI as an example, the KM processes will be degraded over time.
- Organizational structure and procedures: KM can impose a structural effect on the effectiveness of an organization since it influences the efficiency and effectiveness of daily routines. The more flexible the organizational structure and procedures are, the better they can be adapted to the changes related to KM [17].

The IT factor is considered important these days because of the big data available in organization [18]. These big data require IT tools and infrastructure. IT tool availability, IT tools' simplicity to use, and IT tools' ability to be used are three main factors related to IT factors in KM. the availability of IT tools means that there are efficient tools that employees in the organization can use to facilitate KM. These tools can be online meeting tools, knowledge-storing tools, knowledge-sharing tools, and so on [19].

The availability of these tools increases the knowledge-sharing process within the organization. The simplicity of these tools' use is also important [20]. It should be designed to be used by the unspecialized employee. Simplicity can be satisfied using tools description paper for each IT tool used. The ability to use IT tools is also important. Increasing the IT knowledge and skills of each employee in the organization is essential in this digital world [21].
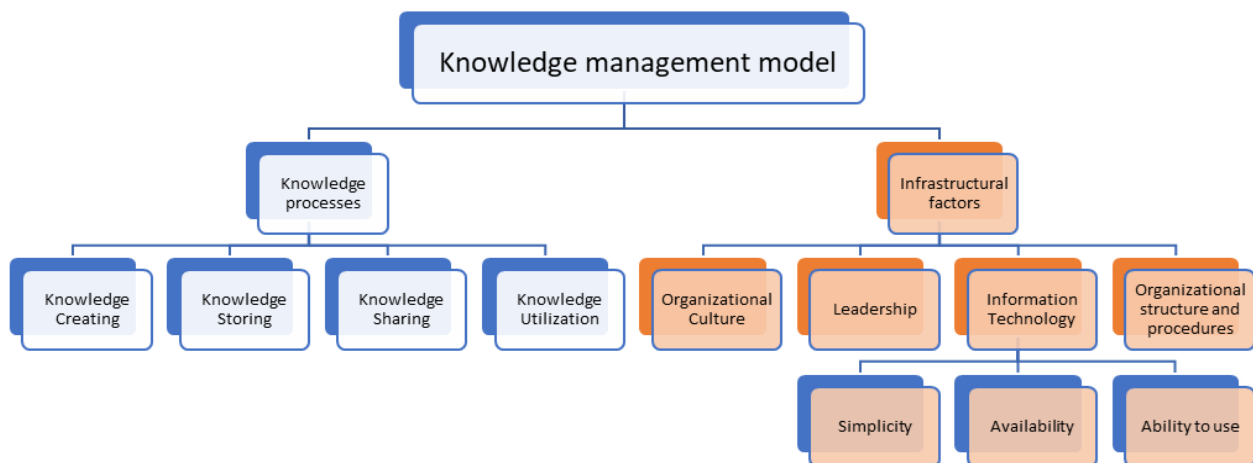

Fig. 2. Knowledge Management Model In The Organization

IV. IT FACTOR TO SUPPORT KM

IT sector in any organization is very important to facilitate the work between other sectors, departments, and employees. This importance comes from the increasing need for IT tools to communicate between employees, tools to store data, tools to share data, and the increase in finding online tools to work such as working on the cloud and making online meetings. The IT sector becomes essential year after year for any organization, company, or government work. This can leads to thinking more about the importance of enhancing the IT tools availability, ability to use, and simplicity to use. Several works discuss the use of IT to enhance the KM in the organization as shown in Table II. [22] discusses the use of IT

in knowledge-sharing practice. They conclude that IT can facilitate the knowledge-sharing process. These IT tools discussed such as databases, portals, and experts' profiles system. They focus on the role of Web 2.0 that helps knowledge sharing using social networking and blogs. The same concern about the IT tools used in knowledge sharing is discussed in [23].

Knowledge portal, Web 2.0, databases, data warehouse, and data and content management systems are discussed. All these tools play important roles in enhancing the knowledge management system in the organization. They are used to store, share, and identify, knowledge to capture and support the employee's work and to enhance access to the knowledge by employees.

The work of [24] admits that the ability to use IT tools facilitates the process of knowledge management system in the organization's performance. The use of these tools can facilitate the reach of knowledge using efficient storage systems and cloud storage. It also facilitates the reach of the knowledge by implementing simple-use tools if any employees background. Organization efficiency is the key metric of the work [25]. This work evaluates the importance of the IT tools available to reduce costs given the scarcity of current resources, shorten delivery time, increase quality and improve productivity. This work concludes that the higher the level of knowledge sharing with IT tools, the better the knowledge management result. The same concern of improving communication, shortening delivery time, and reducing cost are in [26]. They evaluate the importance of the IT tools available in the healthcare sector so that increased performance, error prevention, improve communication, and simple documentation is the main issue of using IT in healthcare KM. Employees in healthcare such as nurses and doctors shall use in the simple way the available IT tools to share patients' information.

