



Digital transformation in Algerian Enterprises: reality and challenges

التحول الرقمي في المؤسسات الجزائرية: الواقع والتحديات

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Abstract

Keywords

This study aims to provide a comprehensive vision of digital transformation in Algerian institutions, by give insight into the reality of adopting digital technology, identifying the factors that motivate and support digital transformation, as well as presenting the most important challenges and main obstacles facing it and ways to overcome them to achieve a successful and sustainable digital transformation. The study concluded that despite the availability of digital infrastructure and investment in it, and despite the good adoption of information and communication technology by institutions, digital transformation is still in its early stages and is affected by challenges and obstacles represented by the lack of skills and digital culture, resistance to change, organizational culture, and financial constraints.

Digital transformation ;
Digital transformation strategy;
institutions; ;
information technology ;

JEL Classification Codes : O32 ; O33 ; L22 ; M15

الكلمات المفتاحية

المخلص

تهدف هذه الدراسة إلى تقديم رؤية شاملة حول التحول الرقمي في المؤسسات الجزائرية، وذلك من خلال تسليط الضوء على واقع تبني التكنولوجيا الرقمية، تحديد العوامل المحفزة والداعمة للتحول الرقمي، وكذا عرض أهم التحديات والعقبات الرئيسية التي تواجهه وسبل تجاوزها لتحقيق تحول رقمي ناجح ومستدام. ولقد توصلت الدراسة إلى أنه على الرغم من توفر البنية التحتية الرقمية و الإستثمار فيها و على الرغم أيضا من التبني جيد لتكنولوجيا المعلومات والاتصالات من قبل المؤسسات و لكن لا يزال التحول الرقمي في مراحله الأولى و متأثرا بالتحديات و العقبات التي تتمثل في نقص المهارات و الثقافة الرقمية و مقاومة التغيير و ثقافة المنظمة و كذا القيود المالية .

تصنيف JEL : O32 ؛ O33 ؛ L22 ؛ M15

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I.INTRODUCTION:

The rapid pace of technological advancement has disrupted traditional business models, making digital transformation an urgent necessity for organizations worldwide, which has prompted them to strive to harness the power of technology to improve their operational efficiency and open new horizons for innovation and growth, as well as to maintain their competitiveness and ensure leadership in the field of business. Digital transformation is a comprehensive process that relies on the use of digital technology to change how organizations operate, provide their services, and adapt their business models to meet challenges, including changes in organizational culture, operations, and performance, with the aim of achieving sustainable improvements.

At the national level, Algerian organizations are not outside the global changes and technological progress, as digital transformation can play important role in improving the efficiency and quality of services provided, as well as reducing bureaucracy and promoting economic growth. However, the stage of full digital adoption is still fraught with challenges and obstacles ranging from insufficient infrastructure to resistance to change by leadership or organizations members and the adoption of an appropriate digital strategy. Despite the efforts and initiatives aimed at modernizing the public and private sectors in order to support digital transformation, Algerian institutions still face major challenges that hinder their progress in this path, due to technological, organizational and cultural barriers. The pace and depth of digital transformation within public and private institutions are still not sufficiently studied. In the context of the above, the problem of this study will be as follows: What is the reality of digital transformation in Algerian institutions, and what are the most prominent challenges facing institutions in the digital transformation phase?

1.2 Hypotheses:

Organizations with clear digital transformation strategies experience higher levels of operational efficiency than organizations without such strategies.

The lack of adequate digital infrastructure and data management capabilities poses a major challenge in implementing digital transformation in Algerian organizations.

Leadership commitment is positively associated with the success of digital transformation in Algerian organizations.

Employee skill development programs and continuous change management positively impact the success of digital transformation initiatives in organizations.

Organizational culture that is resistant to change is a major obstacle to digital transformation in Algerian organizations.

Employee resistance to change is one of the main challenges facing the implementation of digital transformation in Algerian organizations.

1.3 The aims:

This study seeks to achieve the following objectives:

- Present and evaluate the digital transformation scene in Algerian institutions;
- Highlight the role of digital transformation and its impact on operational efficiency and service provision;

- Explore the main obstacles and challenges facing digital transformation in Algerian institutions;
- Provide insights and recommendations for Algerian institutions and policy makers.

