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The impact of digital transformation on enhancing service quality dimensions in higher education: An applied study at the Faculty of Economics, Setif 1 University

Saadi Ayad[1] **Mohamed Fouad Henni**[2]

Abstract

The study aimed to analyse the impact of digital transformation on improving the quality of academic and administrative services at the Faculty of Economic Sciences, Setif 1 University, with a focus on the dimensions of public service quality. The study concluded that digital transformation has a positive effect on service quality, as it facilitated the use of digital systems, reduced the time required for processes and enhanced digital interaction between faculty members and students. Furthermore, organisational culture emerged as the dimension most aligned with digital transformation, reflecting the institution's ability to improve responsiveness and develop both technical and human infrastructure to effectively support service quality.

Keywords

- digital transformation
- public service
- service quality

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[1] Ferhat Abbas University Setif 1, El Bez Campus, Sétif 19137, Algeria, corresponding author: ayad.saadi@univ-setif.dz

[2] University of Tipaza, Oued Merzoug, Tipaza, 42000, Algeria, Laboratory of Applied Economics for Resources Governance and Regional Development, henni.mohamedfouad@univ-tipaza.dz

Introduction

The new digital economy has changed the international business landscape significantly, with lightning speed tech developments within the information and communication industries. This change has challenged educational organisations to keep up with these advancements through digital transformation at universities and colleges. The use of digital technologies has become a necessity to improve administrative and educational processes, and to streamline interactions between students and faculty members.

Digital transformation encompasses more than technology utilisation; this means creating digital strategies to enhance multiple facets of service quality (e.g. tangibility, reliability, responsiveness and empathy). These aspects contribute significantly towards students' experiences and satisfaction.

Universities, including Setif 1 University in Algeria, have actively engaged in digital transformation initiatives to enhance the quality of their academic and administrative services. In recent years, global developments have accelerated the adoption of e-learning and digital solutions, ensuring the continuity of the educational process. As a result, digital strategies have become an essential and updated approach for most higher education institutions.

Enhancing both educational and administrative services through digital transformation can significantly improve the satisfaction of both staff and students. This study aims to examine the relationship between digital transformation and service quality by analysing the influence of digital transformation on various dimensions of service quality.

Significance of the study

The importance of this study lies in exploring the impact of digital transformation on enhancing the quality of educational and administrative services in universities, particularly amidst rapid technological advancements. It seeks to understand the role of digital transformation in fostering interaction between students and faculty members, thereby enhancing the learning experience by facilitating access to academic content and improving communication methods.

The study evaluates the contribution of digital transformation in strengthening electronic systems for managing educational and administrative processes, which subsequently enhances the quality of academic and administrative services. Furthermore, it offers practical solutions to address challenges faced by Algerian university faculties, contributing to their competitiveness in the global higher education landscape.

Previous studies

Boutarfa & Zedira (2024): This study aimed to develop practical frameworks for implementing both digitalisation and broader digital transformation principles, while also identifying the main digital platforms and programs supporting teaching and learning activities. The study demonstrated that digital technologies play a crucial role in facilitating researchers' work by improving access to information, enabling continuous updates in research methodologies and fostering innovation, ultimately contributing to the enhancement of research quality. Furthermore, the authors addressed the key challenges faced by universities in deploying digitalisation strategies and proposed a set of recommendations aimed at strengthening both teaching practices and scientific research outcomes.

Rosak-Szyrocka et al. (2023): The study investigated the relationship between higher education and digitalisation across European countries, relying on panel data from 31 EU member states over the period 2013–2020. It specifically examined key dimensions of digital development, including internet usage, the integration of digital technologies and the provision of digital public services, as captured by the Digital Economy and Society Index (DESI). The results showed that both the adoption of digital technologies and the effective use of digital public services contribute significantly to improving the management and innovative capacity of higher education systems. Furthermore, the findings showed that the pace and patterns of digital transformation varied considerably between countries over time. The study ultimately emphasised that aligning innovation with digitalisation enhances curricula, supports the deployment of advanced learning technologies, as well as fosters research and creativity within universities, thereby leading to improved student performance.

Aisyah et al. (2023): This study aimed to assess digital transformation in higher education by analysing the key factors influencing its success at Universitas Terbuka. The findings indicated that resources, information systems and organisational culture play a crucial role in enhancing the quality of educational services. The study particularly emphasised the importance of organisational culture in facilitating this transformation.

Verhoef et al. (2021): The purpose of this study was to investigate how digital transformation affects business model innovation in a variety of academic fields. Three phases of digital transformation were distinguished by the study: digitisation, digitalisation and complete digital transformation. It emphasised the growth tactics, resources and skills needed for businesses to successfully execute digital transformation. The results highlighted how digital transformation affects performance measures and calls for particular organisational structures. The study concluded by proposing a comprehensive research agenda to guide future studies on digital transformation and its implications for businesses and markets.

Vial (2019): In this research, 282 works on digital transformation were thoroughly reviewed, and an inductive framework comprising eight essential building blocks was developed. It underlined that companies must modify their value creation strategies while handling organisational and structural issues as a result of the disruptions brought about by digital technologies. The study outlined both the advantages and disadvantages of these procedures and suggested a research agenda that would concentrate on dynamic capabilities and ethical issues as important topics for further study in the fields of digital transformation and strategic information systems.

Research gap

The research gap lies in the lack of comprehensive studies focusing on the impact of digital transformation on the dimensions of service quality within higher education institutions, particularly within faculties of economics. While existing studies have examined digital transformation in other sectors such as telecommunications and banking, there remains a need for an in-depth investigation into its application in university faculties. This includes exploring how digital transformation improves educational, administrative and logistical aspects, understanding its impact on academic performance and student-faculty relationships, as well as developing tailored digital strategies for higher education institutions.

1. Literature review

The existing body of literature highlights digital transformation as a critical driver for enhancing the quality of public services within the higher education sector. Numerous studies underline its role in improving institutional efficiency, strengthening managerial performance and increasing student satisfaction. Scholars have explored the multifaceted nature of digital transformation, examining its effects on educational delivery, administrative and logistical processes, as well as the quality of interactions between academic staff and students. This growing research stream provides valuable insights into the mechanisms through which digital technologies reshape university operations and service provision. The main themes and key findings identified in the literature are outlined below.

