

RESEARCH  
ARTICLE**Digital Transformation: A Study of Application Requirements****Ftissi Fouzia**

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Digital transformation, Information and communications technology, requirements.

**Abstract**

The progress of modern societies is increasingly measured by their ability to embrace digitalization. In today's age of information and communication technologies, digital transformation has become a necessity rather than a choice. The swift global shift towards digital financial services, e-payment systems, and other forms of technological integration has prompted most nations to pursue digitalization to keep pace with international advancements and deliver a qualitative leap across all sectors. However, transitioning from traditional systems to digital infrastructures is a complex endeavor that requires the fulfillment of several critical conditions. This paper examines the key requirements needed for the successful implementation of digital transformation at all levels. It also explores viable recommendations to facilitate its effective realization.

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**Received:** 06.01.2025**Accepted:** 14.03.2025**Published:** 15.05.2025 (available online)**Introduction:**

In recent decades, digital transformation has significantly expanded across various fields, bringing with it profound changes in the global landscape. It represents one of the most advanced tools adopted by developed countries to bridge the technological gap and stay in tune with the speed and efficiency demands of modern life. Digital transformation allows institutions to offer high-quality services through electronic transactions utilizing the internet, social networks, and artificial intelligence. As such, it is now indispensable for any entity seeking improvement and sustainability.

Nonetheless, the effective implementation of digital transformation requires a favorable environment and a set of interrelated prerequisites. These are vital for transitioning into a digital society capable of providing high-quality services that are easily accessible and cost-effective, anytime and anywhere. Hence, this study aims to identify the primary requirements for digital transformation and raise awareness among decision-makers regarding the critical elements necessary for a successful digital transition.

## Research Question:

What are the main requirements for implementing digital transformation?

## Methodology:

To address this question, the study employs both descriptive and analytical methods. The discussion is structured as follows:

### 1. Concept of Digital Transformation

- Definition
- Key Features
- Objectives

### 2. Requirements for Digital Transformation

- Legal and Political Requirements
- Administrative and Financial Requirements
- Human and Technological Requirements

## First: Concept of Digital Transformation

### 1. Definition:

Several academic definitions of digital transformation exist. Broadly, it can be understood as the application of modern technological tools—such as mobile phones, computers, and social media platforms—to enhance core business operations, streamline processes, and develop innovative business models.<sup>1</sup>

It is also described as the replacement of traditional human-driven systems with automated solutions, particularly in fields like education and training, thereby reshaping organizational structures and human resource configurations.<sup>2</sup>

Some researchers define it as the conversion of various information sources (books, periodicals, audio recordings, visual media, etc.) into machine-readable formats via binary code, which serves as the foundation of information systems<sup>3</sup>. Others describe it as a form of electronic documentation achieved either through:

- Image-based digitization, or
- Text-based digitization, allowing for modifications via optical character recognition (OCR) software.<sup>4</sup>

Digital transformation has also been framed as a comprehensive shift driven by automation, dematerialization, and the reorganization of mediation processes, affecting all institutional activities.<sup>5</sup> It entails the integration of technologies into all business functions (marketing, supply chain, finance, HR) to enhance performance, customer engagement, and competitiveness.<sup>6</sup>

Digital transformation has been defined as "a new business model based on the use of digital technologies to innovate

<sup>1</sup> - Adel Mohamed Mohamed Mohamed, "Requirements for Implementing Digital Transformation to Achieve the Goals of Educational Institutions in Egypt," *Journal of the Faculty of Education in Benha, Faculty of Education, Benha University, Part 1, Issue 133, 2023, p. 554.*

<sup>2</sup> - Ibid.

<sup>3</sup> - Eid Meni'a, "The Reality of Digital Transformation in the Algerian Tax Administration - A Case Study of the Tax Center in Tissemsilt Province," in the international collective book: *Digital Economy and Its Implications on Intellectual Property Rights*, Maghreb-Near East Center for Strategic Studies, United Kingdom - Britain, 2023, p. 114.

