

# Impacts Projection of Knowledge Technology on Future Organizations Using Dimensions Framework of Richard Daft

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## ABSTRACT

This study attempts to define and explain Knowledge Technology (KT) and further investigates the impacts KT would have on future organizational dimensions by using the framework of organizational dimensions proposed by Richard Daft to carry out the investigation. The study reveals that KT would completely ‘metamorphosizes organizations in all dimensions as proposed by Draft’s framework. Decentralization of information, elimination of middle-class managers, increase in the employment and deployment of knowledge-based machines like Expert systems (ES) artificial intelligence (AI) systems to carry out tasks, the reduction in employees’ workforce and the obsolescing of formal education, etc., are some of the projected impacts of KT on future organizations as revealed in this study.

Keywords: Knowledge Technology, Organization dimension, Knowledge Management, Information Technology, Centralization, professionalism, Structural dimensions

## I. INTRODUCTION

The information technology in the development of mankind has brought many innovative changes leading to the growth of contemporary techno-world. People look upon technology which automatically senses their needs for reducing the burden and time spent for their jobs. With the technology growing day by day, people expect the machine, i.e., normally an artificial equipment to do something in favour of his/her well-being.

According to Herman Singh, ICT is often compared to oxygen – you can’t really live without it. He believes this is especially true in the digital era where the way we work, live, learn, interact and advance within our respective societies depends on the digital revolution that is powered by sophisticated telecommunications networks. “The future of any brand is determined in the moment in the digital world, where customers are moving en masse to digital channels, forcing businesses to find relevant and creative ways to deliver a great digital customer experience. “The trend of declining

voice revenues and changing telecommunications landscape has forced operators to hunt for new revenue streams. With all the changes to compete and create competitive advantage in this new digital world, operators have to deliver an exceptional digital customer experience.”

Information technology (IT) or Information communication technology (ICT) has proven to be an indispensable tool in this 21<sup>st</sup> century. IT technological solutions such as emails, intranet, document management packages such as word processing software, etc., are very essential in solving basic routine and structured problems or tasks in offices and organizations. Albeit a lot of challenges still exist which required tools and techniques which would be tilted towards knowledge and that would augment current ICT tools. These knowledge-based tools would assist with events such as the creation of knowledge, the mapping of knowledge, the retrieval, and use of knowledge, etc. hence to ascertain what this knowledge technology would be and possibly project its impacts on future organizations, the study seeks to ask the questions below to underpin study.

[1] shed light on the impediments of integrating information and ICTs literacy, also mentioned as “21st century competencies”, into the school practice. Curricular stiffness and obsolete teaching and assessment procedures should be refined in order to upgrade substantially the educational practice. According to the 21st century curriculum, knowledge has a triple meaning. First of all, knowledge should enhance all 21st century competencies, such as information and media literacy skills, communication and collaborative skills, creativity, critical thinking and problem-solving skills as well as the way to use them effectively and productively for individual and social development. Furthermore, assessment should be flexible and based on specific and real-life contexts. Thus, 21st century competencies and pedagogy can play an integral role in structuring a trans-disciplinary

approach of the school curriculum [1]. The study aims to ascertain what knowledge technology is, its future, and the projected impact it would have on future organizations and the objectives of the study are as follows:

- i. To find out what knowledge technology is
- ii. To ascertain knowledge technology future and
- iii. To project the impacts of knowledge technology on future originations

## II. Literature Review

### 2.1 The Deference between Information and Knowledge

People often use information and knowledge interchangeably, albeit there is a thin line separating the duo. The term Information is used to specify and describe things and events, while knowledge is used to handle or evaluate things and events as they happen. Information is usually structured while knowledge is seldom in a structured manner [2]. There exists a plethora of literature about what these concepts of information and knowledge are. Hence, Table 1 classifies and summarizes most of the differences in these concepts in different kinds of literature as summarized by [2].

