E-Management and University Service Quality: Empirical Evidence from an Algerian University

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Abstract: *This study investigates the relationship between E- management and university service quality in an Algerian public university using a quantitative descriptive analytical design. Data were collected from 100 students and analyzed through correlation and simple linear regression. The results reveal a statistically significant but modest positive association. E-management explains 5.1% of the variance in perceived service quality ($R^2 = 0.051$), indicating limited explanatory power. The findings suggest that digital systems improve procedural efficiency but do not independently determine service outcomes. Sustainable improvement requires integration between technology, organizational processes, and institutional governance.*
Keywords: *E-management; University service quality; Digital transformation; Higher education; Algeria.*

1. Introduction

Public administration has experienced significant transformation due to the rapid expansion of information and communication technologies. Digital transformation has become a central mechanism for improving efficiency, transparency, and accountability in public institutions. Within this reform trajectory, electronic management (E-management) represents a strategic shift from traditional bureaucratic procedures toward digitally integrated administrative systems.

In higher education, E-management plays a critical role in organizing academic and administrative services such as enrollment, registration, academic monitoring, and information dissemination. While digital platforms enhance procedural speed and accessibility, their presence does not automatically ensure improved service quality. The effectiveness of E-

management depends on institutional alignment between technological infrastructure, organizational processes, and human resource capacity.

In Algeria, universities have progressively adopted digital administrative systems as part of broader public sector modernization initiatives. However, implementation levels remain uneven, and empirical evidence regarding the actual impact of E-management on service quality is limited. The existing literature generally suggests a positive association between digital governance and service performance, yet empirical results often indicate modest effect sizes, particularly in developing institutional contexts.

Accordingly, this study examines the relationship between E-management and university service quality at Mostafa Stambouli University of Mascara. The research seeks to answer the following question:

To what extent does E-management contribute to improving university service quality in Algerian higher education institutions?

By providing quantitative evidence from a field study, this research contributes to a more context-sensitive understanding of digital transformation outcomes in public universities, without presuming the magnitude of the effect.

2. Theoretical Framework

2.1 Conceptual Evolution of E-Management

The concept of E-management emerged as a response to structural inefficiencies in traditional administrative systems, including procedural rigidity and bureaucratic delay (Heeks, 2006, p. 12). Early definitions emphasized the technical substitution of paper-based transactions with digital processes (Najm, 2004, p. 35). However, contemporary scholarship conceptualizes E-management as a broader institutional transformation involving process reengineering, organizational adaptation, and cultural change (Mahmoud, 2011, p. 41) .

From an institutional perspective, technological deployment alone does not guarantee administrative reform. Many digital initiatives fail when technological systems are introduced without sufficient alignment with organizational structures and human capabilities (Heeks, 2006, p. 18).

Consequently, E-management should be understood as an integrated reform approach rather than a purely technical upgrade.

2.2 Core Components and Dimensions of E-Management

The effectiveness of E-management depends on several interrelated components. The Digital Government Policy Framework identifies technological infrastructure, data governance, institutional coordination, and user engagement as essential pillars of digital transformation (OECD, 2021, p. 22) .

Technological infrastructure ensures operational continuity and data security, while digital platforms enable workflow automation and procedural transparency. Human resource capacity remains decisive, as administrative competence and digital readiness directly affect system performance (Heeks, 2006, p. 24). In addition, regulatory and governance mechanisms are necessary to secure accountability and compliance (OECD, 2021, p. 37).

These components function interdependently. Weakness in one dimension may significantly constrain overall effectiveness.

2.3 Functions of E-Management in University Institutions

Within universities, E-management operationalizes classical managerial functions (planning, organization, coordination, and control) through digital tools (Ben Aissa, 2018, p. 76). Digital databases support evidence-based planning, electronic workflows reduce procedural delays, and monitoring systems enhance institutional transparency (Bertot, 2010, p. 268).

Given the high volume of administrative transactions and the diversity of stakeholders, digital integration is particularly relevant in higher education settings. However, its effectiveness remains contingent upon institutional coherence and user-system interaction quality.

