Pak. j. life soc. Sci. (2024), 22(2): 17692-17699 E-ISSN: 2221-7630;P-ISSN: 1727-4915

Pakistan Journal of Life and Social Sciences

www.pjlss.edu.pk

https://doi.org/10.57239/PJLSS-2024-22.2.001289

RESEARCH ARTICLE

Basic Approaches to Digital Transformation Contexts in Higher Education: Reality and Dimensions, an 'Analytical Approach'

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ARTICLE INFO

Received: Oct 17, 2024

Accepted: Dec 5, 2024

Keywords

Digitization

Digital Transformation

Visual Representation

Higher Education

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ABSTRACT

The organization of community institutions is moving towards the optimal use of information technology within the framework of what is known as digital transformation. Accordingly, the presentation addresses the concept of digital transformation, which has become an urgent necessity required by the effectiveness of change and development to benefit from information technology applications, due to the technological revolution's outputs, marking a turning point in the field of informatics and communications. Therefore, the presentation aims to raise awareness of the importance of digital transformation, to increase awareness of the need to bridge the digital divide among user groups, and to update knowledge and applications and employ them effectively for the public good. It uses an analytical approach to theorize the context of digital transformation in general, and in higher education in particular, by adopting the analytical method to describe the concept of digital transformation, define its characteristics and goals, and track the forms of digital transformation and the use of communication technology in various aspects of life and in public institutions. It also addresses the difficulties faced in its implementation, in addition to defining the stages and contexts of digital transformation, with a reference to digital transformation applications in higher education institutions as a model.

INTRODUCTION:

The contemporary world is witnessing a tremendous technological revolution in information and communication technologies. It has become imperative for countries today to engage in the process of change and digital transformation and to move towards the widespread adoption of digital transactions to organize the affairs of community institutions and their administrative structures across various fields and activities. The 21st century has brought a number of clear changes, both locally and globally, with the most prominent manifestations being the efforts to generalize the use of communication technology in public institutions, particularly in the higher education and scientific research sectors, exemplified by the creation of the National Digitalization Committee in 2022.

The importance of digital transformation lies in its becoming a necessity required by all institutions as a fundamental entry point for organizational development. Practically, the outcomes of digital transformation cannot be overlooked, such as achieving abundance in information, speed of flow, and accessibility through various digital platforms. It also offers immense potential for storing

information sources and simplifying the search process within digital collections and retrieving information in various ways, along with reducing costs compared to traditional methods (paper copies). Furthermore, it enables the availability of information to a broader range of beneficiaries and users through digital platforms and archiving them as digital resources accessible remotely in the shortest time frame. Additionally, we must not forget the constant updating of digital information and the provision of access to original digitized information to elevate the level of scientific research in parallel with the advancement of information services.

Objectives:

The study aims to introduce digital transformation technologies by presenting an overview of the characteristics and objectives of digital transformation to understand its essence. The presentation also seeks to emphasize the most prominent and widely used digital applications that have enhanced the effectiveness of digital transformation in various aspects of life. It aims to provide an objective diagnosis of the challenges identified by the global research institution Gartner, which must be taken into account to achieve the best results. Additionally, the presentation aims to outline the stages of digital transformation and the mechanisms for its implementation in the higher education sector in Algeria.

In fact, several justifications have emerged for studying this topic. On a personal level, education is at the forefront of my interests due to my professional field, which necessitates openness to its developments, especially with the creation of the National Digitalization Committee in 2022, making digital transformation a tangible reality in the university space. The shift from a paper-based system to digitization, as part of the "Zero Paper Administration" project, represents a qualitative gain, alongside providing human resources with training sessions to bridge the digital divide within the training team. On an objective level, digital transformation is a necessity imposed by the challenges of modernization and global change.

Problem:

The main issue revolves around the fact that while the contemporary world is witnessing a significant leap in various fields due to technological development and its use, what are the underlying factors and drivers behind digital transformation? We will answer this issue through the following sub-questions: What is meant by digital transformation? What are its characteristics and expected goals? What are the obstacles hindering the implementation of digital transformation? What are the prospects for the application of digital transformation in Algeria, particularly in the higher education sector? To address this issue and its sub-questions, an analytical approach will be adopted, progressing through the following sections:

First: The Essence of Digital Transformation in Algeria: A Reading of Characteristics and Objectives

1- **Conceptual Meaning: Digitization and Digital Transformation:**

The term digitization is a relatively new term that emerged with digital technology. According to the Oxford Dictionary (online), digitization refers to "the process of converting printed or graphic documents on paper or film into electronic digital signals for reading by a computer, carried out by electronically scanning the document." In this sense, digitization revolves around the broader concept of a purely technical process that uses electronic devices to transform files and information sources from their traditional physical (paper) form (books, images, documents) into a symbolic format that can be stored, preserved, and retrieved, whether using a computer or various smart devices.

