

# The digital future of Spanish universities: facing the challenge of a digital transformation

The Bottom Line

Teodoro Luque-Martínez, Luis Doña-Toledo and Nina Faraoni  
*Department of Marketing and Market Research, University of Granada,  
Granada, Spain*

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## Abstract

**Purpose** – This study aims to advance the understanding of both the challenges and the priorities facing Spanish universities undergoing the digital transformation era, to identify areas for improvement in university management, from a managerial point of view.

**Design/methodology/approach** – To analyze the importance and adequacy of various aspects related to digitalization, the authors use the importance–performance matrix, by surveying figures who have or have had a managerial position in the university, such as rectors and vice-rectors.

**Findings** – The results showed that the priority areas were related to strategic and financial management, knowledge management and the society and environment dimension. It all revealed imbalances, the most important of which were in the areas referring to attracting talent, sources of financing, strategic management and digitalization.

**Research limitations/implications** – The study could benefit from considering or placing greater emphasis on alternative viewpoints, including those of external experts and administrative managers at public universities.

**Practical implications** – The practical implications relate to university management. In particular, the study highlights two issues that are a priority: attracting talent and training for university management as well as for data management. It follows from these results that legislative development and public funding should be directed towards adapting the training offer as well as the management structure and processes to the context of digitalization.

**Social implications** – These results have implications for the public sphere, for decision-making related to the public funding that organizations receive from governments. Indeed, as the empirical results demonstrate, the proposed framework is effective not only in assessing the status of digitalization in the university but also in providing information on the most important aspects that need particular attention to achieve the desired future condition.

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**Originality/value** – The novelty of this study lies in the analysis and evaluation of the digitalization process and how public universities are facing it, from the perspective of university management. Methodologically, the novelty lies in the use of the importance–performance matrix, which not only provides insight into the importance of different aspects to be analyzed but also provides information about their adequacy.

**Keywords** Digital society, University management, Higher education, Importance–performance matrix analysis, Strategic management

**Paper type** Research paper

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## Introduction

In recent decades, higher education institutions (HEIs) have undergone substantial changes, such as the Bologna process (Marcelo and Yot-Domínguez, 2019) in Europe and the widespread adoption of e-learning (Ramírez-Correa *et al.*, 2015). Universities now have a broader mission, connecting with both society and the business world, beyond teaching and research (Forliano *et al.*, 2021). Gkrimpizi *et al.* (2023) highlight that the drivers of change that will shape the university of the future are increasing competition, democratization of knowledge and, above all, digital transformation (DT). All of these have caused universities to evolve towards a new model of university (Fernández *et al.*, 2023).

Recently, the COVID-19 pandemic crisis has forced all universities to accelerate online teaching, a process which has implied a DT of staff, faculty and organizations beyond what might have been expected (Bonfield *et al.*, 2020). The emergence of the digital society and the new post-pandemic challenges have placed the new educational model on the front line of analysis where the digital skills of the educator or teacher assume a central role (Núñez-Canal *et al.*, 2022).

HEIs see themselves immersed in this transformation that comprehensively affects all its areas (Castro Benavides *et al.*, 2020). In a major challenge to the entire sector, universities must redefine both strategic and management models throughout the value chain, if the full potential of all opportunities that the wealth of available digital technologies opens up for them is to be efficiently exploited (Teräs *et al.*, 2022). Many universities are developing specific digital strategies in response to the shift towards the use of new technologies, but they lack the vision, capacity and commitment to implement them effectively (Suoranta *et al.*, 2022). According to Hess *et al.* (2016), DT involves changes in organizational structures whose main opportunity is to improve and transform university processes by transforming the use of technology into value, attracting more students and improving student and employee experiences. The greatest pressure for universities to change comes from today's students who demand a flexible, personalized and real-time educational experience (Wang *et al.*, 2023), therefore, they are the ones who demand DT that enhances their experience and education (Bygstad *et al.*, 2022).

Digitalization is one of the main challenges of the university (Bates, 2015; Castro Benavides *et al.*, 2020; Teräs *et al.*, 2022; Farias-Gaytan *et al.*, 2022), and this requires special attention and treatment to respond to the gap it generates in research on university management. Recently, Spain has approved a new law on universities (BOE, 2023) with which it intends to confront and adapt its training itineraries and talent attraction to the new context of digitalization. The objective of this study is to analyze and quantify how the managers of Spanish universities face the new university challenges of the digital society in terms of importance and performance. In short, the aim is to identify the trends within digital society to estimate both the strengths and the weaknesses of the university's response to those trends. The views of the members of the university community with significant management experience (chancellors, vice-chancellors or those who have sat on government

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boards, therefore the most expert people in this field) are examined. A methodology based on the importance–performance matrix analysis (IPMA) (Martilla and James, 1977), also used in university management (Luque-Martínez and Del Barrio-García, 2009), was applied. Both the strengths and the areas for improvement, based on the key factors for the future development of university activity, can be graded and represented with this methodology in a functionally simple way.

Building on the interests of researchers such as Thorpe and Lim (2013) and Anthony and Noel (2021), this study not only quantifies the impact of DT on university services but also highlights a shared perception of the university system across various management dimensions. Thorpe and Lim’s research focuses on the intersection of digital learning environments and their efficacy, examining how online platforms can enhance student engagement and learning outcomes. Anthony and Noel investigate the strategic management and organizational change in HEIs, emphasizing the need for adaptive leadership and innovative strategies to navigate the complexities of DT.