1.1. General concepts about digital transformation

1.1.1. Definition of digital transformation

Digital transformation is a change process that involves using digital technologies to develop new business models, improve services and create greater value within an organisation (Li et al., 2023, p. 3). Digital transformation signifies a profound change in the manner services are delivered, utilising technology to improve efficiency and competitive standing. Given the relative recency of this concept, a universally accepted definition remains elusive; however, it is broadly acknowledged as a catalyst for change across various industries by incorporating technology into multiple facets of daily life.

Amin characterises digital transformation as "the transition from a traditional system to a digital system based on information and communication technology across all fields of work" (Amin, 2018, p. 42), emphasising the movement from traditional practices to digital solutions in numerous sectors. Similarly, Belkadi describes digital transformation as "the process of transitioning organisations to a business model that relies on digital technologies for innovating and delivering products and services while creating new value channels" (Belkadi, 2024, p. 694), underscoring its role in service improvement and innovation.

Digital transformation is defined as "a profound transformation in the way a firm leverages digital technologies to develop new digital business models that generate and capture greater value for the firm" (Verhoef et al., 2021, p. 889). This definition emphasises the main purpose of digital transformation, which is to create and capture greater value through digital innovation.

Feroz characterises digital transformation as the application of emerging digital technologies to achieve substantial enhancements in business operations, which may include improving customer experiences, optimising processes or developing innovative business models (Feroz et al., 2021, pp. 1–2). This definition underscores the significance of digital transformation in boosting operational efficiency and elevating customer satisfaction.

Demirkan defines digital transformation as "the profound and accelerating transformation of business activities, processes, competencies, and models to fully leverage the changes and opportunities brought by digital technologies and their impact across society in a strategic and prioritized way" (Demirkan et al., 2016, pp. 14–15). This definition underscores the primary aim of digital transformation, which is to increase efficiency through digital innovation.

The above definitions make it evident that digital transformation revolves around shifting from traditional systems to digital technologies to enhance various operational aspects, from service and product improvement to customer experience and overall performance optimisation.

1.1.2. Importance of digital transformation

Digital transformation is a key driver of economic and social development in the modern era, facilitating streamlined processes and technological advancement across multiple sectors. It enables optimal data utilisation, ensuring timely decision-making and fostering international collaboration. Its impact extends beyond digital enterprises to industries such as healthcare, education and public services, where technological resource investment is essential for maximising benefits. Furthermore, meeting customer and citizen demands necessitates the urgent adoption of digital transformation, highlighting the need for technology integration into institutional processes to ensure sustainable and effective performance (Al Huwaydi & Hassanin, 2022, p. 1048).

1.1.3. Objectives of digital transformation

Digital transformation aims to develop innovative business models that streamline procedures and significantly reduce service delivery time. By replacing traditional, often cumbersome processes with digital solutions, it contributes to increased productivity and improved organisational performance. It also seeks to enhance service efficiency, optimise public expenditure and encourage the adoption of innovative practices, thereby reinforcing public trust and supporting institutional sustainability. Additionally, digital transformation improves the speed, flexibility and accuracy of service delivery while reducing the likelihood of human error. Beyond its operational impact, it fosters a culture of creativity and continuous improvement, ultimately reshaping both organisational practices and societal mindsets (Shedid, 2021, pp. 203–204).

1.1.4. Pillars of digital transformation

Digital transformation is the outcome of four interconnected pillars that collectively shape an organisation's ability to operate effectively in a digital environment. Technology forms the foundation by providing the tools and systems necessary to support digital activities and modernise operational practices. In parallel, data management plays a critical role in converting large volumes of raw data into valuable insights that can guide informed and strategic decision-making. At the same time, the human factor remains essential. Competent and digitally skilled human resources ensure the proper use of technological tools and the effective interpretation of information. Complementing these elements, institutional processes must be continuously refined and adapted to align with digital develop-

ments. This ongoing evolution not only enhances service quality and organisational flexibility but also supports sustainable growth and long-term performance.

1.1.5. Principles of digital transition in administration

Researchers in the field of digital strategy emphasise that the success of digital transition in administration relies on several fundamental principles (Al Mufarji et al., 2016, pp. 27–28):

1. **Establishing an appropriate legislative framework:** Updating laws and regulations to align with modern digital requirements is essential. This includes recognising electronic documents and facilitating their use in official transactions. Additionally, strengthening digital security standards is crucial for protecting data, ensuring information integrity and fostering trust in the digital system, thereby creating a conducive environment for digital transformation.
2. **Developing digital infrastructure:** Enhancing and modernising digital infrastructure is necessary, both in terms of hardware and networks, as well as investing in human capital to keep pace with technological advancements. Moreover, establishing standardised technical frameworks ensures system integration and efficiency, facilitating digital transformation within institutions.
3. **Reengineering administrative processes:** Digital transformation requires redesigning administrative processes to better align with the digital environment. This includes updating management systems using advanced technologies such as artificial intelligence and big data analytics to enhance decision-making efficiency and streamline operations.
4. **Adopting information technology:** Information technology plays a crucial role in digital transformation by improving operational efficiency, enhancing customer experience and fostering innovation in products and services. Additionally, it serves a strategic function in integrating digital processes, thereby strengthening institutional sustainability and competitive advantage.

1.1.6. Dimensions of digital transformation

The literature on digital transformation identifies several key dimensions (Belkadi, 2024, pp. 695–696):

1. **Developing a digital transformation strategy:** This involves formulating a strategic plan that incorporates a clear vision and mission aligned with the institution's overall strategic objectives. The plan should integrate stakeholders and employ innovative approaches to digital planning.

2. **Technical requirements:** Digital transformation necessitates the establishment of an integrated technical infrastructure, including operating systems, specialised hardware, software and storage media. It also requires specialised technical teams to manage this infrastructure efficiently in order to deliver high-quality services.
3. **Organisational culture:** Organisational culture refers to the shared values and concepts among leaders and long-serving employees, which are transferred to newcomers. These values provide the foundation for organisational cohesion and significantly influence employees' behaviour in adopting new technologies.
4. **Procedural requirements:** Digital transformation requires a comprehensive information security strategy to protect data and ensure its quality. This includes implementing strict measures to safeguard privacy and prevent data theft.
5. **Human requirements:** Human resources are a critical element for the success of digital transformation. This necessitates providing well-trained and qualified personnel in areas such as information technology, data analysis and decision-making. Additionally, individuals must possess a strategic vision regarding the importance of digitisation.

