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Towards High-Quality University Education: Examining the Role of Digital Transformation Dimensions in the Algerian Higher Education Context

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Abstract:
This study examines the impact of digital transformation on the quality of higher education services at Dr. Moulay Tahar University of Saïda, Algeria. It focuses on four dimensions: digital strategy, organizational culture, transformational leadership, and human resources. A quantitative approach was used with a questionnaire administered to 45 faculty members, and data were analyzed using SPSS (version 26). The results show a significant positive relationship between digital transformation and service quality ($R = 0.700$, $p < 0.001$). The study concludes that digital transformation improves higher education service quality when implemented as an integrated system combining strategy, culture, leadership, and human resources.

Keywords: Digital Transformation; Higher Education; Service Quality; Organizational Culture; Human Resources**.**

INTRODUCTION

Higher education institutions have undergone profound transformations in recent decades due to accelerating globalization and rapid technological advancements. These developments have compelled universities to adopt greater flexibility, innovation, and adaptability in order to remain competitive and ensure long-term sustainability (Hashim et al., 2022; Fernández et al., 2023).

In this evolving environment, universities are no longer isolated from digital and technological change. Their performance increasingly depends on their ability to integrate emerging digital technologies and manage the growing flow of information effectively. As a result, traditional educational models are being re-evaluated in favor of more innovative, technology-enhanced, and student-centered approaches (Prinsloo, 2026).

Digital transformation has emerged as a key strategic driver reshaping higher education systems worldwide. It enhances educational quality, strengthens institutional performance, and fosters interactive learning environments through e-learning and blended learning approaches. The COVID-19 pandemic further accelerated this shift, highlighting the critical role of digital technologies in ensuring educational continuity and institutional resilience (Alenezi & Akour, 2023; Mabotha & Ngcamu, 2026).

Objectives of the Study:

This study aims to:

a. Examine the impact of digital transformation on the quality of higher education in Algerian universities.

b. Analyze how digital transformation contributes to improving institutional performance and academic effectiveness.

c. Investigate the relationship between digital transformation dimensions (digital strategy, organizational culture, transformational leadership, and human resources) and higher education quality.
d. Assess the level of digital transformation implementation at the Faculty of Economic, Commercial, and Management Sciences at Dr.
e. Contribute to the literature by providing empirical evidence from a developing country context, specifically Algeria.

1. Theoretical Framework:

1.1 Digital Transformation in Higher Education:

Digital transformation refers to the strategic integration of digital technologies into institutional processes, business models, and services to create value and improve performance (Hashim et al., 2022; Fernández et al., 2023). In higher education, it goes beyond simple technological adoption to involve a comprehensive redesign of educational systems in line with the requirements of the digital economy (Alenezi & Akour, 2023).

It enhances innovation and competitiveness in universities by improving operational efficiency and educational quality through tools such as learning management systems, cloud computing, data analytics, and digital platforms (Liu et al., 2021; Szymczak & Gola, 2022). Moreover, it supports the transition from traditional teaching models to interactive, technology-enhanced approaches based on e-learning and lifelong learning (OECD, 2021).

Recent literature identifies four key dimensions of digital transformation in higher education: digital strategy, organizational culture, transformational leadership, and human resources. These dimensions are considered critical success factors for effective implementation (Benavides et al., 2020; Hashim et al., 2022). Without strategic vision and adequate digital competencies, digital transformation efforts are likely to fail.

Importantly, digital transformation is not purely technological; it is

also an organizational and cultural process requiring changes in mindset, practices, and skills to ensure effective integration of digital tools within academic environments (Fernández et al., 2023).

1.2.Higher Education Quality:

Higher education quality is a multidimensional concept reflecting the ability of universities to achieve their educational, research, and societal missions effectively (Cheng, 2020). It includes teaching quality, curriculum relevance, learning outcomes, student satisfaction, and administrative efficiency (Szymczak & Gola, 2022).

In the digital era, quality is increasingly linked to the effective use of technology to enhance learning experiences. It extends beyond content delivery to include access to digital resources, online interaction, and personalized learning environments (Prifti, 2022).