Given the interest aroused in recent years by DT in universities, there are few studies that address this issue and expressly identify the activities carried out in this area and their level of transformation. Thus, our purpose is to discover how universities started their DT and to quantify their management of university directors and managers.

### Digital society

The 21st century has brought significant transformations, creating a new global and digital scenario (Ohmae, 2005). This era has introduced a novel economic and social context, with a new generation of actors on the Web, including “prosumers” and innovative entrepreneurs (Tapscott and Williams, 2010). Both citizens and consumers have been empowered by virtual communities and platforms, which facilitate their participation and expression in consumption behavior, opinions and choices.

Hess *et al.* (2016) defined digitalization as the profound transformation of business activities, organizational processes, competencies and models, aimed at maximizing the opportunities provided by technological advancements and their accelerated impact on society. This strategic and prioritized transformation underscores the depth of digitalization’s influence.

The economy and civil society have experienced changes that fundamentally alter their organizational DNA. Kotler *et al.* (2010) summarize these changes as:

- a new technological wave that promotes the widespread dissemination of ideas, information and public opinion, enabling consumer participation to generate value;
- technology driving globalization in cultural, political-legal, economic and social fields, creating paradoxes within society; and
- technology fostering the growth of the creative market.

Digital technologies are now deeply embedded in the structures of society in complex and sometimes contradictory ways (Dufva and Dufva, 2019). The information society relies heavily on computerized information processing, a defining characteristic of the digital age (Berry, 2016).

In summary, the rapid emergence of the digital society is an evolutionary process influencing every aspect of life for individuals and organizations (Jain and Jain, 2022). The digital society is characterized by the active development of digital technologies for both personal and professional purposes (Osipov *et al.*, 2021). Digitalization, alongside

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globalization and demographic change, is a fundamental driver of change in the economic, socio-political and cultural spheres worldwide (van Kessel *et al.*, 2022).

#### *Digital transformation at universities*

HEIs are at the epicenter of knowledge creation and dissemination. Currently, access to information and knowledge can be obtained through various channels such as platforms, open-source databases, web browsers, applications and encyclopedias. This emerging trend of openness and digitalization implies that universities must reflect on and transform themselves to adapt to the future (Valdés *et al.*, 2021). The success of HEIs in this digital era is determined by their ability to generate and retain information effectively, through student commitment, result rankings and satisfaction levels (Balyer and Öz, 2018).

The higher education sector's responses to social needs are in constant flux and innovation, necessitating a continuous reassessment of higher education's role within society (Guangul *et al.*, 2020). Adaptation to the digitalization process has compelled universities to redefine their challenges and targets (Núñez-Canal *et al.*, 2022; Rof *et al.*, 2022). Specifically, digitalization in universities involves using technology to renew, simplify and improve processes, task completion and product presentation (Teräs *et al.*, 2022). The digitalization of education encompasses several quality aspects, from organizational issues and technological infrastructure to pedagogical approaches (Bates, 2015). It also promotes internationalization by offering flexible online educational programs (O'Connor, 2014; Vlachopoulos and Makri, 2019).

In this context, Castro Benavides *et al.* (2020) conducted a systematic review of the literature on higher education and digitalization, identifying key dimensions that universities should address in the digital society. They highlighted priorities for the future of HEIs, including teaching, infrastructure, curriculum, administration, research, business processes, human resources, university outreach, governance of DT, information systems and marketing. Bibliometric studies have pointed out average levels of digital competencies among faculty and the urgent need to accelerate university DT (Zhao and Canales, 2021), which affects social, organizational and technological aspects (Castro Benavides *et al.*, 2020).

Bozhko *et al.* (2016) emphasized the need for tools that meet current educational standards and techniques, particularly those based on technology. Bond *et al.* (2018) identified the biggest challenge for universities in the digital society as being related to research, curriculum and digital training, particularly in establishing digital skills and modernizing teaching. Another priority of DT involves infrastructure and administrative changes. Tay and Low (2017) confirmed that the DT of administrative databases leads to agile and flexible management. Farias-Gaytan *et al.* (2022) observed that several HEIs had upgraded digital technologies to enhance current practices in student data and curriculum management, aiming for comprehensive improvement in university services.

Therefore, HEIs face significant challenges related to DT. These challenges include not only the use of digital tools and technologies within teaching and learning processes but also the incorporation of technologies to modify systems, processes, modes of communication and all other relevant academic and administrative activities (Hashim *et al.*, 2021).

Along those lines, the accountancy firm KPMG, has proposed strategies for universities to adapt to the digital environment. It developed a user-centered, research-based set of "building blocks" for the DT of HEIs (KPMG, 2020). Six organizational blocks are contemplated: clients, channels, business strategy, core business practices, advanced data and analytics and empowering business practices.

