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DIGITAL TRANSFORMATION AND THE GOVERNANCE OF MOROCCAN UNIVERSITIES: AN EXPLORATORY STUDY OF LEADERS' PERCEPTIONS AND PRACTICES

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ABSTRACT

Context/Objective/Design: The rapid rise of digital technologies in Moroccan higher education over the past decade has generated major challenges in governance, leadership, and institutional adaptation, extending far beyond the mere digitization of services. This study examines the impact of digitalization on the performance of university services and explores, through leaders' perceptions and practices, the conditions under which these innovations translate into tangible benefits for users. Methodology/Approach: A total of thirty semi-structured interviews were conducted with academic and administrative leaders, IT directors, and vice-deans across different institutions. The data were processed lexicometrically using IRaMuTeQ, highlighting the centrality of the word "student" and the frequency of terms such as "digital," "service," "processing time," and "security." Results: Findings show that digitalization significantly improves service performance by reducing delays, strengthening traceability, and enhancing the quality of interactions among stakeholders. Its effectiveness increases when supported by coherent strategic leadership and sound data governance. However, respondents note persistent system fragmentation, limited digital skills, and outdated infrastructures that continue to hinder a fully efficient transformation. Practical Implications: The conclusions provide institutions with an operational framework to reinforce the effectiveness of their digital strategies, suggesting more integrated steering mechanisms, professionalization of digital skills, and process harmonization to improve organizational coherence. They also call for targeted infrastructure upgrades and more structured data governance to support a sustainable transformation. Originality/Value: Conducted in an understudied Moroccan context, this study stands out by its analytical framework and the specificity of the actors interviewed, opening new perspectives to strengthen stakeholder trust and satisfaction.

KEYWORDS: Digitalization; Data Governance; IRaMuTeQ ; Digital Transformation; University; Morocco.

1. INTRODUCTION

Moroccan higher education is undergoing an acceleration in its digital transformation that goes beyond the mere computerization of procedures. This transformation raises important questions about governance, leadership, and the strategic alignment of information systems with the academic mission, in a context where reference frameworks and degrees of maturity vary from one institution to another. (Ayad et al., 2021; Merchán Rodríguez & Juiz, 2024). A body of empirical work highlights the association between information technology (IT) governance, digital capabilities, and organizational performance. These relationships are reflected in several dimensions, including the success of transformation projects, innovation agility, and the consolidation of steering and measurement systems based on maturity and excellence models. (Chahid et al., 2025; Benhabib & Berrado, 2024).

At the same time, the issue of equity remains central: territorial and socio-economic digital divides persist, while systems such as “digital classrooms” and e-learning platforms show inclusive potential when accompanied by support (Ghazali & Benbrahim, 2024; Boudine et al., 2024). From a techno-organizational perspective, the adoption of frameworks such as COBIT (Control Objectives for Information and Related Technologies) to evaluate and ensure the reliability of services, as well as the optimization of processes through AI, signal a transition towards more integrated architectures. However, many institutions remain at an intermediate level of maturity that requires standardization, training, and investment (Abdelilah et al., 2024; Sakyoud et al., 2023).

Furthermore, stakeholder dynamics are crucial: coordinated engagement between management, teaching and administrative teams, students, and external partners is a key driver of success. Supported by structured data governance and strategic use of analytics, this synergy promotes the dissemination and adoption of digital innovations. The experience of the COVID-19 pandemic has also served as a wake-up call for: while it has accelerated the adoption of digital tools, it has also highlighted persistent weaknesses in interdepartmental coordination and the sustainability of the measures put in place (Ayad et al., 2020; Elugbaju et al., 2024).

Drawing on this observation, the study addresses the following research question: How does digital governance – encompassing IT frameworks, strategic alignment, data governance, and top management engagement – influence perceptions of university service performance and the reduction of

access inequalities, and what organizational, technological, and cultural conditions facilitate these effects?

Based on the literature and the needs expressed by sector stakeholders, we formulate four research propositions guiding the qualitative exploration:

- P1. The digitalization of services may contribute to the improvement of perceived performance, including timeliness, traceability, and user satisfaction.
- P2. Strengthening governance capabilities and digital leadership appears likely to foster greater maturity and coherence in the transformations undertaken.
- P3. Change readiness – including vision, support, and the mobilization of key actors – could amplify the effects outlined in P1 and P2.
- P4. Insufficient consideration of security and compliance requirements may hinder the adoption of digital tools and processes. These propositions are grounded in recent studies on digital governance in higher education, as well as in institutional priorities regarding data management and cybersecurity (Merchán Rodríguez & Juiz, 2024; EDUCAUSE, 2025).

Empirically, the study draws on 30 semi-structured interviews with academic and administrative leaders, information systems directors, and members of management teams at several Moroccan institutions, supplemented by a lexicometric analysis of the corpus using IRaMuTeQ in order to objectify representations and link governance practices and perceived effects (Camargo & Justo, 2013). This description of the protocol and the fieldwork is detailed in the reference manuscript.

The rest of the article is organized around two complementary themes. The first, entitled “Digital Transformation of Universities: Conceptual Framework and Maturity,” uses the TAM (Technology Acceptance Model) and UTAUT (Unified Theory of Acceptance and Use of Technology) models to analyze the determinants of acceptance and adoption of digital tools, as well as the dimensions of maturity and digital governance specific to universities. The second, “Digital Transformation, Data Governance, and Inclusion: Towards Integrated Organizational Maturity,” examines the managerial and institutional levers that promote the success of digital strategies, emphasizing the role of data governance, leadership, and change readiness in strengthening performance and digital inclusion. These two sections are followed by a presentation of the adopted methodology, the

results of the lexicometric and thematic analysis, and a discussion encompassing the examination of the research propositions, the scientific and managerial implications, the study's limitations, and directions for future research.

