

УДК 004.9:378
DOI 10.14258/epb202609

RANKING THE PROBLEMS OF MANAGEMENT IN THE FIELD OF HIGHER EDUCATION BASED ON THE METHOD OF HIERARCHY ANALYSIS

Moussai Abdelouahab¹, Guessas Tayeb²

¹University of M'sila (M'sila, Algeria)

²University of Sétif (Sétif, Algeria)

This study aims to conduct a rigorous and comprehensive examination of the challenges associated with the digitalization of administrative processes within the higher education sector. Its primary objective is to identify, categorize, and prioritize these challenges while exploring their underlying structural causes and institutional conditions that contribute to their persistence. The research provides a strategic framework is proposed to enable higher education institutions to progressively overcome these barriers through the effective use of new digital technologies that continue to transform operational and managerial practices worldwide. In response to the accelerating global shift toward digital transformation, universities face increasing pressure to enhance administrative efficiency, reduce procedural complexity, optimize service delivery, and create a responsive institutional environment capable of meeting the evolving expectations of students, faculty, administrative staff, and external partners. Accordingly, the study seeks to develop an analytical model that supports the systematic improvement of administrative performance while advancing the digital maturity and organizational adaptability of higher education institutions.

The research also emphasizes the importance of strengthening communication and collaboration among professors, students, and university administrative bodies. By streamlining processes, integrating digital workflows, and refining service delivery mechanisms, the study aims to promote a coherent digital ecosystem that facilitates daily academic and administrative operations, enhances transparency, and improves governance. These objectives gain particular relevance as universities modernize management structures and decision-making processes to maintain competitiveness in an increasingly digitalized global education environment. The study highlights the necessity of adopting flexible, interoperable, and data-driven platforms that collectively improve the quality, speed, and reliability of administrative services.

From a methodological perspective, the study employs a mixed-method research design that combines theoretical analysis with empirical observations. It begins with a systematic review of contemporary literature on digital transformation, organizational change, digital governance, and higher education management, providing a conceptual foundation for understanding the scope and nature of the challenges faced. This review is complemented by semi-structured interviews with experts and practitioners with extensive experience in university administration and digital systems, offering detailed insights into institutional readiness, operational bottlenecks, resource constraints, and contextual factors influencing the feasibility and sustainability of digital initiatives.

To assess and prioritize the identified challenges objectively, the study uses the Analytic Hierarchy Process (AHP) through Expert Choice software. This approach enables the development of a hierarchical model to evaluate the relative significance of each challenge based on expert judgments, enhancing the methodological rigor, credibility, and replicability of the results.

The findings indicate that data management challenges-including data integrity, interoperability, accessibility, standardization, and information security-constitute the most critical barriers to successful digitalization. Human and organizational challenges, such as resistance to change, limited digital competencies among staff, insufficient training, and misalignment between organizational culture and digital transformation goals, were also found to significantly impact success. Additionally, technical challenges involving infrastructure, system compatibility, maintenance, and adequate technological support were identified as key constraints that must be addressed to achieve sustainable progress in the digital transformation of university administration.

Keywords: hierarchical analysis process, challenges, digitalization, management, higher education.

РАНЖИРОВАНИЕ ПРОБЛЕМ ЦИФРОВИЗАЦИИ УПРАВЛЕНИЯ В СФЕРЕ ВЫСШЕГО ОБРАЗОВАНИЯ НА ОСНОВЕ МЕТОДА АНАЛИЗА ИЕРАРХИЙ

Муссай Абделуахаб¹, Гессас Тайеб²

¹Университет Мсилы (Мсила, Алжир)

²Университет Сетифа (Сетиф, Алжир)

Данное исследование направлено на всесторонний и глубокий анализ проблем, связанных с цифровизацией административных процессов в сфере высшего образования. Его основная цель заключается в выявлении, классификации и ранжировании этих проблем, а также в изучении их структурных причин и институциональных условий, способствующих их сохранению. Предлагается стратегическая основа, позволяющая учреждениям высшего образования постепенно преодолевать данные препятствия посредством эффективного использования новых цифровых технологий, которые продолжают трансформировать операционные и управленческие практики во всем мире.