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In all, five priority categories for university management in the context of digitalization can be highlighted from the literature review:

- (1) Quality management and ongoing improvement: ensuring the quality of teaching, research and university services, as well as promoting continuous improvement in all those areas. It is essential to ensure quality both for training and for attracting and generating talent, as well as for all nonacademic aspects (infrastructure, university outreach, etc.) (Darawong and Sandmaung, 2019).
- (2) Internationalization and competitiveness: improving the international projection of the university and its ability to compete in an increasingly globalized environment (Romani-Dias *et al.*, 2019). The digitalization process presupposes the capability of students to access online education, increasing competition and promoting access to prestigious universities online (Miotto *et al.*, 2020).
- (3) Innovation and knowledge transfer: fostering research and innovation and knowledge transference to society. In this innovation process, proper training for students in digital and technological competencies is also essential (Jackson, 2019) as is adequate application of all the digital processes and resources of university institutions (Laufer *et al.*, 2021). In addition, the outbreak of the COVID-19 pandemic accelerated the need for DT and innovation in universities (Bhagat and Kim, 2020; Agasisti and Soncin, 2021).
- (4) Economic and financial management: ensuring efficient management of university economic and financial resources is one of the urgent challenges for universities, given the recent continuous crises (Erickson *et al.*, 2021). Universities must therefore professionalize digital processes and resources for management, as well as develop strategies that are consistent with digitalization (Aboramadan *et al.*, 2020).
- (5) Participation and social commitment: to encourage the participation and the commitment of the university towards its social environment, as well as to promote university social responsibility (Wigmore-Álvarez *et al.*, 2020). In short, the university must provide value to society and its environment (Luque-Martínez *et al.*, 2023) as well as contribute to sustainable development and have the capacity for social leadership (Findler *et al.*, 2019).

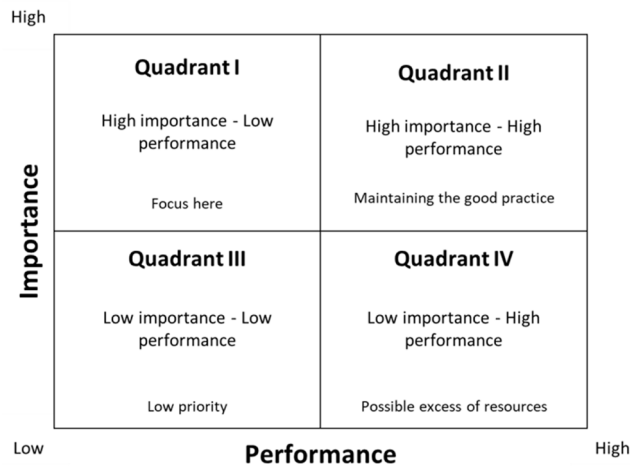
#### *Importance–performance matrix analysis in the higher education sector*

The IPMA model (Martilla and James, 1977) is a versatile tool for improving organizations and developing strategies. It assesses the “importance” and “performance” of organizational aspects to pinpoint areas for improvement, aiding decision-making by identifying key service attributes in line with stakeholder perceptions (Luque-Martínez *et al.*, 2019).

An attractive and interesting characteristic of the IPMA model is that the results can be graphically represented in a two-dimensional grid after examining the mean ratings of importance and performance of the different attributes given by the target population (Chen *et al.*, 2022).

Using the grid in Figure 1 will assist managers in identifying areas needing attention.

The IPMA has been adopted in many sectors, because of its utility for identifying areas needing better resource allocation. However, there have been scarce few applications within the education sector (Yildiz, 2014).



Source: Martilla and James (1977)

Figure 1. IPMA

O'Neill and Palmer (2004) applied it to the university using focus groups to refine the SERVQUAL scale into 22 items that they considered more suitable for measuring service quality in the Australian higher education sector. They identified three underlying dimensions ("process," "empathy" and "tangible") that influenced university service quality. Following on from this, Angell *et al.* (2008) used focus groups to identify the 20 most important university attributes. Subsequently, they applied IPMA to show that "academic links to industry" were more important than, for example, "cost" and "leisure." Yildiz (2014) conducted a similar approach in the context of Turkish universities.

With prospective students under consideration, Silva and Fernandes (2011) and Hanssen and Mathisen (2018) explored how high school students selected higher education institutions using IPMA in the Portuguese and Norwegian contexts, respectively. More recently, the studies of McLeay *et al.* (2017) and Cladera (2021) identified and ranked the most important attributes for achieving student satisfaction. More specifically, Bismala and Manurung (2021) analyzed satisfaction with online learning during the COVID-19 pandemic using IPMA, whereas Daud *et al.* (2011) analyzed the opinions of managers and employers in Malaysia where perceptions of graduate performance in terms of knowledge, skills and abilities were assessed using the IPMA model. Finally, Wohlfart and Hovemann (2019) considered another stakeholder in their study: graduates. They investigated graduate perceptions of the relationship between university, industry and work environment.

The present work therefore enlarges on previous studies, in so far as the opinions and the perceptions of university chancellors, deans and administrative managers are considered.

Specifically, in this study, expert opinions were taken into account for the identification of the aspects relating to the future of the university that were under consideration: on the one hand, the opinions of 10 experts with experience of university management and various postgraduate courses in university management (Parras Rosa, 2021); on the other hand, some publications of the European University Association referring to university independence; and others of the Society for College and University Planning (SCUP) were also considered, such as those referring to environmental, social, economic, technological and digitalization trends (Burns, 2020; Brown *et al.*, 2020; SCUP, 2021a, 2021b).