1.1.7. Principles of digital transformation in service institutions

1. **Coordination and facilitation of service access:** Enhancing the coordination of services to ensure easier access and enabling beneficiaries to utilise them effectively.
2. **Separation between service providers and recipients:** Establishing a clear distinction between the parties involved in the service while promoting the use of electronic services.

1.2. General concepts of public service

1.2.1. Definition of service

According to Kotler, a service is defined as "an activity or performance that one party can offer to another that is essentially intangible and does not result in the ownership of anything, but satisfies a customer's need or want" (Kotler & Keller, 2012, p. 404).

The American Marketing Association (AMA) defines it as "a set of activities or benefits associated with the sale of goods, or provided independently, with the purpose of ensuring customer satisfaction" (Azzam et al., 2008, p. 249).

1.2.2. Characteristics of service

Services are distinct from tangible goods and possess specific characteristics, including:

1. **Intangibility:** defined as the characteristic of services whereby the core value consumed is intangible, lying in the change or transformation that occurs in the customer's state or resources as a result of the service, regardless of any accompanying tangible elements. (Moeller, 2010, p. 361).
2. **Inseparability:** Services are typically inseparable from their providers and often require the client's presence (e.g. medical treatment in hospitals). However, some exceptions exist, such as maintenance services performed remotely.
3. **Heterogeneity:** Services are difficult to standardise, as performance varies even within the same institution. For instance, banking services may differ from one branch to another (Ben Obeid, 2022, p. 131).
4. **Perishability:** Services cannot be stored. If not consumed at a certain time, they are lost (e.g. unsold airline tickets represent a permanent loss) (Kotler & Dubois, 2000, p. 466).
5. **Lack of ownership:** Unlike goods, services do not transfer ownership. Clients pay for temporary use or access (e.g. renting a hotel room) without acquiring ownership (El Wafi, 2019, p. 121).

1.2.3. Concept of public service

Public service has been defined in various ways. Among these definitions:

1. "Public service refers to the essential needs required to preserve human life and ensure well-being, which must be provided to the majority of the population. The guiding principle of public service policies should be improving citizens' living standards" (Rahawi & Kasmi, 2017, p. 110).
2. From an administrative law perspective, it is defined as "a technical service provided on a permanent basis by a public institution, requiring managers to uphold the principles of equality, continuity, and adaptability in order to serve the public interest" (Merizq, 2015, p. 14).

From these definitions, it can be inferred that public services are characterised by universality, granting all citizens equal access without discrimination. The state bears the responsibility of ensuring their provision through available legal, technical and financial resources.

1.2.4. Principles of public service

Public services are guided by principles ensuring equality, continuity and adaptability in service delivery. They are designed to remain relevant to social and technological changes while often provided free or at minimal cost. These services promote social solidarity by reducing inequalities and ensuring access for disadvantaged groups.

1.2.5. Characteristics of public service

Key features of public services include:

1. **Public interest:** They encompass activities that serve collective welfare, whether national, administrative or newly emerging due to socio-economic developments.
2. **Public oversight:** The state monitors service delivery to guarantee continuity and equality, with intervention mechanisms in case of dysfunction.
3. **Non-rivalry in consumption:** Public services are accessible to all without reducing others' ability to benefit, ensuring equal access without additional costs (Khalil, 2020, p. 81).
4. **Lack of incentives and clarity of objectives:** Decision-making in the public sector is often influenced by political factors and may lack clear goals or incentive structures, which can hinder performance effectiveness.

1.2.6. Importance of public service

Public services are essential for promoting social solidarity through the provision of basic needs such as education and healthcare, thereby reducing social disparities. They contribute to comprehensive development by ensuring infrastructure, educational opportunities and healthcare services, which collectively support economic growth. Additionally, they foster social and political stability by addressing citizens' needs and strengthening trust in government institutions.

Public services are typically classified into:

1. **Economic services:** e.g. water and electricity.
2. **Social services:** addressing needs the market cannot adequately fulfil. They can also be **free or fee-based**, with some essential services (e.g. digital payment and authentication services) requiring minimal costs (Haddar, 2018, pp. 82–84).

1.3. General concepts of public service quality

1.3.1. Definition of quality

Quality is a multidimensional concept that applies to products, services and processes, aiming to meet or exceed customer expectations and thereby enhance competitiveness and innovation. It represents a set of attributes that reflect positive and acceptable standards as perceived by users (Al Fadl & Al Taie, 2023, p. 20).

The American Federal Quality Institute defines quality as "an applied approach that seeks to meet customer needs and expectations by using quantitative methods to improve processes and services" (Al Karkhi, 2015, pp. 20–21). Accordingly, service quality can be understood as the set of features and characteristics that enable a service to meet or surpass user expectations.

1.3.2. Definition of public service quality

Service quality can be defined as an overall evaluative judgment or attitude formed by consumers toward a service. It appears from the comparison between their prior expectations and their perceptions of the actual performance delivered. In this sense, service quality reflects the extent to which the service meets, exceeds or falls short of what consumers anticipate.

Public service quality refers to the extent to which services meet citizens' needs and expectations. Quality is defined as "the degree to which a set of inherent characteristics of a product, system or process fulfils requirements" (ISO 9000, 2000, as cited in Hattatash, 2017, p. 453).

Thus, public service quality can be expressed as "the ability of public services to satisfy citizens' explicit and implicit needs, achieving expected benefits and ensuring fairness and efficiency".

1.3.3. Characteristics of public service quality

Public service quality emphasises meeting beneficiaries' expectations through collaboration between providers and recipients (employees and citizens alike). Its key aspects include:

1. **Equality and social justice:** Ensuring universal access regardless of socio-economic or geographic factors.
2. **Sustainable economic growth:** Enhancing living standards and ensuring fair distribution of resources.

3. **Human development:** Providing essential services such as water, energy, healthcare, education and transportation.
4. **Good governance:** Characterised by transparency, integrity and the absence of corruption, all in service of the community.