Study methodology:

The study relied on the descriptive analytical approach to present and describe the study variables, by reviewing a set of research and studies related to the subject.

II.THEORETICAL FRAMEWORK AND PREVIOUS STUDIES:

In a study by researchers Hajar Khalaf Allah and Khaled Ben Jaloul entitled The Contribution of Digital Transformation in Supporting the Competitiveness of Food Industries: A Case Study of Omar Ben Omar Company, Guelma Branch, they demonstrated the impact relationships between the explanatory variables represented by the requirements of digital transformation and the dimensions of competitiveness: creativity, innovation, quality, excellence, cost and flexibility. By distributing a questionnaire to a sample of 50 individuals, the study showed:

The existence of a positive impact of emerging technologies in supporting the digital transformation path of companies.

The existence of a moral impact of digital transformation strategies and digital transformation techniques in supporting creativity and innovation, as well as raising employee awareness of the importance of digital transformation and its impact on the culture of the institution.

The failure to adopt a digital transformation strategy constitutes a major obstacle to the company achieving its full digital potential.

1. Literature on digital transformation:

A. The concept and importance of digital transformation:

Several concepts of digital transformation have been widely raised in academic articles. We mention among them:

(Vial, 2019) defines digital transformation as "a process that aims to improve an entity by triggering significant changes to its properties through combinations of information, computing, communication, and connectivity technologies".

(Hess, Matt, Benlian, & Wiesböck, 2016) agrees with this concept, as they defined digital transformation as: "the use of new digital technologies (social media, mobile, analytics or embedded devices) to enable major business improvements (such as enhancing customer experience, streamlining operations or creating new business models)".

Digital transformation is also defined as: "The use of new digital technologies, such as social media, mobile, analytics, or embedded devices, to enable major business improvements" (Westerman, Bonnet, & McAfee, 2014, p. 5).

Digital transformation is an important and vital step for organizations in an era characterized by rapid changes in the technological field. The importance of digital transformation is evident in:

- Digital transformation helps improve operational efficiency, by automating routine tasks, allowing employees to focus on more strategic activities, thus reducing time and costs.
- Improving customer experience, as customer data can be analyzed and communication with them enhanced through multiple digital platforms to provide customized services that meet their needs and respond quickly to their inquiries.

- Digital transformation provides opportunities to enhance innovation, by developing innovative products and services that meet growing demand, and quickly adapting to changes in the market and customer needs.
- Digital transformation enables the collection and analysis of huge amounts of data, which enhances the ability to make strategic decisions based on accurate information.
- Digital transformation helps organizations open new markets and adapt to rapid changes in the market.
- Digital transformation helps improve cybersecurity measures and data protection.
- Digital transformation improves resource efficiency and reduces waste, which enhances sustainability.
- Contributes to achieving social responsibility goals by improving services and solutions for society.

B. Dimensions of digital transformation:

Digital transformation is a comprehensive process that includes several dimensions: technological, organizational, economic and social, which interact and integrate with each other to achieve the organization's goals and enhance its competitiveness in the age of digital technology. These dimensions are as follows:

- Technological dimension: Includes adopting and integrating emerging digital technologies, such as artificial intelligence, cloud computing, the Internet of Things, big data, and robotic process automation to ensure the speed and efficiency of operations, in addition to updating the technological infrastructure to be more efficient and capable of supporting new technologies (Westerman, Bonnet, & McAfee, 2014).
- Organizational dimension: Reviewing the design of the organizational structure, with the need to enhance the culture of innovation and change within the organization, to enhance the speed of response and adaptation to developments in line with the requirements of the digital age (Berghaus & Back, 2016).
- Human dimension: Includes training employees, developing their digital skills, supporting them and motivating them to accept digital changes in order to adapt to new technologies and methods and participate in the transformation process (Chantias, Myers, & Hess, 2019).
- Strategic dimension: This includes developing strategies that focus on using digital technologies to innovate and develop new business models (Nambisan, Wright, & Feldman, 2019). In addition to enhancing the customer experience by providing personalized, fast and efficient services through digital channels (Fitzgerald, Kruschwitz, Bonnet, & Welch, 2013).
- Economic dimension: By evaluating the financial benefits of digital transformation and improving operational efficiency.
- Social dimension: Studying how digital transformation affects society, including its impact on job opportunities and required skills, while enhancing the institution's role in social responsibility through digital initiatives.