Table 1 : Deference between information and knowledge [2]

Information	Knowledge
Data in context	Information in action
Relations base	Pattern base
Objective	Subjective
People irrelevant	People relevant
Conceptual	Contextual
Categorizational and Classification	Interpretation and inference
Structural	Fuzzy
Static	Dynamic

Accumulate during the time	Growth during the time
Tend to Storage	Tend to distribute
Isolate Context	Shared context
Validation	validation
Invaluable	valuable
Support decision making	Support problem solving
Theory	Experience oriented

### 2.2 Definition of Knowledge Technology (KT)

It is very important to explain what knowledge is, presently, we are all living in a knowledge age. This began in 1990. Knowledge is the pacesetter of socio-economic transformation. In this present age, knowledge is so important to different types of users to gratify their information needs. Knowledge appears in so many dimensions in different sizes and shapes. It can be saved in a database, incorporated into organizations, printed on a sheet of paper and so forth. The progression of knowledge is an unbroken process (It is continuous). When a specific idea is formulated or organized systematically then knowledge is produced and created. Knowledge is produced from the relationship between the implicit (tacit), which is present in a person’s mind and the unambiguous (explicit). Knowledge is one of the most vital resources in any company or organization either in a business firm, academic, industrial or research organization. Many countries all over the globe use the relevance of knowledge to accomplish economic and social progress. In educational sectors, knowledge is present in administrators, individual faculty and some other resources like research reports, articles and journals. Knowledge is analyzed information [3] that is interconnected with other information and evaluated with what is known already.

There are two approaches to ICT or IT definitions: the narrow approach and the wide approach. In the narrow approach, the ICT or IT can be seen with the prism of technology only. That is, the ICT or IT technological components such as the hardware, software databases, networks, etc., which is a subset of information systems [4]. However, the wider approach sees ICT or IT as encompassing technological components with people (management and users), and all the procedures and processes involved in information generation, manipulation, and storage and retrieval. Hence, here, the term ICT or IT is substituted for Information Systems (IS) [5].

Similarly, KT in a broader context can be viewed as involving technology and people as well and the impact it has in our lives. This concept of KT is not new in respect of information systems research and practices. Albeit the radical metamorphosis in the environment of a business coupled with the limitations of the traditional information systems, IS is gradually evolving into knowledge management [6]. However, the KT focus in this study is on technology and tools divulge of other IS components such as people and processes, etc. Table 2 shows the definition of KT and IT as adopted by [2]

Table 2: definition of KT vs IT as adopted [2]

Approach Area	Narrow (Technical)	Broad (Systemic)
Information	IT	IT/IS
Knowledge	KT	KM

The definition of IT as narrowly defined by [7] is: *“Information technology (IT) or information and communications technology (ICT) is the technology required for information processing. In particular, the use of electronic computers and computer software to convert, store, protect, process, transmit, and retrieve information...”*

Hence, in this study the researcher defines KT with Wikipedia’s definition, incorporating the ‘knowledge life cycle’ function presented by many KM researchers like [4]. [4] enumerate these functions in six headings; Create, Capture, Store, Manage and Disseminate. Against this backdrop, the study defines KT as the technology required for the processing of knowledge. Specifically, the use of software and hardware to create, capture, refine, store, manage and disseminate knowledge. Furthermore, the concept of KT refers to a vague set of tools encompassing languages and software that enables a better representation, a better organization, and the transfer of information and knowledge [2].

**2.3 Knowledge Management Approach**

The ever-expanding literature on KM as it regards KT has availed us of a lot of alternative views on KT and different topologies of KM. Some of these topologies are as follows: generation, codification, personalization, transferring, conceptualization, reflecting, action, reviewing, identification, collection, Sharing, adaptation, and application [2]. Hence, faced with these divergent typologies several researchers have designed and developed models and frameworks which seek to integrate them. This study summarizes two of these frameworks or models as so below:

**2.3.1 Model 1: developed by [8]**

[8] used five key KM activities to develop their framework which permits KT opportunities to be identified. These key KM activities are creation/innovation, personalization, codification, discovery, and capture/monitor. In a bid to develop KT for these activity areas, approaches from knowledge engineering are employed. The crux of the work has to do with the evaluation and application of knowledge acquisition approaches and tools already in existence to aid the coding of knowledge for a large intranet system. Each of these five key activities of KM in this framework has the potentials to be supported by KM [8].