1.3.4. Importance and objectives of public service quality

The importance and objectives of public service quality can be summarised as follows:

1. Expanding the scope of public services across different sectors.
2. Enhancing citizen care by ensuring satisfaction and strengthening loyalty toward public institutions.
3. Measuring satisfaction levels through feedback mechanisms to identify areas of improvement.
4. Improving communication between service providers and recipients to ensure efficiency.
5. Prioritising citizen needs by offering high-quality and responsive services.
6. Promoting continuous improvement through specialised management focused on integration and comprehensiveness in service delivery.

1.3.5. Dimensions of public service quality

Measuring public service quality is inherently challenging, as it largely depends on citizens' perceptions of intangible elements. Among the most widely used frameworks for assessing service quality is the SERVPERF model, which focuses on actual performance as perceived by users. In contrast, the SERVQUAL model emphasises perceived quality, evaluating service against customer expectations (Parasuraman et al., 1985). This model identifies five core dimensions of service quality:

1. **Responsiveness:** The ability of employees to address requests promptly and effectively, adapting to changing conditions and diverse citizen needs. This enhances trust and satisfaction (Munusamy et al., 2010, p. 401).
2. **Reliability:** Refers to the ability to deliver the service accurately and dependably, so that customers can consistently rely on it (Adil et al., 2013, p. 67).
3. **Assurance:** Employees' ability to inspire confidence and trust through professional and attentive conduct, thereby ensuring that citizens feel valued and secure.
4. **Tangibility:** The physical aspects of service provision, including facilities, equipment quality and staff appearance. High standards in these elements positively influence citizens' perceptions.

5. **Empathy:** The degree of personalised care and respect shown to citizens. Empathetic interactions strengthen relationships and build loyalty (Al Mahyawi, 2006, p. 95).

1.4. The relationship between digital transformation and the quality of public service

In recent years, digital transformation has emerged as a fundamental driver in reshaping the functioning of public institutions and the way services are delivered to citizens. By integrating advanced technologies into administrative, logistical and decision-making processes, public organisations aim to enhance efficiency, transparency and responsiveness.

At the same time, the quality of public service has become a central concern, as citizens increasingly expect accessible, reliable and user-centred services. Exploring the relationship between digital transformation and the quality of public service is therefore crucial for understanding how technological innovation contributes to improving service delivery, strengthening trust in government and promoting sustainable development.

1.4.1. The impact of digital transformation on improving public service quality

Digital transformation represents one of the most significant modern mechanisms adopted by governments and public institutions to enhance the quality of services delivered to citizens. The adoption of digital technologies has enabled faster administrative procedures and reduced the time required to complete transactions, thereby increasing efficiency and effectiveness in service delivery (Al Khouri, 2012, pp. 129–130). It also contributes to minimising human errors through the reliance on automated systems, in addition to promoting transparency by allowing real-time tracking of processes and providing channels for grievances and feedback (Bannister & Connolly, 2014, p. 123). Hence, digital transformation is not merely a technical change, but a strategic lever to improve citizen satisfaction and strengthen trust in public institutions.

1.4.2. The role of digital technologies in reinforcing the principles of public service

According to the United Nations Development Programme (UNDP, 2023), inclusive digitalisation enhances equal access to public services, ensuring opportunities for all citizens regardless of socio-economic or geographic differences. Regarding continuity, digital systems ensure uninterrupted service delivery even in times of crisis, such as health pandemics, by enabling remote access. As for adaptability, digital systems allow institutions to respond flexibly to evolving needs and technological changes, thereby offering more efficient and effective services.

1.4.3. Challenges hindering the impact of digitalisation on service quality

Despite its numerous advantages, digital transformation faces several challenges that limit its full impact on public service quality. The first challenge is the weakness of digital infrastructure, particularly the disparity between urban and rural areas in access to communication networks and modern technologies, which hinders the widespread delivery of digital public services (Fitriani et al., 2025). Another significant challenge is the digital divide, which reflects inequalities in individuals' ability to access and effectively use technology, often influenced by factors such as age, educational level, and geographical location (van Dijk, 2020, p. 25). A third challenge is resistance to change within public institutions, as digitalisation requires shifts in mindsets, organisational culture and traditional systems, often leading to resistance at both individual and institutional levels, thereby slowing down the pace of digital transformation and resulting in uneven implementation (Ibrahim et al., 2025, p. 73).

1.4.4. International experiences in enhancing public service quality through digitalisation

Several international experiences have demonstrated the success of digitalisation in improving public service delivery. For example, Estonia has developed a highly advanced e-government model in which 99% of public services are accessible online, reinforcing transparency and boosting trust in government. According to official e-Estonia data, nearly all government services are available digitally, reflecting the country's leadership in digital public service delivery (e-Estonia, n.d.).

Similarly, in South Korea, massive investments in digital infrastructure have positioned the country at the top of the UN e-government rankings, as digitalisation significantly reduced processing times and facilitated access to services (Department of Economic and Social Affairs, 2022, p. 69). These cases confirm that investment in digitalisation produces tangible improvements in public service quality.

1.4.5. Lessons learned and future directions

Several key lessons can be drawn from these experiences. Most importantly, the success of digital transformation in improving public service quality requires a comprehensive strategy that integrates infrastructure development, human resource capacity building and the promotion of a culture of change (Westerman et al., 2014, p. 145).

Future directions point towards smart services that rely on artificial intelligence and big data analytics to provide personalised and proactive services to citizens, thereby enhancing satisfaction levels and improving the efficiency of public spending (OECD, 2025, p. 18). Thus, digital transformation should not be viewed as an end in itself, but rather as a means to achieve high-quality public services rooted in the principles of equality, effectiveness and transparency.

2. Methodology

2.1. Research problem

The study seeks to address the research problem through the following primary questions:

What is the impact of digital transformation on the dimensions of service quality at the Faculty of Economic Sciences, Setif 1 University? In what ways can this transformation enhance aspects such as tangibility, reliability, responsiveness and empathy within the institution?

The following sub-questions arise from the main research inquiry:

Q1: Does digital transformation positively affect tangibility?
Q2: Does digital transformation positively affect reliability?
Q3: Does digital transformation improve responsiveness?
Q4: Does digital transformation enhance empathy and solidarity?