2. THEORETICAL FRAMEWORK

2.1. *Digital Transformation of Universities: Conceptual Framework and Maturity*

The digital transformation of universities is a complex socio-technical restructuring of teaching, research, and administrative processes that goes far beyond the simple dematerialization of services. It dynamically articulates technologies, governance practices, and organizational culture, with the aim of improving efficiency, user experience, and institutional performance (Hashim, Tlemsani, & Matthews, 2021; Benmoussa, Laaziri, Amrani, & Diouri, 2024). This restructuring is part of the dynamic capabilities approach, according to which institutions must be able to detect opportunities, seize competitive advantages, and continuously reconfigure their resources to strengthen innovation and overall performance (Teece, Pisano, & Shuen, 1997; Teece, 2007).

At the micro level, approaches focused on individual perceptions, such as the Technology Acceptance Model (TAM), provide insight into how the perceived usefulness and ease of use of systems influence their adoption by academic stakeholders. This conceptual framework is complemented and expanded by the Unified Theory of Acceptance and Use of Technology (UTAUT) model, which introduces the effects of social influence, organizational expectations, and facilitating conditions on the willingness to adopt and use digital technologies. (Davis, 1989; Venkatesh, Morris, & Davis, 2003). This combination emphasizes that the acceptance of digital tools depends not only on the technologies themselves, but also on social interactions and the resources available for their appropriation.

In the context of university digital governance, technology acceptance models highlight several facilitating factors: leadership and commitment from top management, which encourage the adoption of digital tools; the quality of infrastructure and training, which reinforce the perception of ease of use; and organizational norms, collaborative practices, and experience sharing, which promote the spread of usage. Finally, the existence of data governance frameworks such as COBIT or ITIL (Information Technology Infrastructure Library) consolidates the effectiveness of the systems and user

confidence. Thus, the application of TAM and UTAUT in Moroccan universities is not limited to measuring individual acceptance; it also provides a framework for determining the organizational and institutional levers that facilitate digital transformation by aligning perceptions of technologies, strategic coordination, data governance, and institutional performance.

Based on these findings, our study highlights how organizational, technical, and human factors facilitate the digital transformation of universities. Enabling conditions include the quality of IT infrastructure, data security and compliance, digital leadership and strategic alignment, as well as preparation for change through training, communication, and support for key stakeholders. This conceptual framework is based on the Technology Acceptance Model (TAM) and the Unified Theory of Acceptance and Use of Technology (UTAUT), which explain the mechanisms of acceptance and adoption of digital tools by stakeholders, and also justify the formulation of research hypotheses: the impact of digitalization on perceived performance, the role of governance and leadership capabilities, the amplifying effect of change readiness, the constraints of security and compliance requirements, and the variability of perceptions among stakeholders.

Nevertheless, while such models of technological acceptance have helped explain individual usage dynamics, they are not sufficient to grasp the complexity of institutional transformations and governance logics specific to higher education. Digital governance in universities is not limited to the introduction of technological tools, but corresponds to a strategic process of organizational, managerial, and cultural reconfiguration (Besson & Rowe, 2012). Thus, at the macro level concerning the overall institutional and strategic environment, the use of governance frameworks such as COBIT makes it possible to assess strategic alignment, the robustness of delivery, service, and support processes, and the scope for improvement within institutions (Abdelilah, Ahriz, Guemmat, & Mansouri, 2024; Merchán Rodríguez & Juiz, 2024).

Furthermore, international studies (OECD, 2023; IAU 'International Association of Universities', 2022; European Commission, 2025) reveal that many academic institutions still operate without a fully integrated digital strategy. Efforts remain largely focused on teaching, while data governance, administrative interoperability, and security often remain inadequate (Fernández, Gómez, Binjaku, & Meçe, 2023; EDUCAUSE, 2025). More specifically,

the shift towards platformization and data exploitation requires the implementation of powerful analytical tools, structured processing records, and appropriate security policies. This makes it possible to produce reliable indicators for decision-making, while limiting the risks of fragmentation or data silos, which can hinder the effectiveness and adoption of digital systems (Elhissi & Haqiq, 2016; Zahi & Belhaj, 2018). These findings highlight that the digital transformation of universities cannot be reduced to a technical implementation: it requires an integrated approach, combining strategy, governance, training, and stakeholder engagement to create a robust and sustainable digital system.

2.2. Digital Transformation, Data Governance, and Inclusion: Towards Integrated Organizational Maturity

The digital transformation of universities cannot be reduced to the simple adoption of technological tools; it is a complex process of organizational reconfiguration, involving strategy, governance practices, and institutional culture simultaneously. In this context, data governance appears to be a key lever for digital maturity. It encompasses all the mechanisms, policies, and tools that ensure the quality, security, integrity, and value of data for strategic and operational decision-making (Weill & Ross, 2004). By promoting a data-driven, transparent, and responsible approach, data governance helps to strengthen institutional performance and accountability, consistent with the recommendations of the OECD (2022) and the World Bank (2021).