Digital transformation contributes directly to improving quality by increasing operational efficiency, enhancing assessment methods, and improving student experiences, ultimately strengthening institutional performance and reputation (OECD, 2021).

1.3 Relationship Between Digital Transformation and Higher Education Quality:

Recent studies indicate a strong positive relationship between digital transformation and higher education quality, as it serves as a key driver of institutional performance improvement (Alenezi & Akour, 2023). It enhances teaching quality, research productivity, and service delivery, thereby improving overall educational outcomes (Hashim et al., 2022).

Empirical evidence also shows that digital transformation may influence educational quality both directly and indirectly through mediating variables such as operational efficiency and academic performance (Fernández et al., 2023). Additionally, it improves academic staff performance by supporting teaching and research

activities and strengthening student engagement (Benavides et al., 2020).

2. Previous Studies (Literature Review) :

Previous research has extensively examined digital transformation in higher education from multiple perspectives. Some studies have focused on conceptualizing digital transformation, its drivers, and implementation mechanisms, emphasizing its role in enhancing competitiveness and institutional performance (Benavides et al., 2020; Mariana et al., 2020).

Other studies highlight enabling factors such as leadership, organizational structure, technological infrastructure, and human resource readiness (Grosseck et al., 2020; Teixeira et al., 2021; Al-Qaraawi, 2022). Research on digital maturity shows that many universities still lag behind due to limited innovation capacity and financial constraints (Rodríguez-Abitia & Bribiesca-Correa, 2021).

Studies on educational quality emphasize dimensions such as teaching effectiveness, student satisfaction, and service delivery efficiency (Al-Hadabi & Akasha, 2007). More recent work confirms the positive impact of digital transformation on teaching processes, communication, and institutional efficiency (Berada et al., 2022; Slimane & Al-Shami, 2023).

However, most existing research treats digital transformation and educational quality separately. Few studies integrate both within a unified analytical model, particularly in the Algerian context.

2.1. Research Gap:

Despite growing interest in digital transformation in higher education, several gaps remain. First, most studies focus either on technological adoption or institutional modernization, without integrating the multidimensional effects of digital transformation on educational quality (Benavides et al., 2020; Fernández et al., 2023).

Second, key dimensions such as digital strategy, organizational culture, leadership, and human resources are often studied separately rather than as an integrated framework (Hashim et al., 2022; Alenezi & Akour, 2023).

Third, empirical studies from developing countries, particularly in North Africa and the Arab world, remain limited (Rodríguez-Abitia & Bribiesca-Correa, 2021). In Algeria, there is a significant lack of institutional-level studies examining how digital transformation affects educational service quality.

Finally, contextual applications of digital transformation models within specific faculties remain underexplored.

2.2. Research Problem:

Based on the identified gaps, this study addresses the following research question:

To what extent does digital transformation, in its various dimensions, influence the quality of higher education services at the Faculty of Economic, Commercial, and Management Sciences at Dr. Moulay Tahar University of Saïda?

2.3. Hypotheses of the Study:

•H1: Digital strategy has a significant positive effect on higher education quality.

•H2: Organizational culture has a significant positive effect on higher education quality.

•H3: Transformational leadership has a significant positive effect on higher education quality.

•H4: Human resource readiness has a significant positive effect on higher education quality.

3. Methodology:

3.1 Research Instrument:

This study adopted a quantitative research design using a structured questionnaire as the primary data collection instrument. The questionnaire was considered appropriate for capturing respondents' perceptions regarding digital transformation and higher education service quality, in line with the study objectives.

The empirical investigation was conducted at Dr. Moulay Tahar University of Saïda, specifically within the Faculty of Economic, Commercial, and Management Sciences. The study targeted a purposive sample of university professors, selected based on their relevance and involvement in academic and administrative processes related to digital transformation.

The questionnaire was divided into two main sections:

Section 1: Respondents' Demographic Profile

This section collected background information including gender, age, academic rank, and years of professional experience.