2.2. Main hypothesis

To address the research problem, we propose the following **main hypothesis**:

H: There is a statistically significant effect at a significance level of (α = 0.05) between the requirements for implementing digital transformation and the improvement of service quality dimensions at the Faculty of Economic Sciences, Setif 1 University.

This main hypothesis branches into the following **sub-hypotheses**:

H1: There is a statistically significant relationship at a significance level of (α = 0.05) between the implementation of digital transformation and the improvement of the tangibility dimension at the Faculty of Economic Sciences, Setif 1 University.

H2: There is a statistically significant relationship at a significance level of (α = 0.05) between the implementation of digital transformation and the improvement of the reliability dimension at the Faculty of Economic Sciences, Setif 1 University.

H3: There is a statistically significant relationship at a significance level of (α = 0.05) between the implementation of digital transformation and the improvement of the responsiveness dimension at the Faculty of Economic Sciences, Setif 1 University.

H4: There is a statistically significant relationship at a significance level of (α = 0.05) between the implementation of digital transformation and the improvement of the empathy and solidarity dimensions at the Faculty of Economic Sciences, Setif 1 University.

2.3. Study objectives

This research aims to achieve the following objectives:

- to assess the extent to which digital transformation dimensions influence the quality of educational and administrative services provided by universities;
- to outline the fundamental theoretical concepts underlying digital transformation and service quality, emphasising their core dimensions.

The study aims to examine the interconnections among different aspects of digital transformation – including the formulation of digital strategies, technical and procedural necessities, human resource considerations and organisational culture – and their impact on enhancing the quality of educational and administrative services.

2.4. Research methodology and instrument

The study adopted the descriptive-analytical approach to examine the fundamental concepts related to the impact of digital transformation on the quality of services in higher education. Additionally, the statistical approach was applied to analyse the data and test the hypotheses using SPSS software.

The data for this study were collected exclusively from the Faculty of Economics at Setif 1 University; therefore, the results should not be generalised to other faculties or the entire university. To collect the data, a questionnaire was employed as the main tool, complemented by direct interviews. The questionnaire was divided into three main sections:

1. The first section addressed personal information such as gender, academic qualification, job position and experience.
2. The second section focused on dimensions of digital transformation and included 25 items.
3. The third section focused on dimensions of service quality and included 16 items.

A five-point Likert scale was adopted in designing the questions. Data were analysed using the arithmetic mean and standard deviation to assess the dimensions.

3. Results and discussion

This section is dedicated to providing an overview of the institution under study, presenting the research methodology and tools, and describing the study sample. Furthermore, statistical analysis has been conducted in order to address the research problem and test the proposed hypotheses.

3.1. Presentation of Setif 1 University as a pioneering model in higher education and digital transformation

Setif 1 University is one of the leading universities in Algeria. Established in 1978, it comprises five main faculties: Technology, Sciences, Natural and Life Sciences, Economics, Commerce and Management Sciences, and Medicine, in addition to three specialised institutes.

Digital transformation at Setif 1 University is a cornerstone in the development of both educational and administrative processes. The university offers several digital platforms, including an e-learning platform to support distance learning, a WebTV platform, and a Virtual Tour platform that allows students to explore the campus remotely. It also provides a Continuing Education platform (Formation Continue) for training programs and the EDX platform, which expands opportunities for online learning. These platforms contribute to enhancing the academic experience and facilitating both educational and administrative services.

The Faculty of Economic Sciences, Setif 1 University stands out as a leading institution in Algeria. It offers 45 specialisations in economics, commerce, management sciences, finance and accounting across three academic levels (Bachelor's, Master's and Doctorate). The faculty consists of five departments, supported by 329 professors and 234 staff members, and is equipped with 115 classrooms and lecture halls, 157 offices, as well as three libraries. These resources provide a conducive environment for training qualified professionals and advancing scientific research.

Study population and sample

The Faculty of Economic Sciences, Setif 1 University was selected as the study sample due to its leading role in the university's digital transformation. The faculty comprises four departments: Commerce, Finance and Accounting, Economics as well as Management Sciences, in addition to the Dean's Office.

A purposive sampling method was used to select participants directly involved in administrative and digital transformation activities. The study targeted academic staff with administrative responsibilities and administrative personnel. A total of 60 questionnaires were distributed, of which 44 were returned (response rate = 73.33%). After excluding three incomplete questionnaires, 41 valid responses were retained for analysis (68.33% of distributed questionnaires). This approach ensures that respondents had direct experience with the faculty's digital transformation initiatives, and the results are specific to this faculty only.

3.2. Reliability of the research instrument

To verify the reliability of the study instrument, the Cronbach's Alpha coefficient was calculated to measure internal consistency. The results are presented in Table 1.

Table 1. Cronbach's Alpha for the questionnaire dimensions

Dimension	Title of the dimension	Number of items	Cronbach's Alpha
1	Dimensions of digital transformation	25	0.95
2	Dimensions of service quality	16	0.98
Overall Cronbach's Alpha		0.967	

Source: prepared by the researchers based on SPSS outputs.

Table 1 shows that the questionnaire dimensions have high reliability, with Cronbach's Alpha reaching 0.95 for the digital transformation dimension and 0.98 for the service quality dimension. The overall coefficient for all items of the questionnaire was 0.967, which reflects excellent internal consistency and confirms the reliability of the research instrument. Accordingly, the tool can be confidently relied upon to achieve the intended research outcomes.

3.3. Analytical overview of the study sample characteristics

Table 2 presents the demographic characteristics of the study sample. Females represent 56.1% of the respondents, while males account for 43.9%. In terms of professional experience, 48.8% of participants have more than 10 years of experience, 31.7% have between 5 and 10 years, and 19.5% have less than 5 years. Regarding educational attainment, 39% of the respondents hold a Bachelor's degree, 29.3% a Master's degree, and 13.2% a Doctorate. Concerning job positions, 61% of the sample consists of administrative staff, while 39% are faculty members holding administrative responsibilities.

Table 2. Characteristics of the study sample

Characteristic		Frequency	%
Sex	Male	18	43.9
	Female	23	56.1
Educational level	Bachelor's Degree	16	39
	Master's Degree	12	29.3
	Doctorate Degree	13	31.7
Employment position	Faculty with admin. roles	16	39
	Administrative staff	25	61
Experience	Less than 5 years	8	19.5
	5–10 years	13	31.7
	More than 10 years	20	48.8

Source: prepared by the researchers based on SPSS outputs.