The experience of the COVID-19 crisis has highlighted the crucial importance of these organizational foundations: universities with integrated digital strategies, operational platforms, and support mechanisms have been able to maintain educational continuity, while other institutions faced significant digital divide challenges. (Hayar et al., 2022; Czerniewicz, 2020). This experience underscores that digital transformation cannot be effective without genuine digital inclusion. Beyond access to equipment and connectivity, this requires an equitable socio-educational approach aimed at reducing inequalities in access and skills, while ensuring universal accessibility from the design stage of educational systems (Boudine et al., 2024; Arhal, 2024). Thus, the success of university digitization depends on the coherent articulation of strategic vision, preparation for change—including leadership, support, and internal communication—and data governance. This combination promotes intelligent, agile, and inclusive transformation,

capable of strengthening performance, resilience, and acceptance of digital innovations by all stakeholders (Brynjolfsson & McAfee, 2014).

In addition, organizational maturity is a key factor in the sustainability of digital transformations, integrating not only the tools and processes, but also the skills and culture necessary for the adoption of digital systems. Universities that succeed in aligning their technological resources, institutional policies, and the capabilities of their stakeholders create a robust digital ecosystem capable of supporting academic governance, research, and teaching. This dynamic also promotes the engagement of faculty, students, and administrative staff, reduces resistance to change, and optimizes the effectiveness of digital initiatives, thereby contributing to more integrated, efficient, and value-oriented university governance.

3. MATERIALS AND METHODS

3.1. Research design and methodological approach

This study adopts a qualitative approach, deemed relevant for gaining an in-depth understanding of the perceptions, motivations, and practices of those involved in university digitization. The data comes mainly from 30 semi-structured interviews conducted between June 2024 and March 2025. Participants were selected using purposive sampling to cover different strategic functions (governance, education, IT, pedagogy) and different types of institutions (faculty, engineering school, business school, technology school, translation school). The sample size ($n = 30$) was determined by the principle of saturation: the interviewer found that after the 30th interview, the topics discussed began to recur and no longer provided any new information.

The interviews were conducted in French and lasted between 45 and 75 minutes each. They were recorded with the participants' consent and then transcribed in full. The topics covered included the institution's digital strategy, priority services, impacts on performance (deadlines, quality, satisfaction), obstacles encountered, security and data protection practices, and the management indicators used. A semi-structured interview guide was used to ensure the comparability of responses while allowing respondents to elaborate freely on their experiences and provide concrete examples.

3.2. Sample Description

Table 1 presents the main characteristics of the participants. Codes E1 to E30 are used to ensure anonymity. They include a former vice-dean of the Faculty of Economics and Social Sciences, a vice-dean

of the Faculty of Science and Technology, a deputy director of research at an engineering school, a network and systems administrator at a business school, a vice dean in humanities and social sciences, a secretary general at an engineering school, a student affairs and statistics manager, and a director of studies at a technology school. The main

contributions to the corpus show the diversity of topics: strategic vision, infrastructure resilience, internship management, mission order governance, support, job standardization, ethical caution, dashboards, etc. This diversity ensures broad coverage of the challenges of digital transformation in Moroccan higher education.

Table 1: Sample Profile and Contribution To The Corpus.

Function/ role	Institution (type)	Interview code	Duration (min)	Main contribution to the corpus
Vice-dean	FSJES (Law/Economics)	ENT 001	60	Transparency; internships/certificates; indicators; budget monitoring; governance
Doctoral training officer	ENCG (Business)	ENT 002	55	Electronic signature; registrar-process automation; reduced processing times; attractiveness; network/platform limitations
Head of Student Affairs	ENCG (Business)	ENT 003	50	Cybersecurity risks; platform dependency; data quality; awareness-raising; infrastructures
Dean	FST (Science & Technology)	ENT 004	65	Multi-pillar policy (students/staff/e-Finance/Moodle); qualified profiles; robust infrastructures
Director	ENSA (Engineering)	ENT 005	70	Integrated IS (requests/budgets/timetables); dashboards; transparency; generalization of absence tracking
State engineer, software & network	FST (Science & Technology)	ENT 006	55	Multiple platforms (Symfony/Moodle); digital workflows; heterogeneity; standardization
Secretary-General	Higher School of Translation (specialized)	ENT 007	50	HR/exams dematerialization (ministerial platforms); electronic signature; staffing constraints
Head of IT Service	FSJES (Law/Economics)	ENT 008	45	Moderate digitalization; server/coordination needs; gains; persistence of paper
Network & Systems Administrator	ENCG (Business)	ENT 009	60	Structured support (SLAs/maintenance); proactive communication; security; resilience
Vice-Dean for Academic Affairs	Faculty of Humanities	ENT 010	65	HSS perspective; performance ≠ speed; support; ethics; pedagogical diversity
Director, Innovation City & Academic Director, ENS Chemistry	Innovation City	ENT 011	70	Data-driven steering; server investments; security/continuity; impacts on rankings/decisions
Faculty researcher / Program coordinator	Faculty of Sciences	ENT 012	55	Student digital divide; open access; visibility/outreach
Head of Registrar's Office	FST (Science & Technology)	ENT 013	50	Online procedures (certificates/transcripts); appointments; end of queues; UX