The work in [18] discusses the KM from the point of taking appropriate decisions according to the data available and shared between all sectors in the organization. These days, to make appropriate decisions based on data available, intelligent IT tools should use in the organization such as non-contact monitoring devices, intelligent robots, telemedicine in the health sector, and Artificial Intelligence tools. The IT capability is discussed in [20]. They discuss the capability of the IT tools to enhance the organization's work. This work provides several implications for the business and IT executives to concentrate on leveraging both IT and KM capabilities for generating augmented organizational agility. The work of [21] evaluates the importance of IT availability in the business field. It concludes that efficient use of IT tools enhances innovation and increases the ability to sustain the business. This work evaluates the IT role by discussing the free exchange of news and allocation of knowledge, through the exploitation of company potential. Not only organizations, businesses, and the healthcare sector use IT to support KM. The work of [27] discusses the eLearning IT tools to facilitate knowledge sharing. Not only knowledge sharing, but also eLearning can help employees to enhance their skills.

Table II : Summary of the use of IT to improve KM

Reference	Nature of work	Field	IT factors	IT tools
[22]	Discusses the use of IT in knowledge-sharing practice	Organization	Availability	Web 2.0, Knowledge sharing tools
[23]	Discusses the use of IT in knowledge-sharing practice	Organization	Availability	Knowledge portal, Web 2.0, Databases, Data warehouse, Data and content management systems
[24]	Facilitate the reach of the knowledge using efficient storage systems	Organization	Ability to use IT tools	Data storage such as cloud storage.
[25]	To enhance the KM system by reducing cost and increasing storage	Organization	Availability	Data storage
[26]	Improve communication between employees	Healthcare	Availability	Data storage
[18]	To enhance the decision-making.	Organization	Availability, ability to use	Intelligent tools such as AI.
[20]	Discuss the capability of the IT tools to enhance the organization's work	Organization	Capability	Data exchange
[21]	Enhance the innovation and increase the ability to sustain the business	Business	Availability	Data exchange
[27]	Facilitate knowledge sharing and employee skills improvement	eLearning	Ability to use	eLearning platforms

V. INFORMATION TECHNOLOGY TOOLS IN KNOWLEDGE MANAGEMENT

Information Technology tools play a pivotal role in KM and handling of the data, novel ideas, and the exiting organizations' knowledge assets. Additionally, they play a non-trivial part in making effective communication and flow of knowledge across different domains and teams. It is a known fact that for any organization to bloom and thrive at full potential, no corner of the work setting shall remain untouched and be made more organized using the requisite set of tools. Any organization involves an interdependency model where no individual can cater to the entire business needs, rather, teams are involved and the flow of information amongst them is inevitable. Under such scenarios, maintaining a set of records and keeping a track of knowledge flow cannot be emphasized enough. With the dynamics of businesses changing every day, the use of advanced tools for record-keeping and knowledge sharing cannot be undermined at any cost. In modern times, various state-of-the-art IT tools have emerged that maintain the transparent flow of knowledge and information across individuals and teams. Additionally, they aid in maintaining records and provide analysis reports whenever and however desired. Ranging from the content repositories to providing support in taking decisions, their tools can fit along various domains of an organized workspace. This section will focus on giving a glimpse of such available tools as well as provide a summative analysis of how various tools can aid in handling tasks at various difficulty levels [28]. KM tools focus on a spectrum of knowledge types to optimize different areas of the organization's work. For instance, some of them are designed to make better collaborations while others are focused on record keeping or customer behavioral analysis, etc. For this study, the knowledge management tools have been categorized into 5 domains. These are listed below:

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- KM tools for maintaining a knowledge repository
- Database management systems
- Data and Information Analysis Tools
- Decision Assistive Tools
- Relationship Management and Correspondence Tools

This section illustrates how these categories of tools are assistive towards the KM in any organizational setting.

A. Knowledge Repositories

Knowledge repositories refer to the collection of digital documents and information that is originating from the communication resources, or the entire data management process. A typical problem with such data sources is that they are scattered across various decentralized servers where it is difficult for other people to access or have a holistic view of the entire management resources. Knowledge repositories, commonly termed databased, provide access to dedicated cloud or centralized servers where information content can be accessed by any individual (upon suitable levels of authorization). There are many variants of the knowledge repositories in the form of storage servers, and information management tools functioned as the organizational requirements. Some of the key features of the knowledge repositories are listed in Table III.