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Specifically, the following research questions were pursued:

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- RQ1. What are the priorities and the challenges that Spanish universities face and how can their importance be quantified?
  - RQ2. What is the degree of preparedness of Spanish universities with respect to their future challenges?
  - RQ3. What are the main weaknesses of Spanish universities with respect to their future challenges?
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### **Materials and methods**

The study is conducted within the Spanish University System, which has recently undergone several regulatory changes and various strategies, such as Strategy 2015, to enhance its improvement and adaptation. Notably, it ranks among the top 10 university systems in the world and the top 5 in the European Union (Luque-Martínez *et al.*, 2016, 2018), making its analysis particularly relevant in the context of digitization challenges. Additionally, the Andalusian university system, comprising 20% of Spanish public universities and until recently exclusively public, is one of the most significant in Spain. This study is part of a research project focusing on this system, hence the interest in comparing it with the rest of Spain.

Following the analysis of the above-referenced literature, the questionnaire was structured around the following dimensions: Digitalization (D); Internationalization (I); Knowledge generation and management (KG\_M); Education (E); Talent (T); Governance (Go); Management of resources and finance (M\_RF); and Society and environment (S\_E). As the M\_RF dimension was overly broad, it was divided into three: Human resources management (HR\_M), Management of resources and finance (M\_RF) and Strategic management (SM\_). The details of each item are shown in Table 1.

### *Data acquisition*

The survey, conducted using Le Sphinx software, presented questionnaire items in a randomized order to avoid position bias. After a preliminary test with 22 experts, the final questionnaire was emailed on December 18–19, 2022, with reminders sent on January 3 and 16, 2023. The survey targeted a convenience sample of 550 individuals with extensive university management experience (at least eight years), mainly comprising chancellors, vice-chancellors and other high-ranking positions in Spanish universities, both public and private. Although the questionnaire was sent to people with the required experience from all Spanish universities, to promote anonymity it was decided not to ask about the university to which they belonged. The anonymous responses totaled 184, including 70 from Andalusian universities and after filtering, 101 responses remained, with 43 from Andalusian universities.

### **Results**

#### *Most important and most appropriate factors*

On a scale of 1–10, the average importance of the factors amounted to 8.16 with a standard deviation of 1.52 and a coefficient of variation of 0.19. The maximum value was 8.9 while the minimum was 7.1. In view of those values, it may be considered that the heterogeneity of the factor importance score was not high.

Dividing the set of items into three-thirds, the aspects considered most important (Table 2) and therefore of the highest priority were related to strategic management and



**Table 1.** Dimensions of university activity

Dimension	Label	Item
Digitalization	D_Education	Digitalization of education
	D_RDi	Digitalization of R&D + <i>i</i>
	D_Ethics	Ethical application of digitalization
	D_Bigdata	Data management, big data at the university
	D_Cybersecurity	Cybersecurity at the university
Internationalization	I_Education	Internationalization in education
	I_RDi	Internationalization in R&D + <i>i</i>
	I_Network	Participation in international networks
Knowledge generation and management	KG_M_Relevant	Generation of socially relevant knowledge
	KG_M_Transfer	Knowledge transfer
	KG_M_Entrepren	Preparation for entrepreneurship
	KG_M_ResearchEnviron	Alignment of research to the needs of the environment
Education	E_Content	Adaptation of content to the digital sphere
	E_student	Student selection process
	E_Sandwich	Sandwich courses
	E_Prepar	Preparation for future challenges
	E_LaborInsert	Preparation and counseling for job placement
Talent	T_RH	Human resources for digitalization
	T_student	Talent acquisition: student body
	T_Faculty	Talent acquisition: faculty
	T_Managem	Talent acquisition: management
	T_Evaluat	Staff evaluation (teaching and non-teaching)
Governance	Go_Selection	Selection/election process of management bodies
	Go_Finance	Level of autonomy in financial management
	Go_Academic	Level of autonomy in academic management
	Go_Personnel	Level of autonomy in personnel management
	HR_M_Profess	Professionalization of university management
Human resources management	HR_M_DigitAdmin	Digitalization of administrative management processes
	HR_M_PromoFaculty	Faculty promotion process
Management of resources and finance	HR_M_PromoNonFacu	Non-teaching staff promotion process
	M_RF_PublicFinance	Public funding of the university
	M_RF_DigitInfra	Infrastructure for digitalization
	M_RF_Energy	Energy management and sustainability
	M_RF_AlternatFinance	Alternative funding to public financing
Strategic management	SM_Listen	Process of listening to employees and students
	SM_DigitCommun	University digital communication
	SM_Strategy	Direction and strategic management
Society and environment	S_E_Transpar	Transparency and accountability
	S_E_SDG	Adaptation to the SDGs
	S_E_Commitm	Connection and commitment to surrounding area
	S_E_Leader	Social leadership
	S_E_Demograp	Tracking demographic changes
	S_E_Inclusion	Inclusion and diversity treatments
	S_E_Innovation	Promotion of social innovation

**Source:** Authors' own creation



**Table 2.** Evaluation of the university dimensions and their importance, performance and imbalance ordered from greater to lesser imbalance between importance and performance