Section 2: Study Constructs

This section measured the main variables of the study as follows:

- Digital Transformation (Independent Variable), operationalized through four dimensions:
  - Digital transformation strategy (4 items)
  - Organizational culture (4 items)
  - Transformational leadership (4 items)
  - Human resources readiness (4 items)
- Higher Education Service Quality (Dependent Variable), measured using 8 items adapted from relevant literature.

3.2 Measurement Scale:

A five-point Likert scale was employed to measure respondents' level of agreement, ranging from 1 ("Strongly disagree") to 5 ("Strongly agree"). Likert scales are widely used in social science research due to

their reliability in measuring attitudes and perceptions (Likert, 1932).

Response option	Score
Strongly disagree	1
Disagree	2
Neutral	3
Agree	4
Strongly agree	5

To interpret the mean scores, the following intervals were adopted:

- 1.00–1.80: Very low level
- 1.81–2.60: Low level
- 2.61–3.40: Moderate level
- 3.41–4.20: High level
- 4.21–5.00: Very high level

This classification is commonly used in quantitative educational and social research to facilitate interpretation of descriptive results (Abu Zeid, 2010).

3.3 Data Analysis Techniques:

Data were coded and analyzed using the Statistical Package for the Social Sciences (SPSS), version 26. The following statistical techniques were applied in accordance with the study objectives:

- Descriptive statistics (frequencies and percentages): to describe respondents' demographic characteristics.
- Means and standard deviations: to assess the level of adoption of digital transformation dimensions and perceived service quality.
- Standard deviation: to measure the dispersion of responses around the mean.
- Regression analysis (simple and multiple): to test the impact of digital transformation dimensions on higher education service quality as the dependent variable.

4. Results and Discussion:

4.1 Descriptive Statistics of the Sample:

This section presents the demographic characteristics of the respondents. The study sample consisted of 45 academic staff members from Dr. Moulay Tahar University of Saïda.

The results show a predominance of male respondents (62.2%), compared to female respondents (37.8%). Regarding age distribution, the largest proportion of participants falls within the 41–50 age group (48.9%), followed by those aged 30–40 years (37.8%). Both the youngest group (under 30 years) and the oldest group (above 51 years) represent 6.7% each.

In terms of academic rank, lecturers and professors are equally represented (46.7% each), while assistant professors constitute 6.7%. This indicates a balanced representation of mid- and senior-level academic staff.

Regarding professional experience, the majority of respondents (73.3%) have more than 11 years of experience, while 13.3% have between 6–10 years and 13.3% have less than 5 years. This reflects a highly experienced academic population, which enhances the reliability of the responses.

Overall, the sample is characterized by experienced academic staff, which supports the credibility of perceptions regarding digital transformation and service quality.

4.2 Reliability and Validity Analysis:

4.2.1 Reliability Analysis (Cronbach's Alpha) :

Cronbach's Alpha was used to assess internal consistency reliability. A commonly accepted threshold is 0.70, indicating acceptable reliability (Cronbach, 1951).

The overall Cronbach's Alpha for the instrument was 0.932, based on 24 items, indicating excellent internal consistency.

At the construct level, all values ranged between 0.728 and 0.887, confirming satisfactory to high reliability across all dimensions:

- Digital transformation strategy: 0.778
- Organizational culture: 0.728
- Transformational leadership: 0.887
- Human resources: 0.766
- Service quality: 0.795

These results confirm the reliability of the measurement instrument and its suitability for further statistical analysis.

4.2.2 Validity Analysis:

Content validity was ensured through an extensive literature review and expert evaluation. Experts in management and information systems reviewed the questionnaire for clarity, relevance, and coherence, leading to minor refinements.

Construct validity was assessed indirectly through internal consistency. The strong Cronbach's Alpha values provide evidence that the items within each construct measure the same underlying concept.

Although Exploratory Factor Analysis (EFA) was not conducted, the reliability results provide acceptable preliminary evidence of construct validity.

4.3 Descriptive Analysis of Study Variables:

4.3.1 Digital Transformation Dimensions:

The results indicate a generally positive perception of digital transformation within the university.