- Security dimension: Focusing on protecting data and information from cyber threats and developing strategies to manage risks associated with digital transformation.

2. The reality of digital transformation in Algerian institutions:

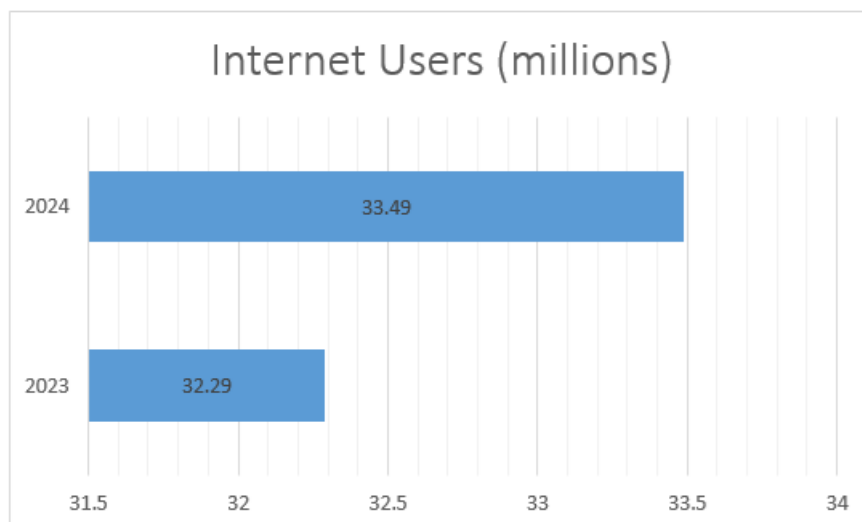
Countries around the world, including countries in the Middle East and North Africa, are increasingly investing in digital transformation strategies. Many countries have adopted e-government platforms to improve the efficiency of public service. However, the pace and success of digital transformation depends on factors such as governance, infrastructure, and human capital. Like the countries of the Middle East and North Africa, Algeria has made significant investments in technical infrastructure, including plans to extend submarine fiber optic cables to surrounding countries, such as Spain, Niger, and Nigeria, and has worked to provide good coverage of the 4G network, but the quality of the network remains low.

A. Digital Infrastructure:

The Internet-led digital transformation has redefined business strategies globally, enabling companies to embrace innovative technologies such as artificial intelligence, mobile apps, and data analytics to stay competitive and meet evolving consumer needs. (Sharma, Mishra, Vinay, & Srivastav, 2023) highlighted that the rise in the number of Internet users has had a profound impact on businesses, e-commerce, and digital transformation. The increasing number of Internet users has accelerated the expansion of e-commerce, enabling businesses to reach wider markets, reduce costs, and enhance operational efficiency. The integration of digital technologies has also allowed businesses to improve operations, enhance consumer experiences, and streamline processes in industries such as online retail and digital marketing. Furthermore, the integration of e-commerce and digital transformation has facilitated multi-channel strategies and personalized interactions with consumers, transforming traditional business models (Sharma, Srivastava, & Fatima, 2023). Small businesses are also adopting e-commerce as a core strategy to compete in the digital marketplace, despite facing unique challenges (Drew, 2003).