<sup>4</sup> - Ibid., pp. 114-115

<sup>5</sup> - Rania Tegaoua and Bouchama Chouam, "Digital Transformation as a Strategic Option in Light of the Transition Towards the Digital Economy in Algeria: An Exploratory Study," *Journal of Economy and Environment*, Vol. 6, No. 1, 2023, p. 422.

<sup>6</sup> - Ibid.

new products and services, their distribution methods, and a focus on the customer or user."<sup>7</sup> It is also described as "innovation through comprehensive change and the integration of available digital technologies into the processes of creating and producing value, business leadership, and especially our way of thinking."<sup>8</sup>

According to some authors, digital transformation is considered one of the most significant trends in the current era across industry and service sectors. It has become a fundamental characteristic of modern life. Digital transformation is a comprehensive program that affects an organization and its internal operations, as well as how it delivers services to its target audience more easily and quickly<sup>9</sup>. It is also defined as "the use of technology to support radical changes in an organization's operations."<sup>10</sup>

Digital transformation also refers to the shift from a traditional system to a digital one based on information and communication technologies across all work areas. This shift requires several elements, including developing a digital transformation strategy, promoting a digital culture, designing digital programs, managing and financing digital transformation, and addressing human, technical, security, and legislative requirements.<sup>11</sup>

Based on the above, digital transformation can be described as a change process focused on converting information and data using new technologies that rely on the internet.

## 2. Key Features:

Digital transformation manifests through various technological innovations, including:

- Widespread internet connectivity
- Automation of knowledge
- Internet of Things (IoT)
- Cloud computing
- Advanced robotics
- Self-driving vehicles
- 3D printing<sup>12</sup>

## 3. Objectives:

The main goals of digital transformation include:

- Enhancing access to public services and ensuring their quality
- Strengthening digital communication infrastructure and optimizing cost-efficiency
- Leveraging technological advancements in ICT
- Promoting transparency, operational security, and data protection
- Reforming education and training systems to develop future-ready skills
- Innovating business models and improving public-sector governance frameworks<sup>13</sup>

<sup>7</sup> - Sadouki Ghrissi, Si Tayeb Hachmi Reda, and Ali Al-Absi, "The Reality and Importance of Digital Transformation and Automation," *Aray Journal for Economic and Administrative Studies*, University Center of Aflou, Algeria, Vol. 3, No. 2, 2021, p. 101.

<sup>8</sup> - Ibid.

<sup>9</sup> - Mohamed Haj Qassi, "Digital Transformation in Algeria Amid Challenges of Digitizing the Economy and Public Administrations," *Journal of Legal and Economic Studies*, Vol. 5, No. 2, 2022, p. 1104.

<sup>10</sup> - Ibid.

<sup>11</sup> - Mostafa Ahmed Amin, "Digital Transformation in Egyptian Universities as a Requirement for Achieving a Knowledge Society," *Journal of Educational Administration*, Issue 19, 2018, pp. 17-18.

<sup>12</sup> - Sadouki Ghrissi, Si Tayeb Hachmi Reda, and Ali Al-Absi, *ob.cit.* p. 103.

The **Arab League** identifies similar objectives, including:

- Increasing operational efficiency and reducing transaction costs
- Creating new job opportunities through digitally-driven business ventures
- Enabling governments to deliver high-quality, accessible public services
- Facilitating social participation and digital communication
- Enhancing internal administrative control and monitoring <sup>14</sup>

## **Second: Requirements for Implementing Digital Transformation**

### *Definition:*

In the Arabic language, the term "requirement" denotes the act of seeking or attempting to obtain something. According to Webster's Dictionary, a requirement is defined as "something that is required in advance" or "an essential condition; something needed or necessary; a need." Similarly, the Oxford English Dictionary defines it as "something that is needed or asked for; a necessity or prerequisite.

Scholar Al-Sukkari views requirements as the identification of existing or potential resources, programs, and collaborative efforts aimed at linking and coordinating these resources to avoid duplication, conflict, and competition, thereby determining the scope and awareness of the services provided.<sup>15</sup>

Requirements are also understood as the essential needs necessary to perform a specific task, established through predefined standards. The Oxford Learner's Dictionary defines a requirement as "something that you need or want; something that you must have in order to do something else." <sup>16</sup>

Procedurally, requirements can be defined as a set of conditions and elements that must be present within a system to transition from a traditional state to a new electronic state.<sup>17</sup>

The requirements for implementing digital transformation are characterized as a comprehensive infrastructure, including high-speed communication tools and modern devices; the qualification and training of personnel in the use of modern technologies; and the development of systems and legislation capable of managing institutions.