Head of Finance / e-Finance	FST (Science & Technology)	ENT 014	60	e-Finance; budget visibility; links between purchase orders and programs; managerial steering
Head of Research Laboratory	FST (Science & Technology)	ENT 015	55	Online budget tracking; procurement; transparency; accountability
ENT/Appoweb focal point	FSJES	ENT 016	50	Aggregated course sheet; grade synchronization; workarounds for Appoweb outages; real-time processes
Deputy Director	ENCG	ENT 017	45	Magnetic cards/barcodes; inventories; digital library (deployment)
Admissions platform manager (Master's/Doctorate)	ENCG	ENT 018	55	Online submissions; dematerialized pre-selection; remote defenses (pilots)
Head of Continuing Education	ENCG	ENT 019	50	Dedicated platform; online enrollment/ management; workload reduction
Secretary General	ENSA	ENT 020	45	Guidance/scholarships (internal platforms); traceability; remote access
Secretary General	ESRF (Translation)	ENT 021	60	Online tenders (Ministry of Finance); publicity; competition
CISO / Information Systems Security Lead	University Presidency	ENT 022	65	Firewalls; segmentation; IP-bound accounts; backups; barriers
Data Center & Backups Manager	University Presidency	ENT 023	75	Server investments; cloud duplication; resilience/continuity
Archiving & Digitization Manager	FSJES	ENT 024	45	File cleanup; scanning; paper reduction
CPGE pathways officer	ENCG	ENT 025	50	Bridges platform; admissions; automated track selection; remote applications
Double-degree officer	ENCG	ENT 026	55	100% online processes; reduced travel; partner coordination
E-learning/Moodle & Studio Manager	Code 212	ENT 027	65	Studio; instructional design; calls for projects; Moodle integration (university-wide)
Online enrolment (ROSETTA) manager	Code 212	ENT 028	60	Centralized enrolment; data leak; need for secure solutions
Head of HR Service	ENCG	ENT 029	50	Self-service employment/salary certificates; hierarchical validation workflow
Student Clubs Manager (ENSA EVENT)	ENSA	ENT 030	45	Online event requests/reports; hierarchical tracking/validation

Source: Author.

3.3. Data Analysis

The transcripts were subjected to lexicometric analysis using IRaMuTeQ software (Interface for

Multidimensional Analysis of Texts and Questionnaires). Developed by Camargo and Justo (2013), IRaMuTeQ allows for frequency analysis, ascending hierarchical classification, and similarity

analysis. In this study, four types of outputs were prioritized: (1) a CHD dendrogram, (2) a word cloud, which visually represents the frequency of terms according to their size; (3) a similarity graph, which maps lexical co-occurrences and shows the relationships between words; (4) a frequency table, listing the most frequently used forms and their grammatical nature. Before analysis, the texts were cleaned up: removal of stop words (articles, prepositions), lemmatization (reduction of words to their base form), division into context units (segments of approximately 40 words), and merging of certain terms (e.g., “electronic signature,” “business intelligence”). The co-occurrence parameter was set to 3 for the similarity graph in order to retain only significant relationships.

In addition to the lexicometric analysis, the researchers conducted a manual thematic analysis of the verbatim transcripts. Each interview was coded according to predefined themes (governance, performance, obstacles, security, student experiences, leadership, compliance, strategic vision,

training). Inductive coding allowed new categories to emerge when the discussions mentioned unexpected topics (e.g., “phishing,” “double balance for staff,” “dependence on physical equipment”). The segments associated with each theme were compared between interviews to identify convergences and divergences.

Prior to conducting the interviews, the research protocol was submitted to the management of the participating institutions and received a favorable opinion. All participants were informed of the purpose of the study, the voluntary nature of their participation, anonymity, and the possibility of withdrawing at any time. The excerpts cited in the article are anonymized; only the participants' roles are mentioned. In accordance with qualitative research practices, the original data are not publicly disclosed in order to ensure confidentiality.

Table 2 summarizes the main characteristics of the corpus used for IRaMuTeQ analysis, providing an overview of the texts, segments, and words retained after cleaning.

Table 2: Corpus Statistics for Iramuteq Analysis.

Corpus characteristic	Value
Number of texts	30
Total word count	41,963
Number of text segments	930
Segments retained after cleaning	843 (90.65%)
Average number of words per segment	35.8

Source: Author.