There are multiple definitions of digital transformation, and this difference is likely due to the perspective from which the researcher views the concept and the area being studied. Some of these definitions include:

- **Digital transformation is defined as:** "The process by which companies transition to a business model that relies on digital technologies to innovate products and services, offering new revenue channels and opportunities that increase the value of their products."
- **Digital transformation is also defined as:** "The integration of digital technology into business operations, a fundamental change in how businesses operate and deliver value to customers. It is also a cultural change that requires organizations to constantly challenge the status quo, experiment, and overcome failure."
- **According to Riemer, "Digital transformation** refers to the changes resulting from the rapid development of digital technologies, which disrupt how value is produced, social interactions, business behavior, and, in general, how we think."
- **Digital transformation is also defined as:** "The shift of an organization from dealing only with physical resources to focusing on informational resources that rely on the internet and business networks, where it tends to abstract and hide things and their connections to the extent that informational, intellectual, and knowledge-based capital becomes the most effective factor in achieving its goals and utilizing its resources."

These definitions, varying across fields such as law, political science, economics, development, and higher education, all focus on a common theme: the intensive use of digital technologies within institutions and organizations to achieve quality in production in response to the ongoing digital environmental evolution.

2. Characteristics of Digital Transformation

Some of the key characteristics that digital transformation is distinguished by include:

- **Interactivity**: The roles of the communicator and the recipient are exchanged, making communication a two-way, reciprocal process rather than a one-way direction, with dialogue occurring between both parties.
- **Asynchronicity**: This refers to the ability to interact with the communication process at a time that suits the individual, whether as a recipient or a sender.
- **Participation and Dissemination**: Digital transformation allows anyone with simple tools to be a publisher of their message and share it with others.
- **Media Integration**: In digital transformation, all communication mediums are utilized, such as text, sound, still images, moving images, two-dimensional and three-dimensional graphics, and other forms of media.
- **Flexibility**: Digital networks are flexible, as digital systems are usually controlled by software on electronic computers, enabling high-quality usage.
- **Intelligence**: Digital networks possess a high degree of intelligence, as the digital system can be designed to continuously monitor changes in communication channels and correct their course.

The characteristics of digital transformation provide individuals, groups, institutions, or organizations with the flexibility to engage with and interact with the digital world using simple tools, with speed and precision, and share their experiences with others. This leads to access to a range of high-quality services, thanks to the latest applications, such as artificial intelligence technologies.

3. Objectives of Digital Transformation

Among the goals that digital transformation aims to achieve, we mention the following:

- **Eliminating Bureaucracy**: The shift from paper-based transactions to electronic ones will significantly contribute to improving administrative management. It will save effort and time as services are provided without complications or difficulties.
- **Promoting and Enhancing Technological Culture**: Technology experts emphasize the necessity of having a mechanism for the free exchange of information and working to raise citizens' technological culture, with a focus on education at all stages.
- **Combating Administrative Corruption**: This requires the shift toward technology and adopting the digital society model to keep up with the world around us, along with implementing e-government systems.
- **Moving Toward the Digital Economy**: The digital society is a modern, advanced society formed by the integration of information and communication technology in the home, work, and entertainment. This will have a positive impact on the reform process.
- **Preserving and Protecting Original Information Sources from Damage, Disasters, and Loss**: Digital transformation facilitates the search within digital collections and the retrieval of information in various ways, while reducing costs compared to traditional methods. It also involves "zero paper" and providing information services with new technologies, such as digital reference services and machine translation.
- **Expanding Access to Traditional Information Sources**: By making information available to a wider range of beneficiaries and users through digital platforms and archiving them as digital resources that can be accessed remotely. This reduces the time taken for information to reach its recipients and users from its original source. Continuous updating of digital information and access to original digitized information leads to the advancement of scientific research through the improvement of advanced information services.

The objectives of digital transformation represent positive outcomes that benefit both individuals and society. They aim to improve various aspects of life administratively by saving effort and time and reducing the burden of paperwork. Additionally, they focus on the storage, archiving, and protection of files to prevent loss, in order to use them to achieve progress and the desired development.