2.4 Concept of University Service Quality

Service quality refers to the extent to which institutional services meet or exceed beneficiary expectations in terms of reliability, responsiveness, and accessibility (Al-Obaidi, 2016, p. 54). In public institutions, service quality functions as a key performance indicator reflecting administrative effectiveness.

In the university context, service quality includes administrative

processes such as enrollment, certification, academic orientation, and results dissemination. Digital transparency and accessibility increasingly shape perceived quality (Bertot, 2010, p. 270). Yet service quality theory emphasizes that technical efficiency alone is insufficient; user experience and system reliability remain central determinants (Cohen, 1988, p. 79).

2.5 Theoretical Relationship Between E-Management and University Service Quality

The literature generally supports a positive association between digital governance and service performance. Electronic systems enhance transparency, reduce processing time, and improve information access, thereby contributing to higher satisfaction levels (United Nations, 2020, p. 94).

However, empirical research indicates that digital reforms produce sustainable improvements only when technological innovation is aligned with organizational restructuring and human capacity development (Heeks, 2006, p. 29). International evidence further stresses the importance of governance integration and strategic coordination in achieving measurable outcomes (OECD, 2021, p. 44)

Therefore, E-management may be considered a necessary but not sufficient condition for improving university service quality. Its effectiveness depends on the coherence between infrastructure, administrative processes, and institutional culture.

2.6 Review of Previous Studies

Empirical studies in higher education contexts generally report a statistically significant relationship between E-management and service quality. Research shows that digital systems enhance transparency and user satisfaction when embedded within broader governance reforms (Bertot, 2010, p. 272).

In Algeria, digital transformation efforts remain partial and often focus on procedural digitization rather than comprehensive administrative restructuring (Ben Aissa, 2018, p. 88). Similar findings are reported in comparative international research, where digital transformation outcomes

vary according to institutional maturity and organizational capacity (OECD, 2021, p. 44).

Overall, the literature suggests that while E-management is theoretically associated with improved service quality, empirical results often reveal moderate effect sizes. The present study contributes to this debate by providing quantitative evidence within an Algerian university context without assuming a predetermined magnitude of impact.

3. Methodology

3.1 Research Design

This study adopted a quantitative descriptive–analytical design, which is appropriate for examining relationships between measurable variables within a defined institutional context. The descriptive component enables an objective assessment of the level of electronic management practices and perceived service quality, whereas the analytical component allows for testing the hypothesized relationship between the two constructs using inferential statistical techniques.

The study follows a cross-sectional design, as data were collected at a single point in time from a defined population. Cross-sectional survey designs are widely used in social sciences to explore associative relationships and generate empirical evidence for explanatory modeling (Creswell, 2014, p. 155). The research strategy is therefore consistent with correlational research aimed at identifying the strength and direction of relationships without manipulating variables (Cohen, 1988, p. 79).

3.2 Population and Sample

The target population consists of all students enrolled at Mostafa Stambouli University of Mascara during the 2024/2025 academic year who utilize digital administrative services. The choice of this institution is methodologically justified because it represents a public university that has integrated several digital platforms for managing administrative and pedagogical processes, making it a relevant empirical setting for assessing the impact of electronic management.

A simple random sampling technique was employed to ensure equal probability of selection and reduce sampling bias. The final sample included 100 students from different faculties and academic levels. A total of 100

questionnaires were distributed and fully retrieved, yielding a response rate of 100%. Although such a rate is uncommon in large-scale surveys, it strengthens internal data consistency within the selected sample.

From a statistical perspective, a sample size of 100 observations is considered acceptable for basic correlation and regression analyses in exploratory research contexts. Methodological literature indicates that sample sizes ranging from 30 to 200 can provide sufficient statistical power for detecting medium effect sizes at the 5% significance level (Cohen, 1988, p. 92).

Data collection was conducted between April 15 and May 1, 2025, during the second semester, a period characterized by intensive interaction with digital administrative platforms. This timing enhances the contextual validity of respondents' evaluations.