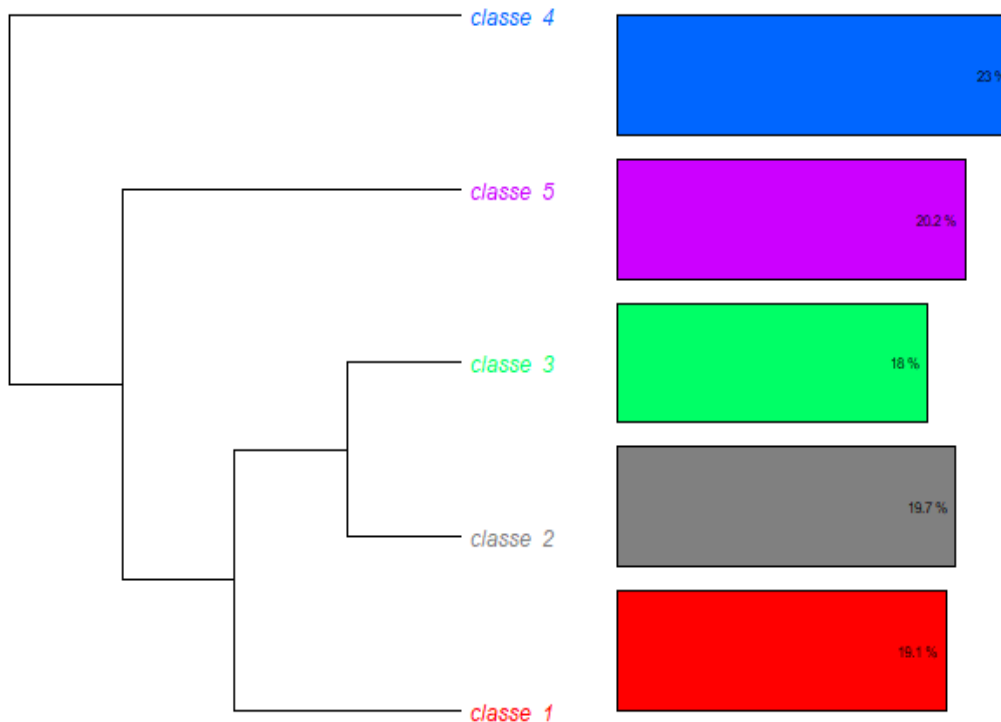
4. RESULTS

4.1. Lexicometric Analysis

The lexicometric analysis aims to objectify the actors' representations of university digitization based on 30 semi-structured interviews, combining a word cloud (above) and a similarity graph (above), supplemented by a frequency table of lemmatized forms. The service/administrative/delay/time axis indicates a public service approach geared towards reducing delays, simplifying procedures, and ensuring traceability. (“track,” “online,” “document”). The presence of “data,” “access,” and “security” reminds us that the value of digital technology depends on solid data governance:

quality of repositories, access control, and identity protection. The lexical field of “platforms,” “tools,” and “systems” highlights a tool-based transformation, where inter-application integration and IS urbanization determine gains. It should be noted that “educational” appears, but less prominently than “administrative,” suggesting that schooling processes are more mature than learning practices. The verbs “implement,” “request,” and “improve” reflect a shift to action, while “training” and “management” indicate the human investments required. Together, these indicators outline a socio-technical system in transition, where efficiency, trust, and fairness will need to be co-piloted to fully sustain the benefits.

Figure 1: CHD dendrogram (IRaMuTeQ).



Source: Author

This dendrogram, derived from a descending hierarchical classification (Reinert method), highlights five classes with similar weights: class 4 (23%), class 5 (20.2%), class 2 (19.7%), class 1 (19.1%) and class 3 (18%). This homogeneous distribution suggests a corpus without a dominant theme, conducive to a multi-centered interpretation. The tree reveals two poles: (i) a set {class 4; class 5} and (ii) a set {class 2; class 3; class 1}. The proximity of the branches between 2 and 3 indicates a similar vocabulary, while 1 retains an intrapole specificity. In practice, each class must be labeled based on forms with high χ^2 and prototypical extracts, then linked to the project's analytical axes (service/deadlines, data/security, governance/change, inclusion/experience). The dendrogram does not rank the "quality" of the themes; it measures their relative frequency and lexical similarity. To consolidate the analysis, we triangulate with the similarity map and the frequency table, and verify the robustness (alternative divisions, stability of classes). The whole picture reveals a clear thematic polarization and a balance of contributions, which is useful for articulating lexicometric results and qualitative interpretation.

Figure 2: Word cloud from the interview corpus (IRaMuTeQ).

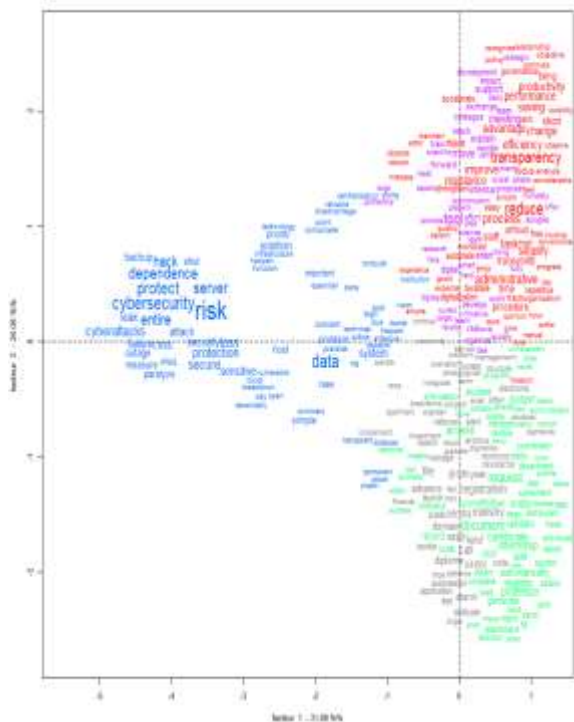


Source: Author.

This IRaMuTeQ factor map represents two structural tensions. On axis 1 (22.87%), the left side aggregates the “user chain” – students, services, online certification, reduction of delays – while the right side focuses on “operation” – supervision, maintenance, backup, identity, ticketing, antivirus – signaling the transition from value promise to production. Axis 2 (23.01%) contrasts, at the top, the risk register (failure, dependency, cybersecurity, leakage, infrastructure) with a lower register focused on performance and delivery (manage, deliver, module, professor, internship). The clusters confirm a triad: data governance in the center (“data,” “security,” “system”), reliability and MCO on the right, user experience and efficiency on the left. The presence of “rural,” “paid,” and “habit” in the risk quadrant reminds us that inclusion and culture condition adoption. Three implications:

- 1) anchor digital identity and reliable SSO repositories (privacy by design);
- 2) industrialize resilience (3.2.1 backups, restoration tests, workstation standardization, supervision);
- 3) drive change through micro-training, local champions, and shared indicators (availability, turnaround time, incidents, satisfaction). The graph corroborates the verbatim quotes and prioritizes interventions.

Figure 4: IRaMuTeQ factor map.



Source: Author.

Table 2: Frequency table of the most common forms (IRaMuTeQ).

Term	Occurrences
Student	102
Digitalization	99
Service	78
Platform	57
Digital	54
Platforms	49
Request	47
Enable	46
Example	42
Management	42
System	41
Administrative	41
Data	41
Institution	41
Time	40
Information	39

Source: Author.