Second: Digital Transformation and Diagnosing Barriers to Implementation

1- Forms of Digital Transformation

Digital transformation has various forms and levels, but some of the most widely used and prevalent technologies include:

- **Smartphone Applications**: These are the most widely used and prevalent technologies today, where institutions can create their own applications to manage their activities and simplify services for both members and beneficiaries.
- **Cloud Computing**: This refers to all computational resources and systems available on-demand via the network, providing a range of integrated computing services. These services include offering data storage space, backup, automatic synchronization, as well as software processing capabilities, task scheduling, email management, printing, and remote access.
- **Internet of Things (IoT)**: This is a network of physical devices, vehicles, household appliances, and other electronic devices such as computers, sensors, and motors that can connect and exchange data with each other.

- **Artificial Intelligence (AI)**: AI refers to the ability of certain programs and computer systems to mimic human behavior and mental capabilities, particularly the ability to learn and deduce. These programs and systems understand their surrounding environment and contribute to finding solutions to the problems they encounter.These are the most prevalent technologies, and the type of technology an organization needs depends on the nature of the activity it targets and the specific audience it aims to serve.

2. Barriers to Digital Transformation

A recent study conducted by the global research firm Gartner identified several barriers that IT managers must overcome to transition their organizations into digital businesses:

- **Barrier 1: Culture of Resistance to Change**
  Digital innovation can only succeed by fostering a culture of collaboration. Employees must be able to work together, explore new ideas, and break through boundaries. However, the current reality shows that most institutions are stuck in a culture that resists change, one based on individualism and hierarchical structures. IT managers who want to create a new digital culture should start by clearly defining a digital mindset, assembling a digital innovation team, collaborating with them, and protecting them from the rest of the organization to allow the development of the new work culture. Once this is achieved, links between digital innovations and core teams can be strengthened to broaden new ideas and spread the new work culture.
- **Barrier 2: Limited Participation and Collaboration**
  The unwillingness to participate and collaborate is not only a challenge for organizational workflows between institutions but also a significant challenge within any organization itself. The issues of controlling processes, information, and systems ownership make employees hesitant to share their knowledge and expertise. Often, the issue of digital innovation with teams sharing multiple tasks is very different from what employees are accustomed to in terms of roles and hierarchies. Therefore, resistance to participation and collaboration must emerge.
- **Barrier 3: Institutions Are Not Ready Yet**
  While many business leaders have paid attention to the buzz around digital business, when IT managers and heads of data and digital operations try to start the digital transformation process, they find that institutions still lack the necessary skills or resources to implement it.
- **Barrier 4: Talent Gap**
  Most organizations follow a traditional working pattern, where work is organized into specific tasks such as IT, sales, and supply chains, with a heavy focus on operations. In such environments, change can be slow. Digital innovation requires organizations to adopt a completely different approach, one that blends employees, operations, and technology together to create new business models and services. Employees also need new skills, focusing on innovation, change, and creativity, alongside a focus on new technologies like Artificial Intelligence (AI) and the Internet of Things (IoT).
- **Barrier 5: Current Practices Do Not Support Talent**
  Having the right talent is crucial, but the right practices allow talent to work more effectively. Traditional, highly organized, and slow processes cannot support digital transformation. There are no ready-made or tested business models to implement, and each organization must find business practices that best support their talent.
- **Barrier 6: Change Is Not Easy**
  Implementing digital business is often costly and technically challenging. Developing platforms, changing organizational structures, and creating work systems with partners requires significant time, resources, and money. Over the long term, institutions must build organizational capabilities that make the change process simpler and faster. They can achieve this by developing a strategy based on an open platform that supports design principles and continuous change

processes, ultimately boosting innovation on this platform and providing new services built on this platform.

Third: Context of Digital Transformation: From Paperization to Digitization

1. **Stages of Digital Transformation as a Turning Point in Information Technology:**

Most studies addressing digital transformation have identified three stages:

1-A: Digitization (Modeling) Digitization is the first stage, which refers to converting analog information into a digital format (i.e., into zeros and ones) so that computer systems can store, process, and transmit this information. Digitization involves changing analog tasks into digital ones, or conceptualizing them as an IT approach for existing tasks. Broadly, it is viewed as the development or empowerment of cost-effective resource configurations using IT. For example, digitization can be seen in the use of digital forms for orders, digital surveys, or digital applications for internal financial advertising. Digitization primarily works on transforming internal and external documents into digital formats, but it does not change the value-creation activities themselves.

1-B: Digitalization (Visual Representation) The second stage of digital transformation is digitalization (visual representation), which involves the use of IT or digital technologies to change existing business processes. This may include the creation of new communication channels via the internet or mobile phones, which allow customers to interact more easily with companies and alter traditional interactions between businesses and customers. This change often involves the organization of new technological social structures with digital products that were not possible without digital technologies. In the realm of digital technology, IT acts as a crucial enabler for tapping into new business opportunities by changing existing business processes, such as distribution communication or managing business relationships. Through digitalization, companies apply digital technologies to improve current business processes by allowing more effective coordination between operations or by adding value for customers through enhanced customer experiences. Therefore, digitalization is not just about cost-saving.