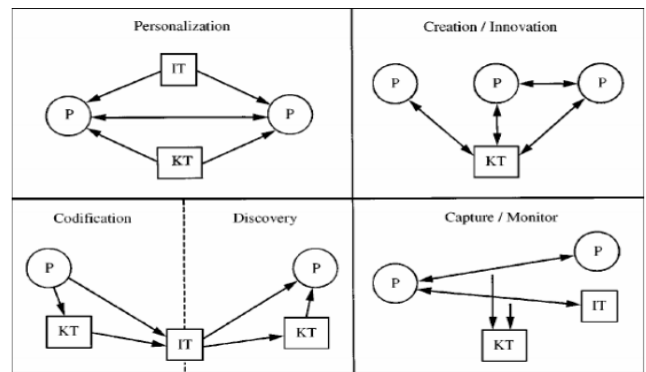


Figure 1: show the framework developed [8]

**2.3.2 Model 2: Marwick development Framework**

Marwick who works at IBM developed a framework for KM. He selected some technologies that add up to KM solutions that he reviewed making use of [9] model of organizational knowledge creation as the basis for his framework. The degrees to which knowledge is transformed within and among implied and unambiguous forms can be aided by these technologies were discussed in the framework couple with some likely trends of future events. Marwick's study discovered that the highest contribution to contemporary solutions is brought about by technological inventions that make use of explicit knowledge, e.g. search and classification. Albeit the KT formation contribution and the communicating of implied knowledge, and support for making it unambiguous, are currently lacking.

Table 3: KT Framework [10].

<b>Tacit to Tacit</b>	<b>Tacit to Explicit</b>
E-Meetings	Answering questions
Synchronous collaboration (Chat)	Annotation
<b>Tacit to Tacit</b>	<b>Tacit to Explicit</b>
Visualization	Text Search
Browsable video/audio of presentations	Document Categorization

**2.4 Knowledge Engineering Approach**

Tim Berners-Lee, the W3C Director predicted a three-generation revolution for modern-day technology. The first happened with the invention of the Internet, with its concomitant technologies such as HTML and HTTP,

bringing a lot of impacts in our daily lives that are undeniable. The revolution of the XML is the second. This second revolution has shifted the use and application of the Web from a static publishing space to the offering of dynamic services in the form of an application processing architecture. Applications such as e-business are perhaps the biggest XML revolution in today's world, the XML revolution's impact on every business model is imminent. This revolution has birthed mega and new business empires which have transformed the business world forever. With this second revolution many people are still asking, will another third revolution happen? The answer is a big yes. Already, we are at the threshold of a third revolution, which is predicted to be the rise of the Semantic Web. This third revolution would be a shift of web structure from the current information-based structure to a knowledge-based structure, and this would revolutionize industries in a similar way as its predecessor the HTML and XML did earlier. This third revolution will usher in knowledge technologies to the society.

This third revolution approach of KT will be such that, the KT will inculcate intelligence to IT or ICT by filtering information that is appropriate and presenting them when needed. The term KT is a vague set of apparatus such as software and languages that enables a better organization, representation, transfer, and exchange of data, information, and knowledge [11].

The maiden conference on KT held on March 2001 in Austin, USA, outlined areas and topics of the conference as follows: Knowledge Acquisition; Knowledge Modeling; Knowledge Interchange; Knowledge Access and Navigation; Topic Maps and XTM; Anthologies and Taxonomies; The Business of Knowledge; Resource Description Framework; Electronic Media Management; Semantic Web;

With the above thematic areas and classifications, the following classifications of KT can be deduced [2]: Knowledge Representation/Artificial Intelligence; Knowledge Organization/Libraries; Internet/Semantic Web; Document/Asset Management; Knowledge

Management /Knowledge Base System; Expert Systems/Agent Computing; Machine Learning /Robotics.

## 2.5 The Future of knowledge Technology

The EU's 6<sup>th</sup> framework program of the Information Society Technologies (IST) thematic priorities of 2002-2006 captures the vision and projections of ambient intelligence, where individuals would be pervaded with intuitive and intelligent interfaces implanted in objects used by people in their daily activities. These objects would be responsive to individuals in a visible way [12].