3.3 Data Collection Instrument

The study relied on a structured questionnaire as the primary data collection instrument. Survey instruments are appropriate for measuring perceptions, attitudes, and evaluations across relatively large groups in a standardized manner (Creswell, 2014, p. 159).

The questionnaire was developed based on established theoretical literature on electronic management and service quality, with contextual adaptation to the Algerian higher education environment. It consisted of three sections:

- **Section I:** Demographic characteristics (gender, academic level, faculty).
- **Section II:** Electronic management, measured through dimensions such as ease of use, service speed, information accuracy, and service availability.
- **Section III:** University service quality, measured through student satisfaction, reliability, responsiveness, and interaction quality.

Responses were measured using a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). Likert-type scales are widely recognized as suitable for capturing attitudinal constructs in quantitative research (Likert, 1932, p. 55).

3.4 Validity and Reliability

To ensure content validity, the questionnaire items were derived from previously validated constructs in the literature and reviewed for conceptual consistency. Content validity refers to the degree to which measurement items adequately represent the theoretical domain of the construct (Nunnally & Bernstein, 1994, p. 83).

Reliability was assessed using Cronbach's Alpha coefficient to measure internal consistency. A Cronbach's Alpha value equal to or greater than 0.70 is generally considered acceptable for exploratory research (Nunnally & Bernstein, 1994, p. 265). The obtained coefficients confirmed satisfactory reliability levels for the study variables, supporting the robustness of the measurement instrument.

3.5 Variables and Conceptual Model

The study includes:

- **Independent Variable:** Electronic management (with its operational dimensions).
- **Dependent Variable:** University service quality.

A conceptual model was constructed to represent the presumed linear relationship between electronic management and service quality. The model assumes that improvements in digital administrative practices contribute positively to perceived service quality. The main hypothesis was tested using inferential statistical methods.

3.6 Statistical Analysis

After data collection, responses were coded and entered into the Statistical Package for the Social Sciences (SPSS). Both descriptive and inferential statistical techniques were employed.

Descriptive statistics included arithmetic means and standard deviations to assess central tendency and dispersion. Inferential analysis involved Pearson's correlation coefficient to examine the strength and direction of the relationship between variables, and simple linear regression to evaluate the predictive effect of electronic management on service quality. The significance level was set at $\alpha = 0.05$, consistent with conventional standards in social science research (Cohen, 1988, p. 14).

Where appropriate, analysis of variance (ANOVA) was used to assess the overall significance of the regression model.

3.7 Study Limitations

This study is limited to a single public university and a relatively moderate sample size. It focuses exclusively on administrative services and does not examine pedagogical quality or academic performance outcomes. Additionally, the cross-sectional design restricts causal inference, as associative relationships do not establish temporal precedence (Creswell, 2014, p. 168).

Despite these limitations, the study provides empirically grounded insights into the relationship between electronic management and university service quality within the Algerian higher education context, and it offers a methodological foundation for broader longitudinal or comparative research in futures investigations.

4. Statistical Data Analysis and Hypotheses Testing

4.1 Reliability and Internal Consistency Analysis

The internal consistency of the measurement instrument was assessed using Cronbach's Alpha coefficient. In quantitative research, coefficients of 0.70 or higher are generally considered satisfactory, while values between 0.60 and 0.70 are deemed acceptable for exploratory studies (Nunnally & Bernstein, 1994, p. 265).

Table N^0 (01): Overall Reliability Analysis of the Questionnaire Dimensions

Dimension	Cronbach's Alpha (α)	Number of Items
Electronic Management	0.608	8
University Services	0.614	7
Overall Questionnaire	0.660	15

Source: Prepared by the authors based on SPSS output

The results indicate that the electronic management dimension achieved $\alpha = 0.608$, while the university services dimension recorded $\alpha = 0.614$. The overall instrument reached $\alpha = 0.660$. Although these coefficients do not exceed the conventional 0.70 benchmark, they surpass the minimum threshold commonly accepted in exploratory research.