### **1. Legal and Political Requirements:**

The successful implementation of digital transformation necessitates the modernization of legislation and regulations to align with digital advancements. Numerous legal domains require updates to accommodate digital applications, particularly those related to financial transactions, intellectual property rights, trademarks, electronic commerce, electronic signatures, cybercrimes, piracy, social media platforms, and information management systems. Consequently, it is imperative to revise and update existing laws to meet the demands of digital transformation, ensuring they keep pace with technological developments and rapid changes in this field. This involves establishing a legal <sup>18</sup> framework that governs and regulates the use of digital technologies, providing necessary safeguards for

<sup>13</sup> - Adel Mohamed Mohamed Mohamed, *ob.cit*, p. 557

<sup>14</sup> - *Ibid.*, pp. 557-558.

<sup>15</sup> - Mohamed Awad Ali Al-Banna, "Requirements of Digital Transformation in NGOs in Light of the National Digital Transformation Strategy Egypt 2030," *Journal of the Humanities Sector*, Al-Azhar University, Issue 32, 2023, pp. 169-170. Available at: [https://jsh.journals.ekb.eg/article\\_330922\\_8f3202ba4c4ded6d6621545d09fd5508.pdf](https://jsh.journals.ekb.eg/article_330922_8f3202ba4c4ded6d6621545d09fd5508.pdf) (Accessed: 11 May 2025, 15:00)

<sup>16</sup> - See: Wahiba Harsh and Samir Youssef Khawaja, "Requirements and Obstacles of Implementing E-Management in Algerian Administration," *Ruaa Journal for Cognitive and Civilizational Studies*, Vol. 70, No. 2, 2021, p. 166.

<sup>17</sup> - Adel Mohamed Mohamed Mohamed, *ob.cit*, p. 548.

<sup>18</sup> - *Ibid.*, p. 562.

stakeholders, thereby expediting and facilitating the digital transformation agenda (Zhen Ch., Jie G., Fang LI, Thithuha N. (2025).

Accordingly, it is essential to enact the necessary legal statutes for the application of digital transformation. This includes pre-implementation measures, such as defining a legal framework that recognizes electronic transformation; measures during implementation, by addressing legal gaps and deficiencies that may arise at any stage of the transformation process; and post-implementation measures, by enacting laws that ensure the security of electronic transactions and delineate punitive procedures for individuals involved in cybercrimes.<sup>19</sup>

### Political Requirements for Digital Transformation

Political requirements are manifested through the presence of a political will that supports the digital transformation strategy and endorses e-governance projects. This support can be provided through both material and moral assistance, which aids in overcoming obstacles and contributes to the overall development of digital transformation programs.<sup>20</sup>

### 2. Administrative and Financial Requirements:

#### Organizational and Managerial Requirements for Digital Transformation

1. **Organizational Restructuring:** Implementing e-administration necessitates reorganizing various structures, processes, and procedures within institutions to align with the demands of digital transformation. This may involve establishing new departments or dissolving existing ones, thereby requiring specific organizational prerequisites. Utilizing technology without an advanced administrative framework does not guarantee institutional success.<sup>21</sup>
2. **Leadership and Administrative Support:** Effective leadership is pivotal in facilitating digital transformation. Leaders play a crucial role in creating an environment conducive to change, fostering inter-organizational relationships, and devising solutions to enhance service delivery.<sup>22</sup>
3. **Organizational Structure:** Traditional hierarchical structures with multiple levels and independent tasks are incompatible with e-administration. Digital transformation demands a modern, flexible organizational framework, preferably a network-based structure supported by advanced technological and informational infrastructure. Additionally, cultivating an organizational culture that emphasizes innovation, initiative, performance enhancement, and efficient task execution is essential.<sup>23</sup> Transitioning to more adaptable structures, such as networks and dynamic units interconnected through communication systems, is necessary. This includes establishing new departments, merging existing ones, and revising internal procedures to foster an efficient and effective e-administration.<sup>24</sup>
4. **Cultural Shift and Digital Literacy:** Altering individual mindsets and fostering a digital culture across institutions is imperative. Engaging all employees in the digital transformation process ensures a comprehensive cultural shift.
5. **Eliminating Bureaucratic Obstacles:** Reducing bureaucratic hurdles that impede change and development is crucial for a smooth transition to digital systems.
6. **Management and Funding of Digital Transformation:** Allocating adequate financial resources to all institutions is vital to support the digital transformation process effectively.