Factors	Importance		Performance		I - P
	Mean	SD	Mean	SD	
T_Managem	7.97	1.82	4.13	1.94	3.84
M_RF_PublicFinance	8.7	1.66	4.92	2.24	3.78
M_RF_AlternatFinance	7.84	1.72	4.08	2.43	3.76
E_Faculty	8.89	1.44	5.19	2.05	3.7
E_Sandwich	7.54	1.60	4.06	2.34	3.48
SM_Strategy	8.75	1.22	5.41	1.91	3.34
D_Bigdata	8.1	1.69	4.82	2.18	3.28
F_Prepar	8.49	1.44	5.24	1.76	3.25
HR_M_Profess	7.99	1.65	4.78	2.14	3.21
T_Evaluat	8.53	1.08	5.35	2.02	3.18
Go_Personnel	8.06	1.58	5.09	2.06	2.97
D_Cybersecurity	8.67	1.72	5.72	2.24	2.95
T_RH	8.01	1.30	5.06	1.87	2.95
Go_Finance	7.95	1.68	5	2.31	2.95
T_student	7.91	1.49	4.99	2.06	2.92
S_E_Demograp	7.08	1.78	4.25	2.03	2.83
E_LaborInsert	8.16	1.57	5.41	1.85	2.75
KG_Transfer	8.68	1.58	5.97	2.00	2.71
I_Education	8.19	1.32	5.55	1.77	2.64
D_Ethics	8.03	1.80	5.4	2.34	2.63
KG_Entrepren	7.77	1.68	5.19	1.92	2.58
S_E_SDG	8.02	1.53	5.51	2.00	2.51
M_FR_Energy	8.13	1.49	5.7	1.93	2.43
KG_Relevant	8.5	1.57	6.07	2.03	2.43
I_RDi	8.75	1.54	6.33	1.86	2.42
S_E_leader	8.49	1.33	6.13	2.07	2.36
HR_M_DigitAdmin	8.55	1.27	6.24	1.80	2.31
M_RF_DigitInfra	8.52	1.09	6.24	1.66	2.28
E_Content	8.05	1.39	5.81	1.96	2.24
KG_ResearchEnviron	8.14	1.50	5.91	2.04	2.23
D_RDi	7.96	1.79	5.78	1.98	2.18
Go_Selection	7.85	1.89	5.75	2.30	2.1
S_E_Innovation	7.39	1.72	5.3	1.92	2.09
E_student	7.49	2.05	5.42	2.40	2.07
I_network	8.44	1.45	6.37	1.88	2.07
D_Education	7.97	1.35	5.99	1.95	1.98
S_E_Commitm	8.51	1.29	6.59	1.60	1.92
S_E_Transpar	8.84	1.34	6.95	1.82	1.89
HR_M_PromoNonFacu	7.44	1.58	5.56	1.90	1.88
SM_listen	7.88	1.50	6.01	2.12	1.87
HR_M_PromoFaculty	8.33	1.57	6.51	2.02	1.82
S_E_Inclusion	8.52	1.28	6.78	1.88	1.74
SM_DigitCommun	7.93	1.26	6.29	1.80	1.64
Go_Academic	8.05	1.47	6.42	1.81	1.63

**Note:** The third of highest values appears in italics

**Source:** Authors' own work

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funding (strategic management and administration; public funding of the university; digitalization of administrative management processes; infrastructure for digitalization); knowledge management (knowledge transfer; generation of socially relevant knowledge); the dimension of society and environment (transparency and accountability; addressing inclusion and diversity; connection and commitment to surrounding area; social leadership); in addition to aspects relating to talent (evaluation of teaching and non-teaching staff); digitalization (cybersecurity); and internationalization (internationalization of R&D + i).

On the other hand, less important aspects included management and funding, governance, societal and environmental factors, entrepreneurship readiness, talent attraction for management and students, education processes and digitalization components.

In terms of performance, the mean score was 5.57 (ranging from a maximum mean score of 7 to a minimum of 4.1) with a standard deviation of 2 and an average coefficient of variation of 0.37. As expected, the heterogeneity of the performance factor was much higher than that of importance. The mean score for importance was 46% higher than it was for performance.

The Spanish universities, according to the interviews with the experts, stood out for the performance of the internationalization factors (participation in international networks; internationalization in R&D + i); in aspects of management and funding (faculty promotion process; digital communication of the university; digitalization of administrative management processes; infrastructure for digitalization; process of listening to employees and students); knowledge management (generation of socially relevant knowledge; knowledge transfer); governance (level of autonomy in academic management); and various issues related to society and the environment (transparency and accountability; inclusion and diversity treatment; connection and commitment to surrounding area; social leadership).

Conversely, lower performance was linked to digitalization, education, various aspects of talent attraction, management financing, knowledge management, governance and social aspects (Table 2).

#### *Major and minor imbalances*

The importance score was higher than the performance score for each and every factor; greater differences indicated greater imbalance or areas most in need of improvement, while lesser differences pointed to aspects that were reasonably well addressed. Of the four quadrants, the one that included the factors of greatest importance and weakest performance reflected the major imbalances that constituted special challenges and were consequently of special interest.

The differences between the average assessment of importance and performance ranged from 3.84 points for attracting talent for management (the most imbalanced aspect) to 1.6 for level of autonomy for academic management. The aspects that were in the third with the greatest differences and in the third with the least differences for the different dimensions are discussed below (see Table 2 with the standardized values).

- Digitalization (D), the aspects of this dimension that reflected the highest imbalances were those related to data management, incorporation of big data and cybersecurity in the university. However, there was no perception of priority need with respect to digitalization of R&D + i and education.
- Internationalization (I) only stood out because of the reduced difference in participation.
- Knowledge generation and management (K\_GM), only stood out because of the alignment of research with the needs of the environment that was among the areas with the least imbalance.