These values suggest moderate internal consistency and acceptable inter-item coherence, while also indicating potential multidimensionality or item heterogeneity within the measured constructs. Such heterogeneity may

partly explain the modest explanatory power observed in the regression analysis.

Given the exploratory nature of the study, the single-institution context, and the limited sample size (n = 100), the reliability levels are considered methodologically sufficient to justify proceeding with inferential statistical analysis. Nevertheless, future research may refine and recalibrate scale items to strengthen internal consistency and enhance measurement precision.

4.2 Demographic Profile of Respondents

The study sample consists of 100 students. The dominant age group is 21–24 years (37%), followed by 18–20 years (24%). Students aged 25–30 years represent 22%, while those above 30 years constitute 11%, and respondents under 18 account for 6%. The age distribution reflects a predominantly young population with relatively homogeneous generational characteristics.

Gender distribution is balanced (53% female; 47% male), ensuring gender representativeness.

Faculty distribution shows relative heterogeneity:

- Economics and Management: 28%
- Science and Technology: 24%
- Law and Political Science: 21%
- Literature and Languages: 15%
- Natural and Life Sciences: 12%

Regarding academic level, Master students (First and Second Year) represent 45% of the sample, while undergraduate levels account for 55%.

This demographic configuration is analytically relevant. The concentration of respondents within the 18–24 age range may reduce variance in digital familiarity, potentially attenuating effect sizes in correlation and regression analysis. Similarly, Master students (due to more frequent administrative interactions) may exhibit more demanding evaluations of service performance. Such heterogeneity likely contributes to perceptual dispersion across items.

4.3 Descriptive Analysis of Study Variables

Descriptive statistics were computed using arithmetic means and standard deviations to assess perceptions of electronic management and university service quality.

4.3.1 Electronic Management Dimension

Table N⁰ (02): Means and Standard Deviations – Electronic Management

Item Statement	Mean	Standard Deviation	Interpretation
Increased student satisfaction	3.97	0.93	High
Improved service delivery speed	3.96	0.98	High
Facilitated access to information	3.88	0.89	Positive
Reduced administrative corruption	3.87	1.08	Positive
Provided better monitoring tools	3.82	1.01	Good
Faced technical challenges	3.71	1.23	Moderate variability
Improved transparency	3.65	1.22	Moderate
Reduced administrative costs	3.57	1.05	Moderate

Source: Prepared by the authors based on SPSS output.

Overall Mean (Electronic Management) = **3.80**Standard Deviation = **0.545**

All items exceed the threshold value of 3.40, indicating perceived implementation of electronic management practices within the university.

The highest mean (3.97) relates to improved service delivery and student satisfaction, suggesting that procedural efficiency represents the most visible outcome of digitalization.

The lowest mean (3.57) concerns cost reduction, indicating that financial efficiency may not be directly observable to students.

Standard deviations ranging from 0.89 to 1.23 indicate moderate variability, particularly for items related to technical challenges and transparency. This dispersion reflects heterogeneous user experiences.

4.3.2 University Service Quality Dimension

Table N⁰ (03): Means and Standard Deviations – University Services

Item Statement	Mean	Standard Deviation	Interpretation
Recurrent technical difficulties hinder use	3.78	0.99	High agreement
Services facilitate procedures	3.77	0.93	Positive
Feeling secure using services	3.71	1.06	Good

Information is accurate and updated	3.58	1.03	Good
Services regularly available	3.53	1.17	Good
Technical support availability	3.32	1.06	Acceptable
Satisfaction with response speed	3.28	1.04	Moderate

Source: Prepared by the authors based on SPSS output.Overall Mean (Public Services) = **3.57** Standard Deviation = **0.571**

Two items (3.32 and 3.28) fall below the 3.40 threshold, indicating relative weaknesses in specific operational aspects of service quality.

The highest mean (3.78) relates to recurrent technical difficulties, suggesting that system reliability remains a structural concern. While procedural facilitation and security are positively evaluated, technical support availability and response speed show comparatively lower scores.

The overall mean (3.57) remains lower than that of electronic management (3.80), indicating that technological adoption does not automatically translate into optimal service quality outcomes.