В условиях ускоряющегося глобального перехода к цифровой трансформации университеты испытывают возрастающее давление, связанное с необходимостью повышения административной эффективности, сокращения процедурной сложности, оптимизации предоставления услуг и формирования гибкой институциональной среды, способной удовлетворять изменяющиеся ожидания студентов, преподавателей, административного персонала и внешних партнеров. В связи с этим авторы исследования стремятся разработать аналитическую модель, направленную на систематическое улучшение административной деятельности, а также повышение цифровой зрелости и организационной адаптивности учреждений высшего образования.

В работе также подчеркивается важность усиления коммуникации и взаимодействия между преподавателями, студентами и административными структурами университета. Путем оптимизации процессов, интеграции цифровых рабочих потоков и совершенствования механизмов предоставления услуг исследование нацелено на создание целостной цифровой экосистемы, облегчающей повседневные академические и административные операции, повышающей прозрачность и улучшающей систему управления. Данные цели приобретают особую актуальность в условиях модернизации управленческих структур и процессов принятия решений, необходимых для сохранения конкурентоспособности в стремительно цифровизирующейся глобальной образовательной среде. В исследовании подчеркивается необходимость внедрения гибких, совместимых и основанных на данных платформ, которые в совокупности повышают качество, скорость и надёжность административных услуг.

С методологической точки зрения исследование основано на смешанном подходе, сочетающем теоретический анализ и эмпирические наблюдения. Оно начинается с систематического обзора современной литературы по цифровой трансформации, организационным изменениям, цифровому управлению и менеджменту в сфере высшего образования, что обеспечивает концептуальную основу для понимания содержания и масштаба рассматриваемых проблем. Этот обзор дополняется полуструктурированными интервью с экспертами и практиками, обладающими значительным опытом в области университетского администрирования и цифровых систем, что позволяет получить подробные сведения об институциональной готовности, операционных узких местах, ограниченности ресурсов и контекстуальных факторах, влияющих на осуществимость и устойчивость цифровых инициатив.

Для объективной оценки и ранжирования выявленных проблем в исследовании используется метод анализа иерархий (АНР) с применением программного обеспечения Expert Choice. Такой подход позволяет разработать иерархическую модель для оценки относительной значимости каждой проблемы на основе экспертных суждений, повышая методологическую строгость, достоверность и воспроизводимость результатов.

Полученные результаты показывают, что проблемы управления данными — включая целостность данных, интероперабельность, доступность, стандартизацию и информационную безопасность — являются наиболее критическими барьерами для успешной цифровизации. Человеческие и организационные проблемы, такие как сопротивление изменениям, ограниченные цифровые компетенции персонала, недостаточное обучение и несоответствие организационной культуры целям цифровой трансформации, также существенно влияют на успех. Кроме того, технические проблемы, связанные с инфраструктурой, совместимостью систем, их обслуживанием и наличием адекватной технологической поддержки, были выяв-

лены как ключевые ограничения, которые необходимо устранить для достижения устойчивого прогресса в цифровой трансформации университетского управления.

Ключевые слова: метод анализа иерархий (АНР), проблемы, цифровизация, управление, высшее образование.

Introduction. The rapid technological development in the field of communications has led administration to rely on modern technologies in an environment rich in devices and equipment, in addition to advanced software and specialized human resources. digitalization is considered one of the most prominent future trends in administration; rather, it has become an inevitable necessity to keep pace with technological advancement, as it allows institutions to benefit from modern technologies to improve their performance and increase their efficiency.

In this context, most educational institutions, including Algerian universities, use digitalization in many of their administrative and pedagogical functions, contributing to strengthening the relationship between professors, students, and university administration.