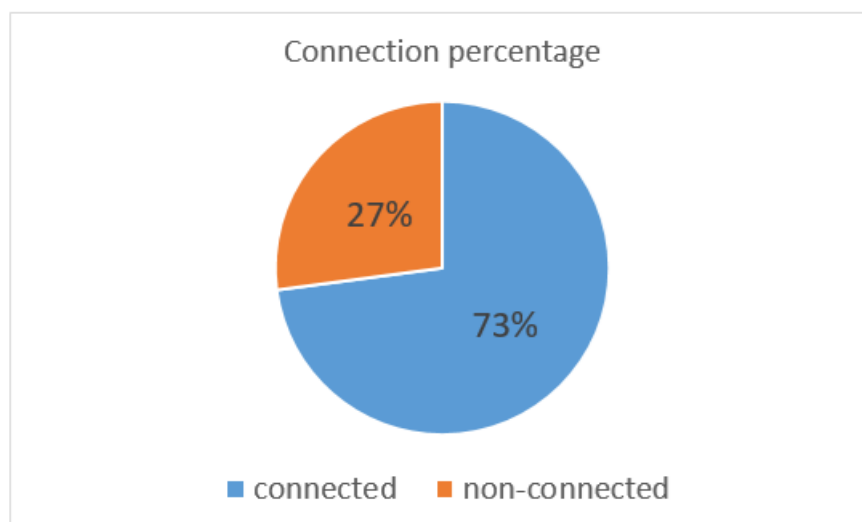
In Algeria, the digital society is represented by the number of Internet users, which constitutes the digital infrastructure. As of January 2024, 33.49 million people in Algeria are Internet users, which represents 72.9% of the population. Internet use has seen significant annual growth, with 1.2 million additional users (+3.9%) compared to January 2023. However, 12.46 million Algerians, or 27.1%, remained offline at the beginning of 2024.

Figure (01): Internet Users in Algeria



Source: (Prepared by researchers).

Figure (02): Connected users in Algeria



Source: (Prepared by researchers).

Internet speeds also improved. Mobile internet speeds over cellular networks increased by 59.4% to 21.36 Mbps, while fixed broadband speeds grew by 12.0% to 12.32 Mbps. Algeria had 24.85 million active social media users at the beginning of 2024, equivalent to 54.1% of the total population. Social media usage increased significantly, with 2.2 million new users (+9.5%) compared to early 2023. In terms of social diversity on social media, 41% of users are female, while 59% are male.

Facebook continued to dominate, with 24.85 million users in Algeria at the beginning of 2024, representing 54.1% of the population. Meanwhile, YouTube ads reached 22.80 million users, representing 49.6% of the total population. Instagram also saw significant growth, with 11.40 million users, up 35.7% compared to the previous year. Despite the progress, Algeria still lags behind developed countries. The main issues are internet connectivity and limited access to high-speed broadband in rural areas where 24.5% of the total population is concentrated (75.5% of Algeria's population lives in urban areas) (Kemp, 2024).

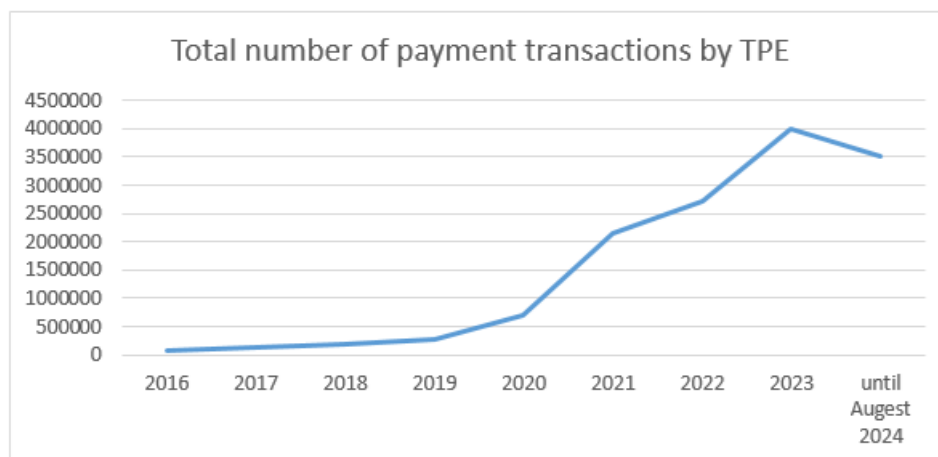
Since the launch of electronic payment in 2016 and until 2024, there are 510 online stores that rely on the electronic payment service, resulting in about 48,491,701 transactions (GIE Monetique, 2024).

Table (01): Total number of TPE in operation

Year	Total number of TPE in operation
2016	5049
2017	11985
2018	15397
2019	23762
2020	33945
2021	37561
2022	46263
2023	53191
until August 2024	58194

Source: (GIE Monetique, <https://giemonetique.dz/activite-paiement-sur-tpe/>, 2024).