This table confirms the “student-centered” orientation of the corpus: the term “student” dominates (102), just ahead of “digitalization” (99), which establishes digital transformation as a means to serve a priority audience rather than an end in itself. The triad “service” (78) – “platform(s)” (57/49) reveals an experience shaped by digital touchpoints, but the coexistence of the singular and plural suggests a plurality of tools, and therefore risks of fragmentation and interoperability. The action verbs “request” (47) and “allow” (46) indicate a user journey structured by the solicitation and “affordance” of systems, consistent with the idea of online counters and self-service. The pairs “system/administrative/data” (41 each) and “time/information” (40/39) anchor perceived performance in the reliability of reference systems, traceability, and reduced delays. “Example” (42) and “management” (42) reflect a pragmatic discourse, fueled by concrete cases and management concerns. The low salience of educational terms suggests that the driving force behind the observed digitalization remains the administration. Implication: consolidate data governance, unify platforms (SSO), and objectify time savings.

In light of the similarity graph (lexical

communities) and the frequency table, the operational structure is consolidated into three correlated areas: (1) request management (forms, electronic signatures, acknowledgments of receipt, attachments, deadline tracking); (2) regulatory technology foundation (backups, network segmentation, MFA, access policies, CNDP registers); (3) governance and access (availability, SSO, network capacity, queues, project prioritization). This organization reflects the co-occurrences of “student-request-certificate-deadline,” “service-procedure-security-tool,” and “digital-access-time-governance,” and converges with international findings: without data governance and target architecture, the value of platforms remains limited (DGSSI, n.d.; Zahi & Belhaj, 2018; Elugbaju, Okeke, & Alabi, 2024; Fernández et al., 2023). These groupings are based on verbatim quotes and measurements from interviews and IRaMuTeQ outputs.

4.2. Qualitative Analysis of Interviews

Beyond lexical analysis, interviews provide valuable insight into the perceptions and experiences of stakeholders. The results can be grouped into five main themes: improving the user experience, data-driven management, obstacles encountered, security governance, and differences in perception among stakeholders.

4.2.1. Improving the User Experience

All participants emphasize that digitization has helped improve the relationship between the university and its students. On the administrative side, the dematerialization of procedures has significantly reduced processing times. Certificates and transcripts are now issued “in a matter of minutes,” sometimes with a verification code to guarantee authenticity. Queues in front of the registrar's office have decreased, and students can track the progress of their requests online. As one vice-dean (E2) points out, “...Before, students had to come three times for a simple certificate; now, they download it from the portal...” This transformation has led to greater satisfaction and reduced tensions at the counter.

Traceability is also cited as a major benefit. Thanks to the automatic recording of requests and processing, departments can provide evidence in the event of a dispute. Teachers and administrators appreciate having a detailed history of actions taken. One administrator (E4) explains that “... Ticketing allows us to know who did what and when, if there is a problem, we can trace it back to its source...” This

transparency builds trust and encourages departments to meet deadlines. In addition, some institutions have implemented electronic signatures, which secures documents and prevents falsification.

4.2.2. Data and Indicator-Driven Management

The use of dashboards and analytical tools to manage services is another significant advance. The managers interviewed explain that they now have key indicators at their disposal: number of requests per week, average processing time, rejection rate, recurring incidents, platform availability. These indicators facilitate decision-making and enable bottlenecks to be quickly identified. One secretary general (E6) said, for example, that “By analyzing peaks in requests, we can adapt our schedules or strengthen our teams.” The data is also used to prepare reports for management, justify investments, and communicate with supervisory authorities.

However, participants warn of the risks of “duplicating” information and the importance of having shared repositories. In some cases, separate platforms (grade management, human resources, finance) are not interconnected, which means that the same information has to be entered several times. This duplication is a source of errors and wasted time. The implementation of a single repository of identifiers, single sign-on (SSO), and shared data dictionaries appears to be a priority. Digital maturity therefore requires not only the acquisition of tools, but also the harmonization of processes and databases.

4.2.3. Obstacles and Resistance

Despite the observed benefits, several obstacles are slowing down the progress of digitalization. On a technical level, infrastructure is not always designed to cope with peak demand periods. Network failures, low bandwidth, or obsolete servers lead to service interruptions. One IT manager points out that “even the slightest power cut or loss of fiber can bring the entire system to a halt.” Some low-cost solutions prove inadequate or difficult to maintain. The diversity of workstations (heterogeneous configurations, varied operating systems) complicates updates and creates vulnerabilities. Participants emphasize the need for an equipment renewal plan and a dedicated maintenance budget.

On the human side, the paper culture remains deeply ingrained. Many teachers and administrators continue to print documents and request handwritten signatures “to be on the safe side.” Mistrust of traceability, apprehension about losing control, and resistance to change are recurring

themes. The managers interviewed mention “diehard groups” attached to the old system who create parallel circuits, slowing down adoption. The inequality of digital skills among stakeholders is also a hindrance: some senior teachers are not proficient with the tools; students from disadvantaged backgrounds do not always have access to a personal computer and use their phones to connect, which makes it more difficult to use the platforms. This heterogeneity calls for targeted training and support measures.

4.2.4. Security Governance and Compliance

The issue of IT security came up in all the interviews. Participants mentioned the implementation of network segmentation strategies, regular backups according to the “3-2-1” rule (three copies, two media, one off-site copy), two-factor authentication (MFA) for privileged users, and phishing awareness. However, several recent incidents have shown that practices are still insufficient. Some institutions do not have a password change policy, and the use of antivirus software is sometimes left to the discretion of users. Flaws in identity management systems can lead to account hijacking. Directors emphasize the importance of appointing a Data Protection Officer (DPO) and strengthening internal cybersecurity skills.