This transformation has faced many complex administrative challenges, which were accurately identified by experts and ranked according to a systematic scientific approach that contributes to a better understanding of these challenges and finding solutions to overcome them. This enhances adaptability in a rapidly changing work environment with continuous developments. For this reason, the Analytic Hierarchy Process (AHP) was adopted as an important and widely used multi-criteria decision-making method, due to its ease of use and wide range of applications.

Based on the above, this study sheds light on the challenges facing the digitalization of administration at the University of M'sila and then seeks to find appropriate solutions to overcome them.

Digitalization is defined as the process of transferring or converting data into a digital form for processing by a computer [1, p 10]. digitalization reflects the social transformation resulting from the widespread adoption of digital technologies that generate, process, and transmit information [2, p 63] digitalization should also be seen as a modernization, reform, and transformation of education to include problem-solving and decision-making supported by digital technologies. The goal is to increase efficiency, flexibility, and accessibility [3, p 121].

In higher education, digitalization refers to all processes through which data whether educational or pedagogical in universities are converted into digital forms. This enables the targeted student groups, professors, and staff to receive and use this data via com-

puters and the internet, employing various dedicated electronic platforms [4, p 85].

Additionally, digitalization has gained increasing importance as a means for the survival of higher education institutions. Higher education is defined as one of the fundamental means of providing students with knowledge, information, thinking, research skills, and the formation of positive attitudes [5, p 16].

Higher education institutions in Algeria include universities, university centers, national higher schools, and higher schools for teacher training.

The Ministry of Higher Education and Scientific Research seeks to digitalize the various institutions of the sector to facilitate and simplify administrative procedures in the pedagogical field and other services. This includes monitoring the digitalization process of research centers and institutions, the management of human resources, financial and accounting resources, and materials. According to the sector's digitalization master plan [6, p 39]. As part of the effort to digitalize the university's General Secretariat and all its affiliated sub-directorates, a number of procedures must be carried out, most notably digitalization of the University's General Secretariat: Administrative processes are automated through digital platforms and a unified portal, improving coordination, planning, and evaluation with data-driven reporting [7, p 1].

Therefore, the research question posed is: What are the challenges facing the digitalization of administration, and how are they ranked using the Analytic Hierarchy Process (AHP)?

The objectives of this study are reflected in the attempt to identify the challenges facing digitalization in the higher education sector by analyzing its various related aspects. The study seeks to rank these challenges according to their importance and impact, with a focus on identifying the main related criteria, in order to build a scientific model that helps prioritize digitalization challenges systematically, contributing to supporting decision-making and achieving effective digital transformation in the higher education sector.

The descriptive analytical approach is used to study the challenges of digitalization in the higher education and scientific research sector, by using articles, books, journals, and internet websites related to the study topic. For the practical component, the study adopted the Analytic Hierarchy Process (AHP) as a decision-making tool. Data concerning the main and sub-criteria were collected, their relative weights

were determined, and the outcomes were subsequently analyzed with the support of Expert Choice (EC) software to ensure accuracy and consistency in the evaluation process.

Literature Review. Zongkai Yang reviews the core concepts and stages of digital transformation in education. The study highlights China's practical responses, focusing on platforms, curricula, teaching, and assessment methods. Additionally, it analyzes three Chinese universities to identify development patterns that guide comprehensive digital transformation in higher education.

Marina Abdurashidova examined how innovation and digitalization influence the quality of higher education at Tashkent State Technical University. Using a multi-method approach with data from 300 participants, it explored perceptions across students, faculty, and staff. Findings revealed that digital technologies enhance education quality by fostering interactive learning and increasing student engagement.