In general, the researches in KT will continually advance, and ways of improving knowledge across emerging networks and the Web would continue to progress, whether they are implanted in multimedia contents or implied in communications of humans. The main goal is to provide a guaranteed automated panacea for the creation and organization of the computing information knowledge arena to bring about new applications, and media services that can radically stimulate and bring about positive impacts. Research works will zero in on technologies that aid the process of knowledge: acquisition, modeling, navigation, retrieval, representation, visualization, interpretation, and sharing. These parameters would be inculcated into new semantic-based applications alongside context-aware systems that have the capabilities of cognitive and agent-based functionalities. Furthermore, these researches would address extensively the anthologies and knowledge resources to facilitate the interoperability of services across divergent platforms, birthing the next generation applications of the semantic web [2]. It is also expected that researches would be carried out on technologies that support the designing, creating, managing, and publication of content in multimedia that would span across networks that are fixed or mobile alongside their devices, with the devices having the capabilities of adapting to the expectations of users. As discussed earlier the overall goal is to stimulate or encourage the creation of content that is rich and

highly interactive that could be used for personal entertainment or broadcasting with the assurance of devices that are advance and media that could be trusted [12].

### III. METHODOLOGY

The study employs a system-related literature review research strategy to do justice to research objectives using Richard Draft's framework on organizations' dimensions.

#### 3.1 Projected Impacts of KT on Future Organizations

This section focus on the impacts of KT on organizational dimensions, an overview of the impacts of IT on organizations from reputable sources, and organizational theories shall form the basis for the investigation of KT impacts. Furthermore, to ascertain an organization's dimension the famous work of [13] is used to form the structural dimensions of the future organization as discussed herein.

#### 3.2 Formalization

The IT age brought about a decrease in the formalization of organization processes. Due to the high use of computers and electronic devices, bureaucracy in organizations fell to a minimum level. This reality is described in the words of [14] thus: "*...Aided by an electronic bureaucracy, customs and immigration are streamlined and goods move freely around the world...*". Hence, fewer amounts of physical documents are required in an organization albeit there is a need for more electronic documents, instructions, and procedures to cater to organizational activities. This can generally be captioned as IT documents. While in the knowledge domain, the documents are captioned – just in time documents (JITD), meaning when a document is needed, it can be instantiated from the scratch. This possibility of instant document formation from scratch can be achieved using some KTs such as digital object library (DOL), semantic web, and other agents. So in this domain, there will be no need for document storage and its management but rather, one will be required to

manage the DOLs or the contents objects that are sharable which are known to be handled by computer agents [15]. Also, in this domain, computerized systems are expected to be handled numerous tasks and the methods of performing them will be documented on a need-arising basis.

#### 3.3 Specialization

With the emergence of computing and the growing need for technology in the organization, the complexity of tasks and processes within organizations is also increasingly growing as well. Thus, many organizations are adding tasks or creating departments that are computer-driven to match up with the constantly evolving IT phenomenon. Furthermore, with the involvement of firms in e-commerce activities, there is a growing need for specialist staff [13]. Hence there is a decline in the demand for general business managers and increasing demand for managers who have a specialist in IT skills. With this paradigm shift in demands for technical specialist staff, occasioned by the IT age, everyone is asking and anxiously waiting for what will happen when the KT is fully manifested. Projections and predictions, have it that in the full manifestation of KT, there will be a specialization of machines since technologies such as knowledge-based systems (KBS), expert systems (ES), robots and computer agents are already in abundance. Hence, a lot of jobs are expected to go into extinction due to this new KT era. Jobs such as production work and processing of materials in industries would be replaced by robots and machines. Albeit people offering services and jobs such as restaurants, teaching, hairdressing may still be relevant as it is difficult to envisage machines or robots who are cook, hairdressers, etc., [13]. In the society where KT rules, workers would be required to be highly knowledgeable as they will be doing high-level jobs as there would be departments and individuals who are not the only specialist but who are also innovative and creative and who have a systematic approach and perspective of the world. This group of specialists may be designated as Meta Specialists [2].

### 3.4 Hierarchy of Authority

The IT age permits increased productivity in industries and elongate the control span of managers due to decreasing need for physical supervision. This is evidence of the continuous decrease in the middle management level [4]. As regards control, with the KT era, there would be a great diminution of control at the center to the individual units, as there would be a great percentage of autonomy at the dispersed units. This phenomenon occurs as a result of the capabilities of the lower personnel to handle or perform high-level tasks with the use of ES and artificial intelligence (AI); and also due to few numbers of staff available in the organization as a result of machine displacement [4]. Hence, it can be conjectured that, in the future, where knowledge systems would be in control of a good percentage of our lives, the hierarchy of control as it is a witness now would be dissipated. And the manager will seat at one point of machine control, having control that spans across all the reliable machines delegated with tasks.