- Education (E), the greatest imbalances were sandwich courses and preparation for the challenges of the future. The student selection process was perceived as reasonably well resolved.
- Talent (T), all the factors in this dimension were in the group with the greatest imbalance. These were characteristics for which a great need for improvement was perceived: human resources for digitalization; talent attraction: students; talent attraction: faculty; talent attraction: management; staff evaluation (teaching and non-teaching).
- Governance (Go), the greatest imbalance and therefore the greatest demand in this dimension referred to as autonomy in financial and personnel management. In contrast, there was no notable imbalance in the selection/election process of the governing bodies and the level of autonomy in academic management.
- Under the resource management, funding and strategy block, the following stood out among the greatest imbalances: public funding of the university; alternative financing to public funding; strategic direction and management; professionalization of university management. On the contrary, no particular need was perceived for improvement in: promotion process for non-teaching and non-research staff; listening process for employees and students; promotion process for teaching staff; digital communication of the university.
- Society and environment (S\_E), there were no aspects among those with major differences, while the following were among the areas with performance levels closer to their importance and were therefore reasonably satisfied: promotion of social innovation; connection and commitment to the surrounding area; transparency and accountability; attention to diversity and inclusion.

### Analysis by dimensions

Grouping the items by dimensions implied the identification of 10 dimensions where performance was, in general, of adequate reliability and with a significant extracted variance as can be seen in Table 3. Out of 88 items, 66 exceeded the value of 0.7 (75%), 14 were between 0.66 and 0.7 and 4 were between 0.52 and 0.6, particularly on the education scale. It was decided to leave it, despite the not-so-very-high indicators, because removing it might cause greater harm.

**Table 3.** Reliability and extracted variance of the dimensions of university activity

Dimension	Reliability		Extracted variance	
	Importance	Performance	Importance	Performance
Digitalization	0.86	0.83	0.64	0.60
Internationalization	0.83	0.80	0.74	0.71
Knowledge generation and management	0.88	0.88	0.73	0.74
Education	0.65	0.76	0.41	0.81
Talent	0.79	0.84	0.56	0.61
Governance	0.82	0.66	0.66	0.51
Management human resources	0.75	0.68	0.58	0.52
Management of resources and finance	0.67	0.72	0.51	0.55
Strategic management	0.67	0.71	0.60	0.64
Society and environment	0.85	0.87	0.53	0.56

**Source:** Authors' own work

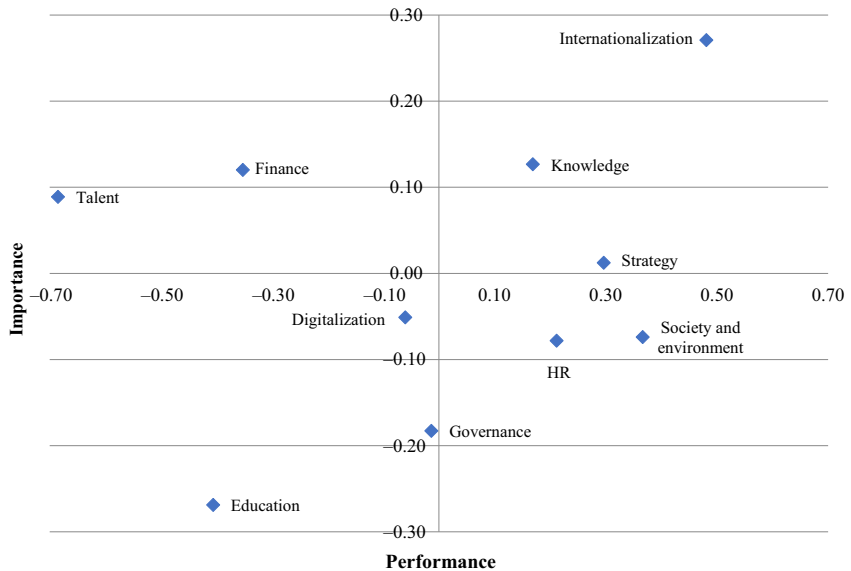
In Table 3, internationalization and knowledge generation stood out as highly important and well-performing. Finance and talent management, though less successful, were still crucial. On average, society and environment, strategy and human resource management performed well, while governance, digitalization and education fell below both performance and importance (Figure 2).

The question arises as to whether similar perceptions are shared in all Spanish universities, to which end we compared the perceptions of the experts from Andalusia (the most populated Spanish region and one of the largest university systems within Spain) with the perceptions of experts from other regions. In general terms, there were no statistically significant differences for many of the items between the respondents based in Andalusia and those based in the other Spanish universities.

Regarding the importance attributed to the different factors, there were only statistically significant differences for the evaluation of both faculty and staff (both teaching and non-teaching), which was higher in other parts of Spain (8.8) than in Andalusia (8.1) at a significance level of 0.00. There were also statistically significant differences ( $p = 0.03$ ) with respect to the importance of transparency and accountability, which was more important for experts from the rest of Spain (9.1) than for experts from Andalusia (8.4).

At a level that can be qualified as quasi-significant (between 5% and 10%) there were also differences in order of importance, always considered more important for the rest of Spain, in the attraction of faculty (9.12 vs 8.50); the faculty promotion process (8.61 vs 7.85), and the level of academic autonomy (8.28 vs 7.69).

Regarding the differences in the performance attributed to the different factors, there was not much disparity between the responses from Andalusia and those from the rest of Spain.