Charifa Soumati studied the main challenges that still hinder the digitalization project of the higher education sector. These challenges prevent its realization or at least delay its achievement. They became evident with the emergence of the COVID-19 crisis, and some of them still persist. The study found that the Ministry of Higher Education is making continuous efforts to advance digitalization and keep pace with the developments occurring in developed countries, according to well-designed plans and strategies, particularly through the use of electronic

tools to monitor and track plagiarism, in parallel with academic training.

This study is distinguished by its attempt to synthesize the most important criteria from prior research on different aspects of digital transformation, with the purpose of constructing a model that ranks the challenges to digitalizing the higher education sector using the Analytic Hierarchy Process (AHP), and subsequently applying it to the Algerian case.

Methodology. Interviews were used as a data collection tool. First interview: Aimed at gathering information on the most important sub-criteria (challenges). Second interview: Based on the (AHP) method, to obtain the weights of the main criteria (challenges). It was also used to analyze the results.

Sample Size: The sample consists of staff from the General Secretariat, the Digital Strategy Office, University of M'sila. As for the sample, a purposive sample was selected to conduct the interviews, consisting of ten experts (Professors, Directors, Engineers, and Administrators), in order to identify the main challenges and to determine the relative importance of all the study's criteria (challenges).

Digital transformation faces major obstacles such as the absence of strategic vision, weak leadership, and limited investment in technology and skills [8, p 7]. Several studies indicate that, the challenges include technical/technological challenges, organizational challenges, and human resources challenges [9, p 71]. Table 1. provides a summary of the challenges facing digitalization in the higher education sector.

Table 1

Summary of studies on the challenges of digitalization in the higher education sector

Main Criteria (Challenges)	Sub-Criteria (Challenges)	Authors
Technological / ICT Infrastructure	Limited or outdated ICT infrastructure	Amando (2025), Alshahrani (2025) [10, p 7], Mahaphan (2025) [11, p 216], Seyda et al. (2024)
Compatibility issues / lack of integration		Alshahrani (2025), Seyda (2024)
Complexity of digital systems- Transition from legacy systems		Mahaphan (2025)
Human Resources	Shortage of skilled workforce / competent staff	Amando (2025), Alshahrani (2025), Seyda et al. (2024)
Financial Constraints / Budget Challenges	High initial investment costs	Amando (2025), Alshahrani (2025), Mahaphan (2025)
Limited budget and resources		Mahaphan (2025), Seyda (2024)
Organizational / Bureaucratic Resistance	Bureaucracy / opposition from interest groups	Mahaphan (2025)
Resistance from decision-makers / risk aversion/ Weak interdepartmental collaboration/ Employee reluctance / hesitation/ Fear of job loss / loss of control		Seyda et al. (2024)
Competence and Adaptability	Lack of continuous training / professional development/ Low participation / enthusiasm/ Lack of trust in digital services/ Heavy workload / time constraints/ Lack of digital skills and experience/ Digital divide/ Risk of unethical use / intellectual property issues /Absence of data exchange standards	Amando (2025)

Ending table 1

Main Criteria (Challenges)	Sub-Criteria (Challenges)	Authors
Resistance to Change	Resistance to modernization / technology adoption	Amando (2025), Mahaphan (2025)
Security, Privacy, and Confidentiality Threats	Cybersecurity risks / data security	Amando (2025), Alshahrani (2025), Mahaphan (2025)
Public resistance to digital adoption (trust issue)		Alshahrani (2025)

Source: Prepared by the authors

Building the hierarchical structure as follow: Level 1: digitalization challenges in administration and the prioritization of addressing them. — Level 2: This con-

sists of the following main criteria (challenges) management — Level 3: Sub-criteria (challenges) derived from the breakdown of the main criteria (Table 1).