3.4. Analysis of the independent variable (dimensions of digital transformation)

The results of the analysis of the respondents' answers regarding the dimensions of digital transformation are presented in Table 3.

Table 3. Responses related to the independent variable

No.	Statements	Mean	Std dev	Relative importance	Degree
1.	The faculty has a clear and well-defined vision and mission for the digital transformation process.	3.78	0.96	2	high
2.	There is alignment and coherence between the digital transformation strategy and the faculty's vision and objectives.	3.87	1.05	1	high
3.	The policies in place contribute to implementing the digital transformation strategy in line with institutional goals.	3.65	1.13	3	high
4.	The faculty periodically evaluates its strategy to ensure alignment with the digital transformation process.	3.51	0.97	4	high
5.	The faculty takes corrective measures to address deviations between actual performance and strategic objectives.	3.02	1.10	5	moderate
Strategic planning dimension		**3.57**	**0.75**	**high**	
6.	The faculty administration encourages greater employee participation in the digital transformation process.	2.65	0.99	5	moderate
7.	The faculty strives to equip its staff with the necessary skills to support digital transformation.	4.14	0.85	1	high
8.	The faculty focuses on training operational staff to enable them to implement digital transformation.	3.90	0.99	3	high
9.	The faculty promotes a culture of development and modernisation in service delivery.	3.19	1.12	4	moderate
10.	The faculty provides programs and mechanisms to spread digital transformation culture and support staff in improving digital skills.	4.00	0.83	2	high
Organisational culture dimension		**3.62**	**0.73**	**high**	
11.	The faculty employs ICT specialists to implement digital transformation projects.	2.97	1.19	5	moderate
12.	The faculty encourages employees to innovate and be creative in the field of digitisation.	3.22	1.15	4	moderate

cont. Table 3

No.	Statements	Mean	Std dev	Relative importance	Degree
13.	The faculty rewards initiatives and contributions that support digital transformation.	3.51	1.02	2	high
14.	The institution ensures that employees receive training and acquire the necessary skills to use modern digital technologies.	3.58	1.18	1	high
15.	The administration plans human resources according to the needs of the digital transformation process.	3.39	1.04	3	moderate
Human resources dimension		**3.33**	**0.93**	**moderate**	
16.	The faculty follows all information security procedures and data protection measures against hacking and cyber theft.	3.73	0.84	2	high
17.	The faculty enforces strict penalties for any security breaches related to data.	3.76	0.76	1	high
18.	The faculty allocates a financial budget to protect data privacy and respect users' and employees' rights.	3.07	1.12	4	moderate
19.	The faculty conducts regular penetration tests to assess the effectiveness of cybersecurity measures.	2.82	1.20	5	moderate
20.	The faculty collaborates with specialised cybersecurity companies to ensure comprehensive data protection.	3.70	0.87	3	high
Procedural requirements dimension		**3.47**	**0.71**	**high**	
21.	The faculty has an advanced technological infrastructure, including modern devices and operating systems.	2.95	1.11	5	moderate
22.	The faculty relies on digital solutions, including storage systems and management software, to ensure smooth operations.	3.31	1.08	4	moderate
23.	The faculty enhances interdepartmental collaboration through an internal online communication system.	3.60	1.11	3	high
24.	The faculty uses an advanced electronic system to receive and process user requests efficiently.	3.87	0.95	1	high
25.	The faculty employs modern technologies to improve the quality and speed of services provided to users.	3.65	1.10	2	high
Technical requirements dimension		**3.53**	**0.90**	**high**	
Overall mean of the independent variable (digital transformation)		**3.58**	**0.69**	**high**	

Source: prepared by the researchers based on SPSS outputs.

Table 3 indicates that digital transformation at the Faculty of Economics, Setif 1, received varying levels of agreement among respondents regarding its different dimensions. The overall mean score for the digital transformation dimensions was 3.58 with a standard deviation of 0.69, reflecting a high level of implementation of digital transformation practices at the faculty. A detailed analysis of each dimension, based on their relative importance, is presented below:

1. **Organisational culture:** The mean score for this dimension reached 3.62, with a standard deviation of 0.73, indicating that the faculty has adopted an advanced organisational culture supportive of digital transformation. This result suggests that the institution fosters innovation and continuous development, motivating staff to embrace modern technologies. It also reflects the faculty's digital ambitions to enhance academic and administrative efficiency in delivering services aligned with the requirements of the digital era.
2. **Strategic planning for digital transformation:** This dimension recorded a mean of 3.57, with a standard deviation of 0.75, showing the faculty's strong commitment to developing a clear and comprehensive digital transformation strategy. This finding indicates that the faculty seeks to establish a structured strategic plan aimed at enhancing digital transformation and aligning institutional activities with its goals. Moreover, this reflects the faculty's alignment with the Ministry of Higher Education's national digitalisation agenda, aiming to integrate technological advancements across academic and administrative processes to improve efficiency and service quality.
3. **Technical requirements:** The mean score for this dimension was 3.53, with a standard deviation of 0.90, showing the faculty's focus on strengthening its technological infrastructure to support digital transformation. Despite the efforts made, there remains a need for further modernisation to ensure comprehensive and effective implementation. This emphasises the importance of adopting cutting-edge technologies and upgrading digital systems to efficiently execute digital transformation strategies.
4. **Procedural requirements:** This dimension ranked second in relative importance, with a mean of 3.47 and a standard deviation of 0.71. This suggests that the faculty prioritises the implementation of integrated and effective data security measures and privacy protection systems. Such practices foster a secure digital environment that builds trust among staff and students, promoting active engagement in digital initiatives. It also highlights the faculty's commitment to adhering to the highest standards of information security in handling digital data.
5. **Human resources:** The mean score for this dimension was 3.33, with a standard deviation of 0.93, ranking it last among the studied dimensions. Nonetheless, this result underscores the critical importance of human capital in supporting digital transformation. The faculty's success largely depends on the competen-

cies of its employees, emphasising the need to strengthen staff skills and provide continuous training to ensure the effective implementation of digital initiatives.