- Digital strategy: (M = 3.42; SD = 0.75)
- Organizational culture: (M = 3.82; SD = 0.83)
- Transformational leadership: (M = 3.80; SD = 1.03)
- Human resources: (M = 3.42; SD = 1.00)

Overall, digital transformation shows a moderate to high level (M ≈ 3.42), indicating that implementation is underway but not yet fully mature.

4.3.2 Higher Education Service Quality:

The findings reveal a generally positive perception of service quality (M = 3.61; SD = 0.91).

The highest-rated items relate to:

- Use of Moodle for academic training (M = 4.02)
- Availability of digital learning materials
- Use of electronic communication tools

These results highlight the importance of digital platforms in improving teaching and administrative efficiency.

4.4 Hypotheses Testing:

4.4.1 Main Hypothesis:

A significant positive relationship was found between digital transformation and service quality ($R = 0.700$, $p < 0.001$).

The model explains 48.9% of the variance ($R^2 = 0.489$), indicating moderate explanatory power.

Regression results confirm a significant effect ($\beta = 0.700$, $p < 0.001$), leading to rejection of H0.

Conclusion: Digital transformation significantly enhances higher education service quality.

4.4.2 Sub-Hypotheses Results:

Digital Strategy

- $R = 0.595$; $R^2 = 0.354$; $p < 0.001$

Significant positive effect

Organizational Culture

- $R = 0.588$; $R^2 = 0.346$; $p < 0.001$

Significant positive effect

Transformational Leadership

- $R = 0.548$; $R^2 = 0.301$; $p < 0.001$

Significant positive effect

Human Resources

- $R = 0.694$; $R^2 = 0.482$; $p < 0.001$

Strongest predictor of service quality

4.4.3 Multiple Regression (Integrated Model) :

The combined model explains 51.4% of variance in service quality ($R^2 = 0.514$), and is statistically significant ($p < 0.001$).

However, individual predictors lose significance in the combined model:

- Strategy ($p = 0.177$)
- Culture ($p = 0.405$)
- Leadership ($p = 0.985$)
- Human resources ($p = 0.060$)

These results suggest potential multicollinearity or high interdependence among digital transformation dimensions. This indicates that the variables do not operate independently but rather as an integrated system.

The findings confirm that digital transformation has a significant and positive impact on higher education service quality. While each dimension shows significant effects individually, their significance decreases in the integrated model due to overlap and interdependence.

This supports a holistic view of digital transformation, where strategy, culture, leadership, and human resources interact dynamically rather than functioning as isolated predictors.

5. Discussion

This study examined the effect of digital transformation dimensions (digital strategy, organizational culture, transformational leadership, and human resources) on the quality of higher education services at Dr. Moulay Tahar University of Saïda. The findings provide both theoretical and practical insights into how digital transformation contributes to improving service quality in higher education institutions.

5.1 Overall Effect of Digital Transformation on Service Quality:

The results of the main hypothesis revealed a strong and statistically significant positive relationship between digital transformation and service quality ($R = 0.700$, $p < 0.001$). In addition, the model explained 48.9% of the variance in service quality, indicating substantial explanatory power in the context of social sciences.

This finding confirms that digital transformation is not merely a technological shift but a strategic organizational capability that enhances efficiency, responsiveness, and service delivery in higher education institutions.

The result is consistent with previous studies that emphasize the role of digital transformation in improving institutional performance through automation, data-driven decision-making, and enhanced communication systems. In particular, it aligns with Vial (2019), who conceptualized digital transformation as a process that reshapes value creation mechanisms, and Berman (2012), who highlighted its role in improving operational efficiency and user experience. Similarly, Kopp et al. (2019) found that digital maturity significantly enhances academic and administrative performance in higher education.

Accordingly, this study extends the existing literature by providing empirical evidence from an Algerian university context, which remains underexplored in digital transformation research.

5.2 Effect of Digital Transformation Strategy:

The findings indicate that digital transformation strategy has a significant positive effect on service quality ($\beta = 0.595$, $p < 0.001$), explaining 35.4% of the variance.