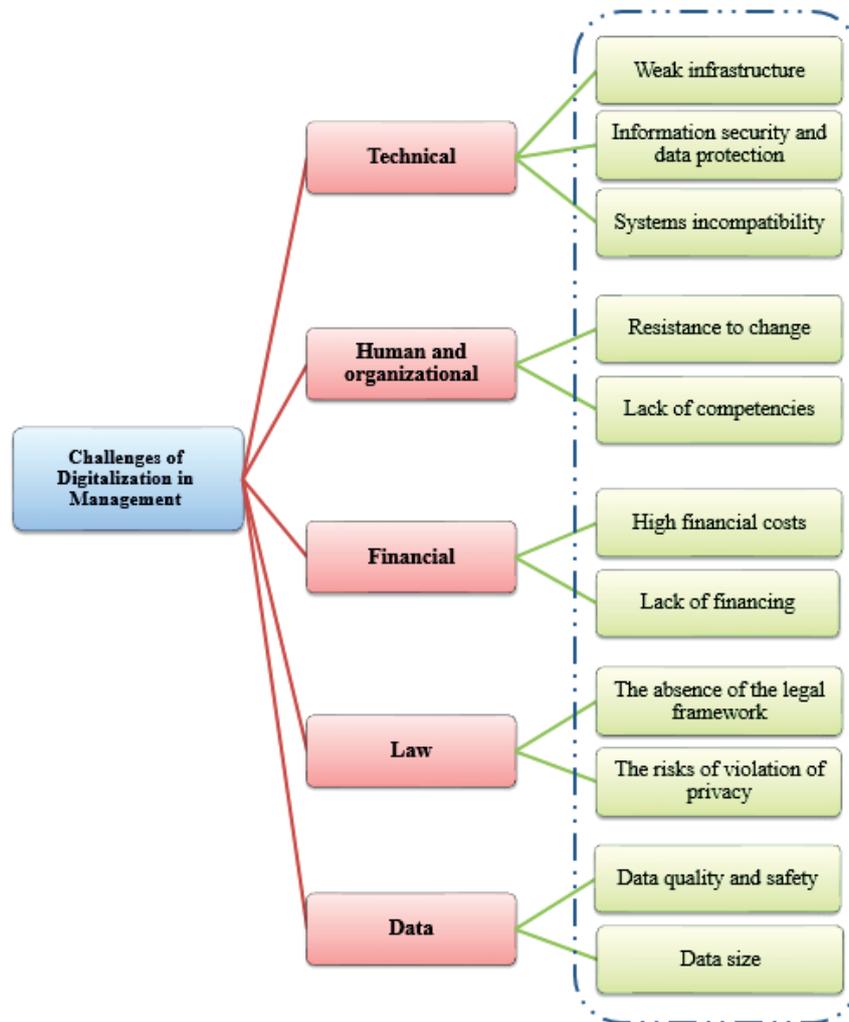


Fig. 1. AHP based model for Digitalization Challenges in Management

Sixty-seven criteria were extracted from the previously mentioned studies, and after consulting experts, five main criteria and eleven sub-criteria were adopted (Fig 1).

Results and Discussion. The main objectives of this research were to identify and prioritize the challenges hindering the successful implementation of digitalization, based on the AHP.

From Fig 2, it is clear that the main criterion that received the highest importance among the other main selection criteria is the «Data» management challenges criterion, with 29.2% of the total. This is due to the importance of data, its quality, and its integrity, given the volume of available data. The second-ranked main criterion is the human and organizational challenges criterion, with 25.2%, which

reflects the relative importance of this criterion due to its significance in the digitalization of the sector, as it depends on individuals capable of adopting it. Weak competencies and internal resistance represent the biggest obstacles to any organizational or technical progress. The third-ranked criterion is the technical challenges criterion, with 18.9%, which is attributed to the importance of infrastructure in digitalization.



Fig. 2. Pairwise Comparison results of main criteria

The final weight of the challenges affects their ranking in the digitalization of management, as observed from Fig (3) and (4), the following can be noted;

— The first challenge that received the highest level of importance among the other challenges is «Information Security and Data Protection,» with 14%. This challenge is crucial as it underpins the safety and stability of digital infrastructure amid rapid digital transformation and reliance on smart systems. Universities face rising cyber threats due to the growing volume and diversity of data, risking financial and reputational harm. Thus, enhancing cybersecurity through strict protection standards, updated systems, and continuous staff training has become a strategic necessity for sustainable digital operations.