Table III : Knowledge Repositories Features

Features	Details	Relevant Tools	Availability	Simplicity of Use	Accessibility
Content Centralization	A range of information resources and content can be stored and accessed from a central location. The information can be shared and used globally across the organization	Microsoft Outlook, PHP, or other languages developed open web portals, etc.	Easily available	Assistance through a dashboard assessment makes them easy to use	Easy Accessibility
Content Management	The information content varies from recorded audio meetings, minutes, correspondence, employee records, and other documentary resources that can be segmented and accessed through organized dashboards	Windows OS, LANs, and Central Local Servers, Shared Computing Tools	Easily available	Assistance through a dashboard assessment makes them easy to use	Easy Accessibility
Cost Savings	By allowing individuals to have direct access to the information content, organizations can save up costs by optimizing and streamlining their business processes. This means, that deduced processing times and more potential to increase profits.		High		
User-Centric Access Control	Organizations aim to release limited information, especially classified content towards individuals. These databases provision an access control that can add a layer of safety and avoid non-authoritative access.		Provision for access control through a dashboard layer added	As simple as a login	Permissible
Maintaining Records	Organizational knowledge is what keeps the processes running. HR gets replaced often. Having records keeps new members abreast of the organizational memory.	Same tools as above	Simple	Simple	Accessible

B. Database Management Systems

These systems serve as the second layer of knowledge sharing, storing, and accessibility. Instead of making the knowledge resources readily available, these systems reside on the use of sophisticated programming environments that is now understandable by every individual. However, as illustrated in the previous part, these are programmed once and provided access to the user through an easy-to-use interface. These database resources are particularly required for tech organizations [29], [30]. Similarly, consumer organizations keep such databases handy for keeping records of structured data (products) and allow users to access them with ease. Some of the key features of the Database Management Systems are shown in Table IV.

Table IV : Features of a Database Management System

Features	Details	Relevant Tools	Availability	Simplicity of Use	Accessibility
Structured Storage and Access	Information is stored in the form of structures and computer-understandable languages. An easy transition is available while storing and retrieving information	Structured Query Languages (SQL), ORACLE, and advanced tools like Hadoop	Easily available	Require Programming Skills or pre-developed dashboards.	Easy Accessibility
Information Retention	Information can be retained in the form of archives spanning years of data.	ORACLE, Hadoop, or other cloud storage environments	Easily available	Require Programming Skills or pre-developed dashboards.	Easy Accessibility (Paid although)
Less prone to Data Loss	Unlike physical records, such databases make data saved with backups to avoid any data loss	Dedicated Servers and Backup Servers	Generally shared by multiple organizations	Dedicated IT team to handle these	Easy Accessibility (Paid although)

C. Data and Information Analysis Tools

These tools help serve as information visualization tools where information content is retrieved and presented to the user in the form of understandable formats. The core aim is to present information in a way that makes a smooth transformation from textual information to visual information in the form of graphs or other analysis models. When the data is in the form of thousands of records, it is imperative to use some statistical measures or similar models to render meaningful information.

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For instance, an HR resource aims to find the number of people who have worked in the organization during the past 10 years and were of age less than 40. Such inferences can be drawn using the visualization tools that assist in getting the desired information ready. Thus the overall aim is to extract information and present it in a desirable format. Some other examples of visualization tools are the 2D and 3D graphs, which provide more than one domain of data inspection. Table V shows the most important features of data analysis tools

Table V : Features of a Data Analysis Tools

Features	Details	Relevant Tools	Availability	Simplicity of Use	Accessibility
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D. Decision Assistive Tools

Decision assistive tools are the modern category of tools that require access to the history of events and data to generate inferences. These tools generally fall in the category of AI. The tools analyze the event history along with analyzing the trends contained inside them. Detailed discussion on use of such tools is out of scope for this work.

E. Relationship Management and Correspondence Tools

These are the most commonly used tools for knowledge management in any organization. One of the core processes that any organization incorporated in correspondence and communication in any form like emails, minutes of meetings, phone calls, etc. Such are the commonly used tools like email servers, audio recorders text converters, etc. Having these tools are part and parcel of any organization and their usage is highly user-friendly [31].

VI. CONCLUSION

The importance of the use of IT tools and their availability in any organization has been discussed in this paper. The review concern on the impact of the IT sector on the knowledge management of an organization. In general, there are different factors that play a role in KM such as the knowledge sharing, innovation and creativity, and the organization culture. All these factors besides the IT factor enhances the productivity of employees in the organization. A review of some papers that use IT tools as a supporting sector in the organization to satisfy KM have been discussed. The three factors that affect the IT sector importance are tools availability, ability to use the IT tools, and the simplicity of using them. This review also discusses some IT tools that can support the KM in the organization such as KM tools for maintaining a knowledge repository, Database management systems, Data and Information Analysis Tools, Decision Assistive Tools, and Relationship Management and Correspondence Tools.

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