Source: Figure by authors

**Figure 2.** Representation of the dimensions according to importance and performance (normalized values)

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There were only two cases with statistically significant differences, with a higher mean score in the case of Andalusia, which were the leadership role that the university should play (significance level 0.03); one of the most highly valued characteristics both in Andalusia (6.73) and in the rest of Spain (5.76). The same occurred with the item strategic direction and management (significance level 0.02), a characteristic with an intermediate evaluation (in Andalusia 6.0 and in the rest of Spain 5.0).

There were other factors with a quasi-significant difference in performance (between 5% and 10%), two of which were among those with high scores: digitalization infrastructure (6.64 for Andalusia and 6.0 for the rest of Spain) and autonomy in academic management, which was higher in the rest of Spain (6.67) than in Andalusia (6.03). A third factor with an intermediate score was the selection/election process of the governing bodies (6.31 for Andalusia and 5.39 in the rest of Spain).

Grouped by dimensions, in no case were there statistically significant differences between the scores of Andalusian university managers and those from other parts of Spain.

Finally, the gap in the importance of the relationship with the local community stands out as a crucial component for the success of the DT in Spanish universities. This collaboration not only facilitates the implementation of new technologies and educational methodologies but also strengthens the link between the university and its immediate environment, creating an ecosystem of innovation and mutual development. The active participation of the local community can provide valuable input and feedback, allowing universities to adjust their digital strategies to better meet local and regional needs.

## Discussion

The research findings are consistent with previous studies in identifying digitization as a critical challenge for universities. [Bates \(2015\)](#), [Castro Benavides et al. \(2020\)](#) and [Teräs et al. \(2022\)](#) also stress the importance of comprehensive digitization encompassing infrastructure, pedagogy and digital competencies of staff. The impact of COVID-19, addressed in studies such as [Bonfield et al. \(2020\)](#) and [Bhagat and Kim \(2020\)](#), reinforces the manuscript's observation about the urgent need to rapidly adapt institutions to new modes of digital teaching and management.

In terms of financial and strategic management, the manuscript's findings are congruent with studies such as [Eriksson et al. \(2021\)](#) and [Aboramadan et al. \(2020\)](#). These studies emphasize the need for alternative funding sources and a professionalization of management to meet the challenges of digitization. In addition, research by [Bond et al. \(2018\)](#) and [Zhao and Canales \(2021\)](#) on digital competencies supports the manuscript's conclusion on the urgency of improving the digital competencies of academic and administrative staff to ensure effective implementation of digital technologies in higher education.

Internationalization, highlighted in the study as a positive performance area, is also considered key in studies by [Romani-Dias et al. \(2019\)](#) and [Miotto et al. \(2020\)](#). These studies highlight the importance of internationalization for the success of universities in the digital era, enabling greater competitiveness and global collaboration. The manuscript's findings on relevant knowledge generation and knowledge transfer are aligned with studies that highlight the need for universities to not only adapt their educational models to digital technologies but also to ensure that their research and outreach activities have a significant impact on society, as suggested by [Forliano et al. \(2021\)](#) and [Zhao and Canales \(2021\)](#).

## Conclusions and implications

In this study, the priorities and challenges faced by Spanish universities in the context of DT have been identified and analyzed. The priority factors focused on key areas such as society

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and environment, management of resources and finance, strategic management, knowledge generation and management and talent management.

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- Talent attraction (T): A significant imbalance was found in all factors related to talent attraction, including the attraction of students, teaching staff and management personnel. Particularly notable is the difficulty in attracting talent for management, suggesting an urgent need for strategies to improve universities' ability to attract and retain personnel with the necessary skills to face the challenges of digitalization and strategic management.
  - Human resources management (HR\_M): Although efforts have been made in staff promotion, the professionalization of university management remains a critical need. This implies the necessity for training and developing specific managerial skills for university leaders to implement strategic and technological changes effectively.
  - Management of resources and finance (M\_RF): Universities face significant challenges in securing adequate funding sources, affecting their capacity to invest in digital infrastructures and resources needed for DT. This problem is even more pronounced because of the dependence on public funding, which is often insufficient.
  - Strategic management (SM): Despite the well-developed process of listening and digital communication, strategic direction and management require attention. Universities need to develop clear and coherent strategies that align their long-term goals with the opportunities and challenges of the digital environment, ensuring solid strategic direction.
  - Digitalization (D): Process management and security present challenges, although the application of digitalization in teaching and research has been adequate. This indicates that universities must enhance their capabilities in data management and cybersecurity to protect information and ensure the integrity of their digital systems.
  - Governance (Go): A significant imbalance was observed in financial independence and faculty management. However, the procedures for electing governing bodies do not present major problems, suggesting that the governance structure may need minor adjustments compared to other aspects.
  - Education (E): Challenges were identified in preparing students for the future and implementing sandwich courses. This implies that universities must review and adapt their educational curricula to ensure that students acquire relevant skills for the labor market and are prepared for future challenges.
  - Internationalization (I): This dimension showed reasonably good performance, particularly in participation in international networks and internationalization in research and development. Spanish universities are well-positioned in these aspects, providing a solid foundation for other areas that require improvement.
  - Knowledge generation and management (K\_GM): This dimension also showed satisfactory performance, with factors such as the generation of socially relevant knowledge and knowledge transfer being well evaluated. This indicates that universities are effectively contributing to society through their research and outreach activities.
  - Society and environment (S\_E): Dimensions related to transparency, accountability, inclusion and diversity and social leadership showed positive performance. This suggests that universities are committed to their social environment and are achieving a significant impact in these areas.