Compliance with Law 09-08 and the National Commission for the Control of Personal Data Protection (CNDP) guidelines is seen as imperative. Participants say they have registered their processing operations and obtained authorizations for their registration or management platforms. However, they acknowledge that some projects are launched without prior consultation with the DPO or that external services (clouds, SAAS software) are used without a compliance audit. They are concerned about liability in the event of a leak or incident. This fear encourages caution and may slow down the adoption of certain innovative solutions. The DGSSI report reminds universities that they are required to report any major incidents and inform users (DGSSI, n.d.).

4.2.5. Diversity of Perceptions Among University Stakeholders

In line with the qualitative and exploratory nature of the study, this section provides additional information on the diversity of perceptions expressed by the various university stakeholders interviewed. Managers emphasize that administrators attach particular importance to

operational efficiency and traceability, particularly in relation to reducing workload and optimizing internal processes.

According to senior management, teachers show a keen interest in improving learning environments, real-time monitoring of student progress, and the integration of innovative digital teaching tools, while sometimes expressing reservations about the risk of dehumanizing the teaching relationship.

Students, for their part, are described as sensitive to the simplicity of procedures and speed of response, often comparing their university experience to the digital standards they are accustomed to in their daily lives.

Finally, IT managers and DPOs, who are directly involved in the technical aspects, highlight the issues of security, compliance, and maintenance, which are sometimes perceived as restrictive by other categories of stakeholders.

4.2.6. Other Perspectives and Observed Cases

Although the above themes form the bulk of the feedback, some interviews highlighted additional elements that shed light on the dynamics of transformation. For example, a vice-dean of a science faculty mentioned the concept of digital identity as the cornerstone of interactions. At his institution, each student has a unique ID that allows them to access all services (online courses, library, administrative files, room reservations). This identity is linked to a badge system that tracks attendance in laboratories and libraries. According to this official, “more than the tool itself, it is the unique ID that allows us to centralize data and track students' progress without asking them for the same information ten times over.” This practice brings the university closer to large companies that use integrated ERP systems.

Another interesting case is that of a business school that has developed an alumni portal interconnected with professional networks. Former students can update their career information, recommend the school to their companies, and participate in mentoring campaigns for current students. The platform integrates Business Intelligence tools to analyze graduates' trajectories, identify promising sectors, and adapt training programs. This feedback shows that digitization is not limited to schooling: it also affects relationships with graduates and community building. Managers see it as a way to establish the school's reputation and enhance student employability.

Some participants emphasized the need to think about digitization in terms of the value chain.

According to them, the goal is not simply to replace paper forms with online forms, but to rethink the entire process to add value. For example, digitizing the internship process is not limited to generating a PDF agreement; it includes automating the search for companies, integrating tutor evaluations, and tracking the skills acquired. This positioning is based on a service-oriented approach: "Our job is to prepare students for employment, not to produce documents," says one administrator (E4). With this in mind, universities can draw inspiration from methods such as design thinking to develop user-centered services.

Finally, several respondents mentioned innovative use cases currently under development. Some institutions are experimenting with hybrid classrooms equipped with audio-visual capture devices and interactive whiteboards to broadcast live lectures to remote students. Others are working on integrating artificial intelligence modules to assist teachers with automated exam grading or to offer personalized learning paths. An ongoing project at an engineering school aims to create digital twins of laboratories so that students can conduct virtual experiments. These initiatives demonstrate a desire to go beyond simple dematerialization and explore innovative areas. However, they raise ethical, intellectual property, and skills issues. Those responsible emphasize the need to conduct pilot studies and assess the impact before rolling out the initiatives on a wider scale.

4.3. Discussions

The results obtained highlight a consistent dynamic between the technical, organizational, and human dimensions of the digitization of university governance in Morocco. Lexicometric analysis, combined with interviews, reveals that digital transformation is not perceived as a simple modernization of tools, but as a comprehensive restructuring of the relationship between the user, the institution, and the data. The classes derived from the dendrogram and the factorial axes confirm that performance, data governance, security, and user experience are the main themes structuring the discourse of the actors.

The digitization of administrative and educational services appears first and foremost as a major lever for efficiency and transparency. Participants highlight improvements in turnaround times, the traceability of requests, and reduced travel. The lexical cluster centered on the terms "turnaround time," "document," "certificate," and "follow up" reflects a positive perception of the transformation,

in line with the conclusions of Antonopoulou et al. (2023) that digitization enhances the perceived value of university services. However, this improvement remains dependent on the stability of infrastructure and the quality of implementation, as confirmed by occurrences associated with "breakdown," "infrastructure," and "connection." These elements show that digital performance remains dependent on robust technical engineering, but also on effective interdepartmental coordination. Thus, research proposition P1, concerning the improvement of perceived performance through digitalization, is fully supported.

Beyond functional aspects, the maturity of the transformation depends heavily on governance capabilities and digital leadership. Institutions that have established structured management—transformation committees, job standardization, ticketing procedures, and alignment with national standards—show more consistent and controlled progress. Leadership is described as a coaching and facilitation role, aimed at uniting stakeholders around a shared vision. These observations are consistent with the work of Ghamrawi and Tamim (2023) and Purwanto et al. (2024), for whom digital success is inseparable from integrated governance and collaborative management. The co-occurrence of terms such as 'management,' 'steering,' 'system,' and 'supervision' confirms the importance of this institutional foundation. Findings clearly support research proposition P2, which posits that governance capabilities and digital leadership foster the maturity of the transformation.