1-C: Digital Transformation The third and most prevalent stage is digital transformation, which describes the change at the company level that leads to the development of new business models. These new models may be novel for leading companies or the industry in general, as businesses compete to gain a competitive advantage through their business models and the ways in which they create and deliver value to customers. Digital transformation also involves turning the returns from digital processes into profits. This stage offers a new business model by applying a new logic for creating and sustaining value, affecting the entire company and how it conducts business. Digital transformation goes beyond digitalization, which changes basic processes and organizational tasks; it reorganizes operations to fundamentally alter a company's way of creating value. For example, in the healthcare sector, digital transformation is exemplified by the widespread and deep integration of IT, which fundamentally changes how healthcare services are delivered. IT usage in this context is transformational, leading to substantial changes in current business processes, procedures, and capabilities, and enabling healthcare providers to enter or exit new markets. Digital transformation has become an essential requirement for modernizing all sectors, especially the education sector, which contributes to achieving sustainable development for human resources, helping to align with the knowledge economy and the digital revolution brought about by IT and communications advancements.

2. Digital Transformation Strategies in Higher Education:

In the context of digital transformation in universities, the Ministry of Higher Education and Scientific Research has adopted several technological solutions as alternatives to traditional methods. Some of the key initiatives include:

- Decision No. 1242 dated September 22, 2022, urges the establishment of a sectoral committee to implement and monitor distance education in higher education institutions.
- Activation of the Moodle platform for distance teaching, as stated in Instruction No. 1792 for teaching horizontal units remotely.
- Use of educational platforms and links to other platforms for learning, interaction, and research in e-learning, such as Zoom, Skype, and Google Meet.
- Creation of an automated application for certifying national university degrees, enabling students to submit certification requests after they have been validated by the Vice Presidency for Higher Education at the university for both the first and second stages, continuous education, diplomas, and higher education in training. The platform is available at: (https://progres.mesrs.dz/webauthentification).
- The PROGRES system, which includes various links, some dedicated to training and student life, allowing student registration and grade entry by professors (PROGRES.MESRS.Dz/webtve), and another link for managing human resources in the higher education sector (PROGRES.MESRS.Dz/wear).
- Links for extracting administrative documents, such as the field training certificate for students.
- Official pages on social media platforms like Facebook and Instagram for each university to publish and communicate with students.
- Complete abandonment of publishing and posting announcements within the university institution, now carried out using social media tools such as Facebook and WhatsApp, with groups created on these platforms for communication between students and professors. This is part of the Zero Paper policy adopted by the ministry, as well as internal institutional instructions such as Instruction No. 2006 dated November 21, 2021.
- In the context of the generalization of the "Zero Paper" policy, PhD thesis discussions are held remotely through a digital platform, such as Dspace for PhD theses, where students no longer need to create paper models and submit them to the committee, according to Instruction No. 1475 dated October 6, 2022.
- Activation of the digital library for each faculty under the supervision of the National Office of University Publications.

CONCLUSION:

In light of analyzing the context of digital transformation, it becomes evident that digital transformation is the outcome of the scientific and technological revolution. Humanity now lives in an era profoundly dominated by knowledge. If we were to describe the 21st century, we might call it the age of the Internet generation and the dominance of information technology. Thus, it has become imperative for individuals to integrate into the knowledge society to fulfill their existential needs as thinking beings eager for knowledge and learning. This also involves broadening the horizons of thought, transitioning from traditional, patterned thinking to a more expansive, creative approach. Consequently, institutions must modernize to transition into the knowledge society, effectively joining the digital world. True power lies in the ability to think and translate ideas into tangible, productive outcomes. It is also worth noting that adopting technological tools in the context of digital transformation must be paralleled by preparing human resources through training programs, updating knowledge, and keeping pace with new applications.

The objectives and characteristics of digital transformation reveal current positive impacts and promising future outcomes, as technology has turned the world into a global village governed by information. Digital transformation will contribute to improving services and enhancing productivity, making it a priority for both public and private sector institutions. This requires regular reforms to keep up with the seamless and flexible advancements in utilizing technological tools. Higher education stands at the core of digital transformation due to its wealth of pedagogical activities and research practices that continuously engage with electronic information. Therefore,

digital transformation in higher education holds significant strength and importance as it provides a flexible educational environment free from routine and monotony. It does so by adopting e-learning, distance education, and leveraging educational and communication platforms to serve the cause of knowledge and learning effectively.

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