4.4 Inferential Analysis and Hypothesis Testing

To examine the relationship between electronic management and university service quality, Pearson correlation and simple linear regression were applied.

4.4.1 Correlation Analysis

Table N^0 (04): Pearson Correlation

Variables	r	p-value	N
Electronic management → University services	0.225	0.024	100

Source: Prepared by the authors based on SPSS output.

The correlation coefficient (r = 0.225) indicates a weak positive association. According to conventional effect size classifications (Cohen, 1988, p. 79), this magnitude corresponds to a small effect.

The p-value (0.024) is below α = 0.05, confirming statistical significance at the 95% confidence level. Therefore, the null hypothesis of no association is rejected.

4.4.2 Simple Linear Regression Analysis

Table N^0 (05): Model Summary

Criterion	Value

R	0.225
R²	0.051
Adjusted R²	0.041
Standard Error	0.55974

Source: Prepared by the authors based on SPSS output.

The coefficient of determination ($R^2 = 0.051$) indicates that electronic management explains 5.1% of the variance in university service quality. The adjusted R^2 confirms limited explanatory power.

This modest explanatory strength suggests that service quality is influenced by additional organizational and contextual determinants not incorporated into the present single-predictor model.

4.4.3 ANOVA – Model Significance

Table N⁰ (06): ANOVA Results

Source	SS	df	MS	F	Sig.
Regression	1.641	1	1.641	5.238	0.024*
Residual	30.704	98	0.313	–	–
Total	32.345	99	–	–	–

Source: Prepared by the authors based on SPSS output

The F-value (5.238) with $p = 0.024$ confirms that the regression model is statistically significant at $\alpha = 0.05$. Thus, electronic management contributes meaningfully (although modestly) to explaining variations in service quality.

4.4.4 Regression Coefficients and Final Equation

Table N⁰ (07): Regression Coefficients

Variable	B	Std. Error	Beta	t	Sig.
Constant	2.669	0.396	–	6.735	0.000
Electronic management	0.236	0.103	0.225	2.289	0.024*

Source: Prepared by the authors based on SPSS output.

The regression equation is expressed as:

$$\boldsymbol{University\ Service\ Quality = 2.669 + 0.236(E - Management)}$$

The regression coefficient (B = 0.236) indicates that a one-unit increase in electronic management is associated with a 0.236-unit increase in perceived service quality. However, the explanatory power remains limited ($R^2 = 0.051$), meaning that electronic management accounts for only 5.1% of the variance.

Despite statistical significance, the standardized Beta (0.225) confirms that electronic management functions as a contributing rather than dominant determinant. The relatively low coefficient reinforces the need to incorporate demographic and organizational control variables in future models to enhance explanatory robustness.

5. Discussion of Results

This section interprets the empirical findings in light of the theoretical framework and relevant scholarship on digital governance and service performance. The objective is not only to confirm statistical significance but to explain the magnitude, limitations, and structural implications of the observed effects.

5.1 Level of Electronic Management Implementation

The overall mean of electronic management (3.80) indicates a generally favorable perception of digital administrative practices. However, lower evaluations for transparency (3.65) and cost reduction (3.57) suggest that digitalization remains primarily procedural rather than structurally transformative.

This pattern is consistent with staged digital reform models, which argue that institutions initially automate existing processes before achieving deeper organizational restructuring (Heeks, 2006, p. 18). The relatively limited dispersion (SD = 0.545) indicates moderate consensus among respondents, but also suggests restricted variance in the independent variable, which may statistically constrain the strength of association with service quality.

Demographic structure further contextualizes these findings. The concentration of respondents within the 18–24 age group (67%) implies relatively homogeneous digital familiarity, potentially reducing perceptual variance. Additionally, Master students (45%) interact more intensively with administrative systems, which may generate more critical or differentiated evaluations.

Overall, electronic management appears operationally functional but not yet institutionally consolidated.

5.2 Level of University Service Quality

University service quality achieved a moderate overall mean (3.57), remaining below the level recorded for electronic management. This gap indicates that technological availability does not fully translate into improved service outcomes.