Figure (03): Total Number of payment transaction by TPE



Source: (GIE Monetique, <https://giemonetique.dz/activite-paiement-sur-tpe/>, 2024).

B.At the level of institutions and small and medium-sized companies:

There are over 1 million registered SMEs in Algeria. 97.1% of these are micro-enterprises, employing fewer than 10 employees. The informal sector is large.

There is good adoption of basic ICT by SMEs. In contrast, there is low adoption of more advanced ICTs such as ERP software.

Big tech companies and foreign providers are attracting Algerians' attention online, with 14 of the 20 most visited websites in Algeria being foreign.

Tech startups are on the rise, with over 900 startups identified and over 40 receiving the government's Startup Label

Little venture capital activity – between 2011 and 2020, only 3 startups raised over \$100,000 compared to 13 in Tunisia and 92 in Egypt.

Algeria has the highest rate of female engineers in the world according to UNESCO

Not enough IT engineering graduates annually

Brain drain is a major issue

Talent lacks the necessary skills (Digital & DAAS e.V, 2020).

Technologies such as cloud computing, artificial intelligence, and the Internet of Things are starting to make their way into Algerian businesses, although adoption is slower than in leading countries in the region such as Morocco and Tunisia. Algeria's major companies, particularly in the telecommunications and energy sectors, are at the forefront of this transformation (Ramdani & Boudinar, 2021).

C.Data protection and localization:

This is considered a challenge for national and foreign companies to enter the Algerian digital market. In fact, digitalization includes personal data and involves its protection. Algeria has established a legal framework for data privacy through Law No. 18-07, issued on June 10, 2018. This law defines the conditions for the collection, recording, organization, storage, adaptation, modification, extraction, consultation, use, communication, transmission, publication or making available of personal data. The National Authority for the Protection of Personal Data (ANPDP) is the main body responsible for regulating data privacy and is responsible for supervising the implementation and enforcement of data protection laws in the country. This body ensures that personal data is processed in accordance with legal standards to protect the privacy of individuals and personal information (Algeria, 2018).

D.Digitization of Human Resources:

In the Algerian business context, HR digitization has faced significant obstacles. Ramdani and Boudinar noted that the HR function is at the core of the digital transformation process, but it faces significant resistance due to structural and cultural issues. The lack of a comprehensive digital strategy across organizations leads to fragmented HR systems and slow adaptation to employee needs, making it difficult for companies to keep up with global trends (Ramdani & Boudinar, 2021).

E.Accounting Information Systems (AIS):

Digital transformation has had a limited impact on accounting information systems (AIS) in Algerian enterprises. According to a study by (Meraghni, Bekkouche, & Demdoun, 2021), there is low awareness of the importance of digitizing accounting systems among Algerian enterprises. The study, which surveyed 237 individuals from 120 enterprises, concluded that enterprises have not sufficiently updated their automated information systems to meet the requirements of digital transformation. Factors such as insufficient infrastructure, poor digital culture, and limited financial resources were identified as major barriers.

F.Oil and Gas Sector:

Algeria's oil and gas sector, one of the country's key industries, has been slow to embrace digital transformation. Despite the significant benefits digital technologies offer, including real-time data collection and predictive analytics, companies in the sector have been reluctant to fully integrate these tools. A case study of digital transformation initiatives within a national drilling contractor revealed challenges such as poor data integration, lack of standardized processes, and organizational inertia, all of which hinder effective digitization (Arnaout, Sarah, & Gerhard , 2019).

3. Challenges and Opportunities of Digital Transformation in Algeria

A. Challenges of Digital Transformation in Algeria:

The digital transformation process in Algerian institutions faces several challenges, the most prominent of which are:

- Weak technological infrastructure: The undeveloped technological infrastructure is one of the most prominent barriers to digital transformation in Algeria. The digital ecosystem in Algeria suffers from insufficient internet penetration, limited access to high-speed broadband, and poor data management systems. These constraints prevent companies from fully benefiting from digital tools

and platforms, which slows down the digital transformation process across multiple sectors (Arnaout, Sarah, & Gerhard , 2019).