— The challenge of «Systems Incompatibility» ranked second with 13.6%. This challenge highlights the importance of system integration as digital transformation expands. Incompatibility between legacy and new systems causes operational inefficiency, higher costs, and project delays. The solution is to build a flexible digital infrastructure founded on unified and interoperable standards.

— The challenge of «Lack of Competencies» ranked third with 11.7%, reflecting the recognition of the importance of having the necessary human skills for the success of digitalization processes. No matter how advanced the technologies are, their effectiveness largely depends on the ability of employees to use them efficiently and effectively. This challenge includes various aspects, from limited familiarity with digital tools to the lack of technical skills that enable employees to interact with smart, data-driven systems. The solution lies in continuous investment in training and the development of specialized programs that keep pace with rapid technological changes.

— The challenge of «Data Quality and Safety» ranked fourth with a percentage of 10.3%. This aspect

The financial challenges criterion ranked fourth, with 16.1%, indicating its importance in covering the costs of equipment, hardware, and software required for digitalization. The legal challenges criterion (Law) came in fifth place, with 10.6%. The consistency ratio (CR) for the pairwise comparisons of the main criteria was 4%, which did not exceed the permissible limit (10%) according to the Analytic Hierarchy Process.

is vital for the success of digital projects, as accurate and reliable data form the basis for sound decision-making. Inaccurate or unsafe data can harm system performance and erode institutional trust. To address this, strict data quality controls, secure management practices, and advanced analytical tools should be applied to ensure consistency and reliability.

— The challenge of «Weak Infrastructure» ranked fifth with 9.9%. This factor plays a crucial role in the success of digital transformation, as digital infrastructure forms the backbone of any integrated system. Weak networks, limited data centers, and outdated equipment hinder performance and the adoption of advanced technologies like AI. Strategic investments in robust infrastructure, high-speed networks, and secure cloud systems are essential to ensure institutional readiness for digitalization.

— The challenge of «The Risks of Violation of Privacy» ranked sixth with 9.7%. This challenge underscores the growing importance of privacy protection amid increasing data collection and exchange. Safeguarding personal information is essential to maintain user trust and comply with legal regulations. Universities must adopt clear privacy policies, apply encryption and anonymization methods, and promote awareness among all stakeholders to prevent misuse or unauthorized access.

— The challenge of «High Financial Costs» ranked seventh with 6.9%. This challenge represents a key obstacle to administrative digitalization due to the high financial costs involved. Expenses include infrastructure upgrades, system integration, staff training, and continuous updates. To overcome this, universities should adopt gradual implementation strategies and explore alternative funding sources to support digital innovation.

— The challenge of «Lack of Financing» ranked eighth with 6.7%. This challenge emphasizes the

crucial role of financing in the success of digital transformation projects. Insufficient or unstable funding hinders system upgrades, infrastructure expansion, and talent acquisition, especially when relying solely on government budgets. To overcome this, universities should adopt sustainable financing strategies, build partnerships with the private sector, and leverage grants and support programs to ensure continuity.

— The challenge of «Data Size» ranked ninth with 6.7%, This challenge highlights the rising importance of effective data management in the digital era. Universities face difficulties in storing, processing, and analyzing massive data volumes generated by integrated systems and smart applications. Addressing this requires investing in advanced infrastructure, adopting cloud and big data technologies, and implementing strong data governance strategies.

— The challenge of «The Absence of the Legal Framework» ranked tenth with 6.4%, This challenge highlights the pressing need for clear and updated legislation to govern digital data management. A comprehensive legal framework is vital to protect privacy, regulate data exchange, and ensure accountability for data misuse. Such regulations strengthen trust, reduce legal uncertainty, and foster innovation within institutions.