In summary, transitioning from traditional systems to digital frameworks requires effective change management and sufficient financial allocations to ensure the successful implementation of digital transformation initiatives.

<sup>19</sup> - Achour Abdel Karim, "The Role of Electronic Administration in Rationalizing Public Service in the United States and Algeria," Master's thesis, Department of Political Science and International Relations, Faculty of Law and Political Science, Mentouri University - Constantine (Algeria), 2009/2010, p. 24.

<sup>20</sup> - *Ibid.*, p. 25.

<sup>21</sup> - Adel Mohamed Mohamed Mohamed, *ob.cit.*, p. 562.

<sup>22</sup> - Wahiba Harsh and Samir Youssef Khouja, *ob.cit.*, p. 171.

<sup>23</sup> - Hussein Mohamed Al-Hassan, *Electronic Administration: Concepts, Characteristics, Requirements*, Al-Warraq Publishing and Distribution, Amman, 2011, p. 156.

<sup>24</sup> - Wahiba Harsh and Samir Youssef Khouja, *ob.cit.*, p. 172.

### **3. Human and Technological Requirements:**

Human capital is a pivotal element in the successful implementation of digital transformation initiatives. The process necessitates a comprehensive approach that encompasses both human and technical dimensions to ensure effective transition and sustainability.

Entering the digital realm necessitates the development and enhancement of human resources to establish a cadre of specialized, qualified, and well-trained personnel possessing high-level human skills pertinent to the foundational environment of information systems<sup>25</sup>, databases, and internet-based work systems<sup>26</sup>. In other words, it is imperative to cultivate knowledge workers in the digital field. This underscores the necessity of disseminating computer literacy among citizens and employees prior to implementing digital transformation, to avert potential obstacles that may arise during implementation due to misunderstandings stemming from a lack of scientific and practical knowledge of this new approach<sup>27</sup>.

From a technical standpoint, the volume and complexity of data and information generated by various e-government applications necessitate the establishment of a sophisticated, nationwide institutional information network. This network should be integrated with the internet to facilitate the rapid, accurate, and efficient transmission of textual, audio, and visual data, while ensuring the security of the exchanged information. Consequently, transitioning from traditional administrative frameworks to electronic governance applications mandates that institutions digitize their operational activities encompassed by these applications. It also requires the identification and conversion of all interactions between beneficiaries and relevant entities into electronic transactions, alongside enhancing the performance of administrative bodies and improving the quality of all services provided<sup>28</sup>.

Therefore, it is imperative to establish a robust infrastructure that serves as the backbone and foundational support for the digital transformation process. This includes the development and enhancement of communication networks to ensure they are comprehensive, ready for use, and capable of handling a substantial volume of simultaneous communications, thereby achieving the intended benefits of internet utilization. Additionally, it involves providing appropriate digital technologies, including equipment, computers, systems, databases, and software, as well as offering digital mail services. All these components should be widely accessible for both individual and institutional use. The technical infrastructure is divided into:

#### **Technical Infrastructure Requirements**

A robust and advanced technical infrastructure forms the backbone of any digital transformation effort. Key components include:

- **Hard Infrastructure:** This encompasses physical elements such as high-speed internet connectivity, modern computing devices, and secure data storage solutions.
- **Soft Infrastructure:** Involves software applications, digital platforms, and cloud-based services that support business processes and data management.

<sup>25</sup> - Adel Mohamed Mohamed Mohamed, *ob.cit*, p. 563.