3.5. Analysis of responses for the dependent variable (service quality dimensions)

The results of the analysis of respondents' answers regarding the service quality dimensions are presented in the Table 4.

Table 4. Responses related to the dependent variable (service quality)

No.	Statements	Mean	Std dev	Importance	Degree
26.	The faculty uses modern technologies in the teaching process to enhance the digital learning experience.	3.53	1.02	4	high
27.	The faculty's website is user-friendly and provides efficient electronic services.	3.78	0.82	2	high
28.	The visual design of the electronic systems is appropriate and facilitates navigation, enhancing digital interaction.	4.09	0.76	1	high
29.	The electronic documents and files provided are of high quality and contribute to facilitating digital operations.	3.73	0.89	3	high
Tangibility		**3.78**	**0.64**	**high**	
30.	The faculty is committed to providing its digital services on time with accuracy and efficiency.	3.34	0.88	3	moderate
31.	The electronic service system provides all the operations that faculty members and staff need to perform easily and effectively.	3.82	0.83	1	high
32.	Faculty members and staff can complete all their transactions entirely through the college's electronic system.	3.56	1.00	2	high
33.	Faculty members and staff have full confidence in the accuracy of the information obtained through the college's electronic systems.	3.31	1.03	4	moderate
Reliability		**3.54**	**0.82**	**high**	
34.	The electronic services provided are characterised by a quick response to the needs of the college's affiliates.	3.85	0.85	1	high

cont. Table 4

No.	Statements	Mean	Std dev	Importance	Degree
35.	The college informs its affiliates via electronic messages about the readiness of the concerned service.	3.51	1.07	2	high
36.	The college administration takes immediate corrective actions to address any delays in providing electronic services.	3.10	1.50	4	moderate
37.	The college's affiliates receive prompt responses to their inquiries through the available electronic channels.	3.45	0.97	3	high
Responsiveness		**3.49**	**0.98**	**high**	
38.	Communication with the college's clients through electronic channels is conducted using their preferred language.	3.02	1.10	3	moderate
39.	The college's employees provide personal attention to clients through various digital communication platforms.	2.65	0.99	4	moderate
40.	The college's employees seek to understand clients' problems through electronic tools and propose appropriate solutions.	4.16	0.85	1	high
41.	The college is committed to maintaining the confidentiality of clients' information through electronic systems and applying data protection policies.	3.90	0.99	2	high
Empathy		**3.48**	**0.92**	**high**	
Overall mean of service quality dimension		**3.64**	**0.73**	**high**	

Source: prepared by the researchers based on SPSS outputs.

Table 4 shows that the overall level of service quality is high, with a mean score of 3.64 and a standard deviation of 0.73. These results reflect the faculty's strong commitment to providing high-quality educational and administrative services. A detailed analysis of each dimension according to its relative importance is presented below:

1. **Tangibility:** This dimension recorded a mean score of 3.78 and a standard deviation of 0.64, indicating that the faculty has achieved considerable success in using modern technologies to enhance the digital learning experience. The visual design of electronic systems and the ease of digital interaction contribute to improving the effectiveness of the educational process, demonstrating the faculty's commitment to providing an innovative learning environment aligned with the requirements of the digital era.

2. **Reliability:** With a mean score of 3.54 and a standard deviation of 0.82, this dimension reflects a high level of confidence in the faculty's electronic systems. Respondents expressed trust in the accuracy and credibility of the available information, which highlights the efficiency of the electronic system in facilitating administrative and educational processes, thereby reinforcing reliability and trustworthiness in academic service delivery.
3. **Responsiveness:** This dimension achieved a mean score of 3.49, with a standard deviation of 0.98, indicating that the faculty is actively working to improve response speed to requests through the available electronic channels. Despite certain challenges and limitations, the college remains committed to providing swift and effective solutions to the needs of its affiliates, demonstrating its adaptability to the dynamic demands of the digital environment.
4. **Empathy:** The mean score for this dimension was 3.48, with a standard deviation of 0.92, reflecting the faculty's focus on enhancing credibility and building trust with its clients. The college strives to ensure data confidentiality and protection, fostering a sense of reassurance among users when engaging with electronic systems. Moreover, the personal attention provided through digital communication platforms reflects a collaborative and empathetic approach that prioritises the comfort and satisfaction of students and staff.

3.6. Testing the study hypotheses

3.6.1. Testing the main hypothesis

Hypothesis statement: "There is a statistically significant effect at the significance level (α = 0.05) between the requirements for implementing digital transformation and the improvement of service quality dimensions at the Faculty of Economic Sciences, Setif 1 University".

To test this hypothesis, simple linear regression analysis was used, as shown in Table 5.

Table 5. Testing the main hypothesis

Variable	*B*	*r*	R^2	*t*-statistic	*p*-value
Digital transformation	0.757	0.801	0.64	8.35	0.000

Source: prepared by the researchers based on SPSS outputs.

Table 5 shows that digital transformation plays a significant role in improving service quality at the Faculty of Economic Sciences, Setif 1 University. The independent variable has a direct positive effect on service quality. The *t*-statistic (8.35) exceeds the critical value (2.021), and the *p*-value (0.000) is below 0.05, indicating a statistically significant relationship. The coefficient B (0.757) indicates that a one-unit increase in digital transformation leads to a 0.757-unit increase in service quality. Furthermore, $R^2 = 0.64$, meaning that 64% of the variation in service quality is explained by digital transformation. Accordingly, the main hypothesis is accepted.

3.6.2. Testing the sub-hypotheses

Table 6 presents the results of testing the sub-hypotheses that examine the relationship between digital transformation and the dimensions of service quality (tangibility, reliability, responsiveness and empathy) at the Faculty of Economics, Setif 1 University, using a simple regression model.

Table 6. Testing the sub-hypotheses

Variable	*B*	*r*	R^2	*t*-statistic	*p*-value
Tangibility	0.55	0.69	0.35	4.67	0.000
Reliability	0.95	0.81	0.65	8.57	0.000
Responsiveness	1.09	0.78	0.60	7.69	0.000
Empathy and solidarity	1.10	0.83	0.68	9.24	0.000

Source: prepared by the researchers based on SPSS outputs.