— The challenge of «Resistance to Change» ranked eleventh with 6.9%, This behavioral challenge reflects resistance to digital transformation due to fears of job loss, adaptation difficulties, or lack of digital confidence. Such resistance often results from weak communication and insufficient training during the change process. Effective change management through employee involvement, continuous training, and fostering a culture of learning and innovation is essential to build acceptance and ensure digitalization success.

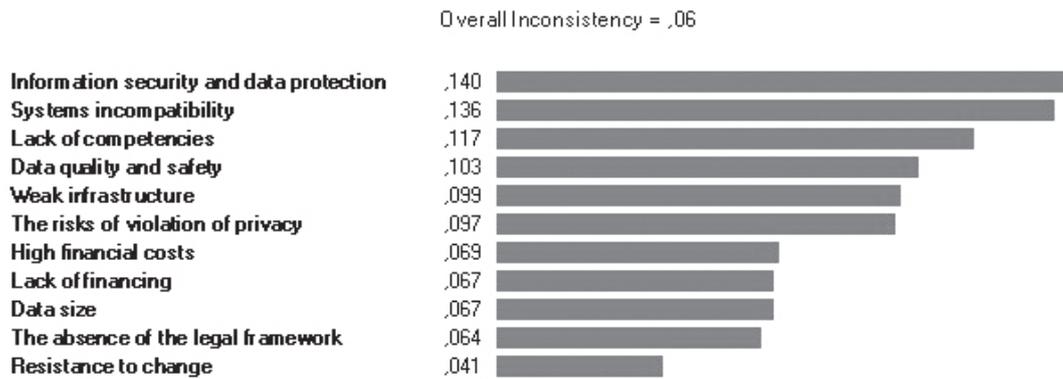


Fig. 3. Ranking of digitalization challenges in management

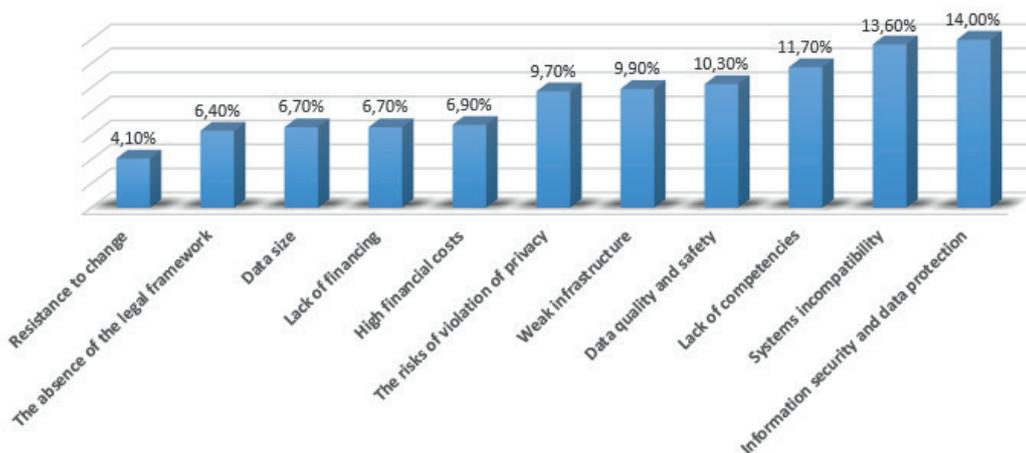


Fig. 4. Weights of digitalization challenges in management

Conclusions. Identifying and understanding the challenges facing digitalization in university institutions is an important step towards addressing and overcoming them. This is what our study revealed, which

attempted to identify the most important challenges based on relevant literature, in order to estimate the weight of each challenge and rank them using the Analytic Hierarchy Process (AHP) as a suitable tool.