<sup>26</sup> - Asia Belkadi, "Requirements of Digital Transformation and Their Role in Improving the Quality Level of Services Provided in the Telecommunications Sector - A Case Study of Algérie Télécom in Sétif Province," *Journal of Finance, Investment, and Sustainable Development*, Vol. 9, No. 1, 2024, pp. 695-696.

<sup>27</sup> -Jumana Abdul Wahab Shalabi, *The Reality of Electronic Management at the Islamic University and Its Impact on Organizational Development*, Master's Thesis, Department of Business Administration, Faculty of Commerce, Islamic University of Gaza, 2011, p. 19.

<sup>28</sup> - Adel Mohamed Mohamed Mohamed, *ob.cit*, p. 563.

- **Communication Networks:** The establishment of reliable internal (intranet) and external (extranet) networks facilitates seamless information exchange and collaboration among stakeholders.<sup>29</sup>

Therefore, it becomes evident that digital transformation necessitates the establishment of a robust and advanced infrastructure through:

- Developing high-efficiency local communication networks.
- Ensuring the availability of necessary equipment, tools, and software to activate digital technology, achieved through a system comprising devices, operating systems, storage media, and software applications.
- Providing the human resources required to operate the infrastructure, including experts and specialized personnel for implementing digital technology and facilitating its usage, as well as consultants in change management to organize the digital transformation process.
- Building a strong, accurate, and advanced database.<sup>30</sup>

Therefore, the digital transformation process necessitates both human and technical requirements, highlighted by the need to provide specialized experts in digital transformation and to establish a robust and advanced technical infrastructure capable of accommodating substantial data flows.

It is noteworthy that some have identified three primary requirements for digital transformation:

- Defining an appropriate digital transformation strategy.
- Understanding the available operational mechanisms and assessing the importance and effectiveness of each, such as equipped facilities and internet connectivity, to ensure quality communication.<sup>31</sup>
- Training all employees on the mechanisms of digital transformation to ensure effective implementation. Additionally, promoting a digital culture is crucial, which includes advocating for digital literacy and emphasizing individuals' rights to training in the use of modern technologies.<sup>32</sup>

Others have added further requirements, including:

- Comprehending the transformative impact of digital change, recognizing it not merely as a goal or luxury, but as a necessity to keep pace with global developments and achieve leadership.
- Developing a comprehensive digital transformation strategy.
- Establishing a general framework for digital transformation.
- Investing in the development of digital innovators.<sup>33</sup>

## Conclusion

Digital transformation is no longer a luxury or optional trend—it is a necessity for countries, governments, and organizations. The COVID-19 pandemic accelerated this shift, revealing the urgent need for digital readiness. However, the transition from conventional to digital systems hinges on meeting specific requirements and cultivating an enabling environment.

<sup>29</sup> - Moussa Abdel Nasser and Mohamed Qureshi, "The Contribution of Electronic Management to the Development of Administrative Work in Higher Education Institutions: A Case Study of the Faculty of Science and Technology at the University of Biskra, Algeria," *Al-Bahith Journal*, Issue 09, 2011, p. 91.

<sup>30</sup> - Sabrina Cheraga, "Requirements of Digital Transformation in the Algerian Insurance Sector," *Journal of Finance, Investment, and Sustainable Development*, Vol. 06, No. 02, 2021, pp. 257-258.

<sup>31</sup> - Mohamed Haj Qassi, *ob.cit*, p. 1104.

<sup>32</sup> - Adel Mohamed Mohamed Mohamed, *ob.cit*, pp. 563-564.

<sup>33</sup> - Ibid, p. 564.



### Findings:

- Digital transformation is essential, not optional.
- Global technological shifts have compelled nations to adopt digital tools.
- Successful transformation depends on legal, political, administrative, financial, human, and technical conditions.
- Despite challenges, many countries strive to meet these requirements.

### Recommendations:

- Develop realistic and applicable digital strategies across sectors
- Establish robust ICT infrastructure
- Guarantee cybersecurity and data protection
- Update legislation to reflect digital needs
- Cultivate technical expertise and reduce dependency on foreign technology
- Promote public-private cooperation and learn from global best practices
- Foster digital culture and responsible citizenship among all social groups

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