Two items (technical support availability (3.32) and response speed (3.28)) fall below the operational threshold (3.40), revealing localized weaknesses in post-implementation support and responsiveness. At the same time, the relatively high agreement regarding recurrent technical difficulties (3.78) highlights system reliability as a structural constraint.

Service quality theory emphasizes reliability and responsiveness as core determinants of perceived quality (Cohen, 1988, p. 79). When technical stability is fragile, efficiency gains from digitalization are only partially reflected in user satisfaction. These findings support the argument that digital infrastructure alone cannot ensure substantive performance improvement without organizational stabilization and continuous support (Heeks, 2006, p. 29).

Thus, service quality reflects partial digital integration rather than comprehensive transformation.

5.3 Relationship Between E-Management and University Service Quality

The correlation coefficient ($r = 0.225$, $p < 0.05$) confirms a statistically significant but small positive association. According to established effect size standards (Cohen, 1988, p. 79), this magnitude represents a limited practical effect.

Several statistical factors may explain this modest relationship. First, the high mean and relatively low dispersion of electronic management reduce observable covariance. Second, sample homogeneity (particularly age concentration) likely attenuates effect size in simple correlational analysis.

From a theoretical perspective, the direction of association aligns with digital governance literature, which posits that electronic systems enhance accessibility and procedural efficiency (United Nations, 2020, p. 94). However, service quality remains a multidimensional construct influenced by

organizational culture, administrative coordination, leadership practices, and support mechanisms beyond technological deployment.

Electronic management therefore functions as a contributing factor rather than a dominant determinant.

5.4 Effect of Electronic Management on University Service Quality

Regression analysis indicates that electronic management explains 5.1% of the variance in service quality ($R^2 = 0.051$). Although statistically significant ($F = 5.238$; $p = 0.024$), the explanatory power remains limited.

The regression coefficient ($B = 0.236$) shows that a one-unit increase in electronic management corresponds to a 0.236-unit increase in perceived service quality. This effect is incremental rather than structural, confirming that digital practices improve performance at the margin but do not generate substantial transformation independently.

The low adjusted R^2 (0.041) suggests that most variance in service quality is attributable to additional determinants not included in the single-predictor model. These likely include governance quality, staff responsiveness, procedural clarity, and institutional coordination.

Such findings are consistent with international evidence indicating that digital reform yields measurable outcomes only when integrated with organizational restructuring and human capital development (OECD, 2021, p. 44).

5.5 Analytical Synthesis

The empirical evidence demonstrates that electronic management contributes positively to university service quality, yet the magnitude of its effect remains modest. Digital transformation improves procedural accessibility and administrative efficiency, but its overall impact depends on institutional maturity, operational reliability, and governance integration.

Accordingly, electronic management should be interpreted as an enabling institutional mechanism whose effectiveness is contingent upon broader structural conditions rather than as a standalone driver of performance improvement.

6. Conclusion

This study examined the relationship between electronic management and university service quality within an Algerian higher education institution

using a quantitative descriptive analytical approach. The findings reveal a statistically significant but modest positive effect. Although digital systems enhance procedural efficiency and accessibility, their explanatory power remains limited ($R^2 = 0.051$), indicating that technological deployment alone does not substantially determine service outcomes.

The results suggest that electronic management operates as an enabling institutional mechanism rather than a primary driver of performance. Sustainable improvement requires alignment between digital infrastructure, organizational processes, human resource capabilities, and governance structures. In particular, operational reliability and administrative responsiveness appear central to strengthening perceived service quality.

From a strategic perspective, digital transformation should extend beyond platform expansion toward structural integration and institutional coordination. Future research is encouraged to adopt multivariate models incorporating organizational culture, leadership style, governance quality, and demographic controls to enhance explanatory depth and allow comparative analysis across institutional contexts.

In sum, electronic management exerts a measurable yet limited influence on university service quality. Meaningful and lasting improvement depends on comprehensive institutional transformation within a coherent strategic framework.

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