The study resulted in the following findings:

— The process of digitalization in the higher education sector faces several challenges, including technical challenges, human and organizational challenges, among others.

— By ranking these challenges according to their relative importance, data management challenges were identified as the most significant, followed by human and organizational challenges, then technical challenges, followed by financial and legal challenges.

— A set of challenges related to the digitalization of management was identified, totaling eleven challenges.

— The first challenge, **Information security and data protection**, received the highest importance among the other challenges, followed by **Systems incompatibility**, and then **Lack of competencies**.

— The model developed enables universities to accurately prioritize challenges and make data-driven decisions.

— The model built in this study included the most important criteria (challenges), which reached five main criteria and eleven sub-criteria.

Based on the study results, the following suggestions can be made:

— Develop data management strategies and employ artificial intelligence technologies.

— Organize continuous training sessions aimed at improving employee skills.

— Provide incentives to encourage active employees.

— Standardize technical systems across all university departments.

— Develop strict legal frameworks to protect digital data.

— Form specialized cybersecurity teams in each university to monitor systems and protect them from threats.

Future research may include applying the proposed model in other institutions, in addition to incorporating more challenges based on empirical studies. The analysis can also be supported by other methods such as F-AHP (Fuzzy Analytic Hierarchy Process).

REFERENCES

1. Boumarafi R., Samir B. M. Internet speed is a necessary mechanism for achieving digitization and quality higher education. Berlin, 2023.
2. Juergen B., Henriette S. Digitization as a catalyst for business model innovation a three-step approach to facilitating economic success. *Journal of Business Management*. 2016. No. 12.
3. Shermaine A. B., Eraldine S.-S. A Study of Digitalization of Higher Education Institutions in the Caribbean. *Journal of Comparative & International Higher Education*. 2024. No. 16 (2). Pp. 117–126. URL: <https://ojed.org/jcihe>
4. Boujredah F., Kasmi S. Digitization In Enhancing The Quality Of Higher Education At The Algerian University. *Insanah Journal for Research and Studies*. 2025. No. 16 (1). Pp. 81–93.
5. Bukhari U. The importance of higher education in preparing human capital within the knowledge society. *Journal of Intellectual Excellence in Social Sciences and Humanities*. 2020. No. 2 (1). Pp. 15–30.
6. Ministry of Higher Education. A Vision for the Digitalization of the Higher Education and Scientific Research Sector — Digitalization Master Plan (SDN). Ministry of Higher Education and Scientific Research, Algeria, 2022. Pp. 39–41.
7. University of Msila. Secretary General of the University. Retrieved from University of Msila, 20.08.2025. URL: <https://www.univ-msila.dz/site/office-of-the-secretary-general-of-the-university/>
8. Amando S. Unveiling the Barriers to Digital Transformation in Higher Education Institutions: A Systematic Literature Review. *Discover Education*. 2025. No. 4 (1). P. 37. <https://doi.org/10.1007/s44217-025-00430-9>.
9. Seyda O., Altın S., Celik S. A fuzzy AHP analysis of the barriers to digital transformation in Turkish SMEs. *The Eurasia Proceedings of Science, Technology, Engineering & Mathematics*. (2024). No. 27. Pp. 63–80. <https://doi.org/https://doi.org/10.55549/epstem.1518392>.
10. Alshahrani A. Adopting Emerging Technologies in Digital Government: A Multi-Case Analysis of Drivers, Enablers, and Challenges in Saudi Arabia. *Digital Government: Research and Practice*. 2025. <https://doi.org/10.1145/3719297>.
11. Mahaphan K. Digital Transformation In Public Services: Challenges And Opportunities. *Proceeding of International Conference on Social Science and Humanity*. 2025. No. 2 (2). Pp. 211–226. <https://doi.org/10.61796/icossh.v2i2.14>.

Поступила в редакцию: 08.12.2025.

Принята к печати: 21.01.2026.