H_1: There is a statistically significant relationship at the significance level ($\alpha = 0.05$) between the implementation of digital transformation and the improvement of the tangibility dimension.

The results confirm the existence of a statistically significant relationship between the implementation of digital transformation and the improvement of tangibility. The *t*-statistic reached 4.67, which is higher than the tabulated value (2.021), thus confirming the validity of the first sub-hypothesis. The correlation coefficient ($r = 0.69$) indicates a strong relationship between digital transformation and the enhancement of tangible service aspects. The coefficient of determination ($R^2 = 0.35$) shows that 35% of the variation in tangibility can be explained by digital transformation.

H_2: There is a statistically significant relationship at the significance level ($\alpha = 0.05$) between the implementation of digital transformation and the improvement of the reliability dimension.

The results confirm the presence of a statistically significant relationship between digital transformation and reliability improvement, with a *t*-statistic of 8.57, exceeding the tabulated value (2.021). The correlation coefficient ($r = 0.81$) reflects a very strong relationship between the two variables, and the coefficient of determination ($R^2 = 0.65$) indicates that 65% of the variations in reliability can be explained by digital transformation. This confirms the validity of the second sub-hypothesis.

H_3: There is a statistically significant relationship at the significance level ($\alpha = 0.05$) between the implementation of digital transformation and the improvement of the responsiveness dimension.

The results indicate a statistically significant relationship between digital transformation and the enhancement of responsiveness. The *t*-statistic of (7.69) exceeds the tabulated value (2.021), confirming the hypothesis. The correlation coefficient ($r = 0.78$) suggests a strong association between digital transformation and responsiveness, while the coefficient of determination ($R^2 = 0.60$) shows that 60% of the changes in responsiveness are explained by digital transformation.

H_4: There is a statistically significant relationship at the significance level ($\alpha = 0.05$) between the implementation of digital transformation and the improvement of the empathy dimension.

The results reveal a statistically significant relationship between digital transformation and the enhancement of empathy and solidarity. The *t*-statistic (9.24) is greater than the tabulated value (2.021), confirming the hypothesis. The correlation coefficient ($r = 0.83$) indicates a very strong relationship between digital transformation and the improvement of empathy, while the coefficient of determination ($R^2 = 0.68$) means that 68% of the variations in empathy are explained by digital transformation. Therefore, the fourth sub-hypothesis is accepted.

Conclusions and recommendations

The main findings of this study are summarised as follows:

1. **Digital transformation implementation:** The Faculty of Economics, Setif 1, achieved a high overall level of digital transformation (mean = 3.58, SD = 0.69). This reflects strong adoption of digital practices, aligning with Boutarfa and Zedira (2024), who emphasised the role of digital tools in enhancing academic operations and research processes in Algerian universities.
2. **Organisational culture:** Scoring 3.62 (SD = 0.73), this dimension reflects a culture that promotes innovation and continuous improvement. These results are

consistent with Aisyah et al. (2023), who highlighted organisational culture as a key factor facilitating digital transformation and improving service quality in higher education institutions.

3. **Strategic planning for digital transformation:** With a mean of 3.57 (SD = 0.75), the faculty's structured strategic approach ensures alignment of digital initiatives with institutional goals. This finding aligns with Verhoef et al. (2021), who noted that well-defined organisational structures and strategies are essential for successful digital transformation and performance enhancement.
4. **Technical requirements:** Achieving a mean of 3.53 (SD = 0.90), the faculty's focus on robust technological infrastructure supports tangibility and reliability in service delivery. This aligns with Rosak-Szyrocka et al. (2023), who found that integrating digital technologies significantly improves operational efficiency and educational management.
5. **Procedural requirements:** Scoring 3.47 (SD = 0.71), these safeguards ensure data security and privacy, promoting user trust and contributing to empathy and reliability dimensions. Vial (2019) emphasised that effective digital transformation requires managing structural and organisational challenges, consistent with our findings on procedural support.
6. **Human resources:** Despite being the lowest scoring dimension (mean = 3.33, SD = 0.93), human capital is crucial for sustaining transformation. Continuous training and skill development are needed. This finding is in line with Vial (2019) and Aisyah et al. (2023), who stressed the importance of competent staff in implementing digital strategies successfully.
7. **Tangibility (service quality):** The mean score of 3.78 (SD = 0.64) indicates successful integration of modern technologies and user-friendly digital systems. This supports Rosak-Szyrocka et al. (2023) findings on how digital services enhance interaction, learning experiences and student satisfaction.
8. **Reliability:** With a mean of 3.54 (SD = 0.82), this reflects confidence in the accuracy and dependability of electronic services, supporting the link between digital infrastructure and trustworthiness highlighted by Verhoef et al. (2021) as well as Boutarfa and Zedira (2024).
9. **Responsiveness:** Scoring 3.49 (SD = 0.98), responsiveness indicates the faculty's efforts to provide timely solutions. This dimension aligns with prior research on the importance of adaptability and user-centred services in digital environments (Rosak-Szyrocka et al., 2023).
10. **Empathy:** With a mean of 3.48 (SD = 0.92), the faculty demonstrates personalised attention and concern for users' needs. This dimension is consistent with SERVQUAL principles (Adil et al., 2013; Parasuraman et al., 1985) and aligns with findings by Vial (2019) on the importance of human-focused interactions in digital transformation.

To enhance service quality at the Faculty of Economic Sciences, Setif 1 University, and to define digital development priorities aligned with the needs and expectations of its students and staff, the following **recommendations** are proposed:

1. **Enhance digital infrastructure and tangible technologies:** Continuously update and maintain digital platforms and systems to ensure reliable, accessible and sustainable service delivery.
2. **Develop human capital and organisational culture:** Implement ongoing training programs for staff and promote a culture of innovation and active participation in digital transformation initiatives.
3. **Improve responsiveness and electronic service delivery:** Strengthen mechanisms for timely interaction with students and staff, ensuring efficient and effective solutions to all digital service requests.
4. **Promote empathy and user-centred support:** Provide personalised attention through digital channels, safeguarding users' needs and fostering trust and satisfaction among students and staff.
5. **Ensure information security and procedural compliance:** Invest in advanced information security technologies and adopt robust digital governance measures to maintain a safe and sustainable digital environment.

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