- Lack of digital competencies and skills: The lack of a digitally educated workforce is a major obstacle to the successful implementation of digital transformation strategies, as Molchanova indicates that the lack of qualified professionals capable of managing digital projects and integrating new technologies hinders companies' ability to take full advantage of digital opportunities. Moreover, insufficient training and education exacerbate this challenge (Molchanova, 2023).
- Cultural and organizational challenges: Resistance to change within organizational structures and adherence to traditional business models hinders innovation and poses a major challenge to digital transformation in Algerian organizations. The lack of clear plans for digital transformation by senior management and poor awareness of its importance lead to insufficient investment in both technology and human resources (Hu, Wu, & Yu, 2023). Digital transformation projects may also face resistance to change from employees.
- Financial constraints: The high costs of investing in technology and infrastructure and the difficulty of obtaining the necessary funding to support digital transformation projects can be an obstacle for many organizations
- Security concerns: Increased risks related to cybersecurity and data breaches make organizations reluctant to adopt digital solutions.
- Legal framework: The absence of clear legislation supporting digital transformation, which affects decision-making.

B. Opportunities for Algerian companies in digital transformation:

The digital transformation process represents a great opportunity for Algerian companies to enhance their competitive capabilities and achieve success in the market. The most prominent opportunities available are:

- Increase operational efficiency: Despite the many challenges, the digital transformation of Algerian companies offers great potential to improve operational efficiency. For example, the oil and gas sector can benefit from real-time data reporting systems that improve drilling performance and optimize resource allocation. By adopting digital transformation, Algerian companies can reduce costs, improve accuracy, and enhance overall efficiency (Arnaout, Sarah, & Gerhard , 2019).
- Boost innovation and product development: Digital technologies provide Algerian companies with the tools to innovate and create new products, and thus enter new markets. Integrating advanced digital systems allows companies to streamline product development processes, customize offerings according to customer requirements, and remain competitive in the global market. The adoption of cloud computing, artificial intelligence, and the Internet of Things can put Algerian companies in a position to drive significant innovation (Hu, Wu, & Yu, 2023).
- Enhancing competitiveness: Digital transformation has the potential to increase the competitiveness of Algerian institutions at the national and global levels. By digitizing processes, improving customer service, and adopting advanced technologies, Algerian companies can strengthen their market presence and expand their operations, as the competitive advantage gained

from digital adoption allows companies to become more flexible and responsive to changing market conditions (Wolf, Arlett, & Christian , 2018).

- Improving customer experience and expanding markets: Organizations can improve customer experience by enhancing communication with them across multiple digital platforms and providing personalized services, which facilitates a rapid response to their needs, thus enhancing their satisfaction and loyalty. E-commerce can also open new horizons for national institutions, by selling products and services online, allowing access to customers beyond local borders.

III.CONCLUSION:

The digital transformation in the Algerian enterprises is still in its early stages, characterized by slow progress and numerous challenges. Technological limitations, organizational inertia, and workforce inadequacies are some of the major obstacles hindering widespread digital adoption. However, the potential for growth, innovation, and enhanced efficiency presents a compelling case for Algerian companies to prioritize digital transformation. With the right infrastructure, education, and strategic investments, Algerian enterprises can overcome these challenges and fully reap the benefits of the digital age.

Through the results of the study, we propose the following recommendations for effective strategies to achieve success in the digital age:

- Enhancing digital culture among employees, by encouraging creative thinking and a culture of innovation and building a corporate culture that supports change and reduces employee resistance to digital transformation.
- Encouraging investment in modern technologies, such as cloud computing, artificial intelligence, and the Internet of Things.
- Performing cybersecurity measures to protect sensitive data and information.
- Using data to improve customer experience by enhancing interaction and communication across multiple channels and providing personalized services that enhance customer satisfaction and loyalty.
- Providing training courses to develop employees' digital skills and encourage employees to self-learn and innovate in their fields.
- Strengthening partnerships and cooperation with technology companies to exchange knowledge and expertise.
- Focusing on continuous innovation in products and services to meet market changes and the ability to adapt.

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