This result highlights that strategic planning is a fundamental pillar of successful digital transformation. Universities with a clear digital strategy are better able to align technological initiatives with institutional objectives, thereby improving service delivery and organizational coordination.

This finding is consistent with Chanias et al. (2019), who emphasized

digital strategy as a key driver of transformation success, and Matt et al. (2015), who demonstrated its role in enhancing organizational performance.

In the context of this study, the results suggest that the absence of a clear digital roadmap may limit the effectiveness of available technological resources.

5.3 Effect of Organizational Culture:

The results show that organizational culture significantly influences service quality ($\beta = 0.588$, $p < 0.001$), explaining 34.6% of the variance.

This indicates that digital transformation success is strongly dependent on cultural readiness and openness to change. A supportive organizational culture promotes collaboration, knowledge sharing, and acceptance of digital technologies among academic staff.

This finding is consistent with Yoo et al. (2010), who emphasized that digital transformation requires cultural change rather than technological adoption alone. It also aligns with AlHujran et al. (2018), who identified organizational culture as a critical success factor in digital public services.

Thus, even in technologically advanced environments, resistance to change may significantly limit transformation outcomes.

5.4 Effect of Transformational Leadership:

The study revealed that transformational leadership has a significant positive effect on service quality ($\beta = 0.548$, $p < 0.001$), explaining 30.1% of the variance.

This indicates that leadership plays a key role in motivating staff, fostering innovation, and guiding digital transformation initiatives.

This finding is consistent with Bass and Riggio (2006), who highlighted the role of transformational leadership in enhancing change readiness and employee engagement. It also supports El Sawy

et al. (2016), who emphasized leadership commitment as a critical determinant of digital transformation success.

In higher education institutions, transformational leadership facilitates change acceptance and promotes a shared vision for digital adoption, thereby improving service delivery processes.

5.5 Effect of Human Resources:

The results demonstrate that human resources have the strongest impact among all variables ($\beta = 0.694$, $p < 0.001$), explaining 48.2% of the variance in service quality.

This finding highlights that employees' digital skills, training, and competencies are the most critical determinants of successful service quality improvement.

It is strongly supported by Rønn-Andersen et al. (2020), who emphasized the importance of digital skills and human capital in digital transformation success. It also aligns with OECD (2019) reports, which identify human capital as the primary driver of digital readiness in public institutions.

In the university context, these results suggest that investment in human capital development is more impactful than technology investment alone.

5.6 Integrated Model and Interdependence Effect:

Although the multiple regression model was statistically significant ($p < 0.001$), individual predictors became insignificant when combined.

This suggests the presence of multicollinearity or overlapping explanatory effects among the dimensions. In other words, digital strategy, organizational culture, leadership, and human resources are highly interdependent components of a single digital transformation system.

This finding is consistent with Soto-Acosta (2020), who conceptualized digital transformation as a holistic organizational

capability rather than isolated dimensions. It also aligns with Fitzgerald et al. (2014), who emphasized the need for simultaneous alignment of strategy, culture, leadership, and skills for successful transformation.

Therefore, the lack of individual significance in the combined model does not weaken the results; rather, it reinforces the systemic nature of digital transformation.

5.7 Theoretical Implications:

This study contributes to the literature by:

- Confirming the multidimensional nature of digital transformation in higher education.
- Supporting the view of digital transformation as a systemic organizational capability.
- Extending existing theoretical frameworks (e.g., TOE, dynamic capabilities) to the Algerian university context.

5.8 Practical Implications:

The findings suggest that university decision-makers should:

- Develop integrated rather than fragmented digital transformation strategies.
- Strengthen organizational culture toward innovation and digital readiness.
- Enhance leadership capacity for digital governance.
- Prioritize continuous training and development of human resources.

6. Conclusion of Discussion:

Overall, the study confirms that digital transformation significantly enhances the quality of higher education services. However, its effectiveness depends on the simultaneous interaction of strategic, cultural, leadership, and human resource dimensions, highlighting its

systemic and integrated nature.

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