The success of this transformation also depends on universities' capacity to prepare for change and support stakeholders. The terms "training," "resistance," and "change" form a semantic core that highlights this human dimension. Institutions that have invested in micro-training sessions, targeted support mechanisms, and local relay figures report better appropriation of the tools. These findings align with the conclusions of Veseli et al. (2025), according to which organizational readiness conditions the sustainability of reforms. Digital transformation only produces its effects to the extent that stakeholders understand and commit to it: technology alone is not sufficient; it must be supported by a culture of learning and trust. These elements clearly support research proposition P3, which states that change readiness enhances the effects of internal capacities.

This trust is precisely tested by concerns regarding security and compliance, which are pervasive in participants' discourse. References to "data," "security," "risk," "backup," and "code"

reflect awareness of digital vulnerabilities. Several actors mention fears of incidents, data loss, or non-compliance with Law 09-08. Such concerns can slow the adoption of digital tools, especially when cybersecurity procedures or legal compliance frameworks are not clearly defined. The results converge with the priorities outlined by EDUCAUSE (2024–2025) and confirm that data security and protection constitute prerequisites for any digital innovation. Stakeholder engagement depends on the institution's ability to establish a reliable technical and regulatory trust framework. Overall, these elements support research proposition P4, which posits that security and compliance concerns hinder adoption if not adequately addressed.

Finally, interviews with top management reveal that perceptions and priorities vary across different profiles within the institution. According to managers, teachers emphasize pedagogical aspects and human interaction, administrative staff focus on process simplification, while IT managers and DPOs concentrate on security and compliance. This diversity of perspectives illustrates the complexity of digital transformation and highlights the need for an integrated governance approach that reconciles different priorities without assuming the views of non-interviewed stakeholders.

This exploratory study initially focused on the perceptions of top management in Moroccan higher education institutions, which explains the stronger emphasis on administrative services compared to digital pedagogical transformation. This emphasis reflects the organizational context and current priorities of these institutions. Future research could extend to faculty and students to better understand the pedagogical dimensions of digital transformation and provide a more balanced view between administrative and educational aspects.

Taken together, these results outline a balanced and coherent landscape. The lexical clusters identified in the analyses (efficiency, security, governance, change, inclusion) reflect an integrated vision of digital transformation, where technical performance only makes sense if accompanied by clear governance and sustainable human appropriation. The factorial map, contrasting performance and risk, reveals the dual movement occurring in Moroccan universities: a pursuit of greater efficiency alongside heightened vigilance regarding system protection and reliability. This observation suggests that the digitalization of university governance is not a linear process but a collective learning journey balancing innovation, control, and trust.

Table 3: Synthetic Validation of Research Propositions (Discussion).

Research propositions	Key evidence (keywords + sources)	Decision
P1 - Digitalization → perceived performance	Time-savings; remote access; traceability; "delay/certificate/track/document" (lexicometric); external support (Antonopoulou et al., 2023)	Accepted
P2 - Governance & leadership → maturity	Designated roles; steering committees; SSO/ticketing/CNDP; PLS-SEM on leadership & governance (Niță & Guțu, 2023; Purwanto et al., 2024); 5D leadership (Ghamrawi & Tamim, 2023)	Accepted
P3 - Change readiness → amplified effects	Short trainings (10–20 min); local champions; continuous support; shared vision/meaning/perceived usefulness; PLS-SEM readiness (Veseli et al., 2025)	Accepted
P4 - Unaddressed security & compliance → barriers	Incidents (phishing, leaks); Law 09-08/CNDP; MFA/encryption/logging requirements; EDUCAUSE 2024–2025 priorities	Accepted (conditional)

Source: Discussion and interview evidence from the manuscript, complemented by the cited literature.

5. FINAL CONSIDERATIONS

An examination of digitalization practices in Moroccan universities reveals a dynamic and complex domain, characterized by profound organizational transformations and a range of context-specific challenges. Digitalization is reshaping not only administrative processes but also the strategic conceptualization and governance of university services, influencing decision-making frameworks and the interactions between institutional actors and technology.

Recent evidence indicates that digitalization is not simply an operational tool but a strategic enabler, capable of enhancing coordination, transparency, and service efficiency. Its effects are maximized when supported by coherent strategic leadership, robust data governance, and targeted capacity-building initiatives for university staff.

However, the adoption of digital tools is neither linear nor uniform. It is shaped by institutional hierarchies, varying levels of digital competencies, infrastructural limitations, and cultural dynamics, resulting in diverse trajectories of implementation across different universities.

Traditional models of technology adoption, which often assume rational, linear processes, are

insufficient to capture these complexities. The transformation is iterative and involves negotiation, experimentation, and reinterpretation by multiple actors, often under conflicting institutional logics.

In this regard, viewing digitalization through the lens of organizational paradoxes offers valuable insight. Tensions between efficiency and equity, control and autonomy, or performance and inclusiveness are not barriers but potential levers for innovation, provided they are acknowledged and strategically managed.

The contextual dimension is particularly critical. Most theoretical frameworks are derived from Western higher education systems, where infrastructures, regulations, and organizational cultures are well-established. Examining the

Moroccan context allows for the adaptation of these frameworks and the generation of knowledge that is more inclusive and sensitive to diverse organizational realities. Finally, from a managerial perspective, effective digital transformation requires more than technological investment. It necessitates integrated organizational strategies that combine staff training, ethical governance, data security, and stakeholder engagement, fostering hybrid competencies and enabling universities to achieve sustainable, inclusive, and strategically aligned governance. These findings may also be applicable to other higher education institutions in emerging or developing contexts, where similar organizational structures, resource constraints, and digital maturity challenges exist.

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