### 3.5 Centralization

Advancement in IT has availed organizations the ability to cut down the layers in management making it possible for decision making to be at the sub-units instead of the center. Information sharing across units even traversing regions is made possible and easier as hitherto, the holding and hoarding of information only at the headquarter was inimical to fast development. But with KT, organizations would no longer require many people who would collaborate or congregate physically to share information. Albeit smaller units of individual groups who constitute the organization could be a distance apart and still be able to share the same kind of information electronically and carry out concerted efforts to deliver on the mandate of their organization.

Planning is crucial when it comes to events organization and delivery; many people spend hours in search of relevant information usually physically or on the Internet for planning and getting optimal solutions to their problems or challenges. Albeit with the full

manifestation of KT, this precious waste of man's time through search especially on the internet would become a thing of the past as the search engines and some ES and AIs would be available to offer knowledgeable and on-point solutions to numerous alternatives [18]. With this new trend, the decision-making at the middle management level would completely be passed to KT and only a few decisions would be left for the topmost and centralized headquarter to make. [2] called this new trend Post centration.

### 3.6 Professionalism

The advent of sophisticated IT systems necessitated the employment and deployment of highly educated professionals who would be able to use and maintain them [19]. But in the paradigm shift of KT, there would be a metamorphosis in the meaning of professionalism in the industries and the society at large. Formal academic learning that offers degrees or certificates would be replaced by continuous learning, as all workers would be trained on their job as they progress on the rungs of the ladder of their jobs. As the machine is predicted to replace a good number of working people as discussed earlier, two categories of workers would exist in the future. i.e., the low-level employees who do not require professional education to carry out simple tasks with the aid of machines and the second category of employees who are well trained to handle complexities that may arise from KT [16].

### 3.7 Personnel Ratio

In this era of IT in recent decades, there has been an increase in the ratio of staff to line workers in most industries, with clerical employees finding themselves substituted by machines and an upsurge in the demand for computer specialists as well handle these machines. Albeit it is projected that the advent of KT would seek to reverse this trend as the number of specialists would decline as it related the total number of employees in the industry [4]. On the other hand, many jobs are projected to fall under the ax of KT. Jobs such as middle-managers, administrators, and clerical staff would be replaced by knowledge-based systems. The

[18], 5-part organizational structure framework explains this inevitable reality of the future. The technical aiding staff, the middle liner, and the organizational administrative support staff would be substituted by intelligence machines while the top managers and core technicians would abide as high-

level and low-level employees, which would constitute a 2-part structure for organizations.

Table 4 adopted by [2] shows the comparison of the impacts on dimensions for IT and KT, while in the remaining aspect of the work, the individual impact of KT dimensions would be discussed in more detail.

Table 4 shows the comparison of the impacts on dimensions for IT and KT [2]

	<b>IT Impact</b>	<b>KT Impact</b>
<b>Formalization</b>	IT- document	JIT- document
<b>Specialization</b>	Specialized Department/Specialized Staff	Machine Specialization/Meta Specialized Staff
<b>Hierarchy of Authority</b>	Wide-span control	Machine point control
<b>Centralization</b>	Decentralized Decision Making	Post centralized Decision Making
<b>Professionalism</b>	Mass- oriented	Geniuses- oriented
<b>Personal Ratio</b>	5- Part Structure	2- Part Structure

#### IV.CONCLUSION AND FUTURE WORKS

##### 4.1 Conclusion

This study attempts to define and explain what KT is and further investigates the impacts KT would have on future organizational dimensions by adopting the organization dimensions' framework of Richard Daft. The study reveals that KT would completely 'metamorphosizes organizations in all dimensions as proposed by Daft's framework. Decentralization of information, elimination of middle-class managers, increase in the employment and deployment of knowledge-based machines like Expert systems (ES) artificial intelligence (AI) systems to carry out tasks, the reduction in employees' workforce and the obsolescing of formal education, etc., are some of the projected impacts of KT on future organizations as revealed in this study.

##### 4.2 Future Works

Some gaps still exist in this study for future studies that would consolidate this work. That is, it is imperative to carry out a work that centers on contextual dimensions in industries such as size, strategies, culture, and technology to underpin deeper impacts of KT on future

organizations. Also, the work did not consider any technical aspects of the KT, as it would have been more appropriate and germane to analyze some results gotten in the process under an actual case study.

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