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Regarding the homogeneity in the perceptions of university systems, the perceptions of the chancellors of the Andalusian university system did not differ significantly from the perceptions of other chancellors throughout the rest of Spain. This challenges the common belief that there are major regional differences in the evaluation of the importance and performance of university factors.

Spanish universities must place greater importance on talent attraction, especially in management, and the professionalization of university management. The selection and promotion of management positions should prioritize individuals with demonstrated capabilities in strategic management, particularly digital skills. It is crucial to offer specialized training in university management as a prerequisite for occupying positions of responsibility. This extends to all levels, ensuring that both teaching and administrative staff are equipped to handle the challenges of DT.

The design and adaptation to the context of digitalization and artificial intelligence, as well as data management and big data, should be prioritized. Public Administration must promote these changes and implement them through regulatory measures. The new Spanish university legislation should be used to adapt the training offer and management processes to the demands of the digital era. This includes not only technological infrastructure but also the development of digital competencies across all university staff.

Public administration can also establish incentives in various funding options to promote changes in the structure and processes of data management. This includes the provision of infrastructure and the creation of calls to finance research and development (R&D). Additionally, it is essential to fund research on university management adapted to digitalization, particularly for public universities that depend on public funding. These incentives may include grants for digitalization projects, tax incentives and support for implementing emerging technologies.

Universities, on their part, should prioritize training in data management and the use of big data to foster its intelligent use. This involves not only adopting new technologies but also continuous training for staff in the use and analysis of data for informed decision-making. Integrating advanced data management systems can significantly transform administrative and academic efficiency, providing a solid foundation for innovation and continuous improvement.

The educational curriculum must adapt to prepare students for the future, emphasizing artificial intelligence and strengthening the link between academia and industry. Universities should update their educational programs to include essential digital competencies and foster collaboration with technology companies. This will ensure that graduates are well-prepared for the challenges of the contemporary labor market and can effectively contribute to the digital economy.

In terms of governance, financial and management autonomy is a more pressing concern than election processes or promotion methods. Universities need greater freedom to manage their financial and human resources effectively and adaptively. This may involve legislative reforms that grant greater autonomy to educational institutions, enabling them to respond more agilely to the changing needs of the educational and technological environment.

Finally, it is essential to foster an environment that values and promotes transparency, accountability, inclusion and diversity. Universities should remain committed to their social environment and strive to have a positive impact on the community. This includes initiatives to increase the participation of diverse social groups in university life, ensuring that all students have equitable access to educational and professional development opportunities.

These conclusions are drawn from a small nonrandom sample, though of special value due to the quality of the members, given their extensive management experience, which is an



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added guarantee. However, it would be beneficial to complement this study with other perspectives, such as the opinions of external experts and administrative managers at public universities. This diversity of perspectives can offer a more comprehensive and nuanced view of the challenges and opportunities in the DT of universities.

### **Limitations**

The IMPA model used in this study has several limitations that should be considered. First, the methodology is based on subjective perceptions of the participants, which may introduce biases in the results. Although experts with extensive experience in university management were selected, their opinions may not fully reflect the objective reality or the variety of contexts within Spanish universities.

Another limitation is the generalization of the results. As the sample includes mainly senior administrative figures, the findings may not be representative of all levels within the university structure, especially those at the operational or grassroots level, who are also impacted by digitization. In addition, the focus on public universities may not adequately capture the dynamics present in private institutions, which restricts the applicability of the findings to the entire higher education sector in Spain.

### **Future lines of research**

For future research, it is crucial to delve deeper into several aspects of DT in universities. This includes investigating the impact of digitization on educational quality, exploring how new pedagogical methodologies and digital resources affect student learning and outcomes. It is also essential to analyze inequalities in access to digitization, identifying barriers and developing strategies to ensure technological equity among various regions and socioeconomic groups. Additionally, the relationship between digitization and environmental sustainability should be examined, exploring how digital practices can reduce the carbon footprint and promote efficiency in resource management. Other areas of interest include cybersecurity and digital resilience, preparing universities for cyber threats and ensuring educational continuity, studying the impact of digitization on the well-being of university staff, assessing technological stress and professional development opportunities, evaluating funding models for digitization, improving efficiency in administrative management and analyzing the effects of digital technologies on academic research.

Also, it is essential to delve deeper into how universities can establish and maintain effective collaborations with the local community in the context of digitization. This involves creating sustainable collaboration frameworks, involving local stakeholders in decision making and in educational and research projects. In addition, research should investigate how these collaborations affect the attraction and retention of talent, both student and faculty and how they improve the public perception of the university, as well as its ability to attract funding and institutional support. It is also crucial to analyze the impact of these collaborations on student satisfaction and performance, offering more relevant and motivating learning experiences.

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## About the authors

Teodoro Luque-Martínez is a professor of market research and marketing at University of Granada. Market Research and Marketing Department Chair and Consumers' Behaviour Master Program Coordinator. He has more than 60 papers presented in international congresses and events. He is also Director of ADEMAR Research Group. Professor Luque-Martínez has published 17 books in different publishing editorials such as Ariel Economía, Pirámide, Thompson-Civitas or Editorial Universidad de Granada. He has also published different articles in national and international journals such as *European Journal of Marketing*, *Service Industries Journal*, *Revista Española de Documentación Científica*, *EPI*, *Journal of Marketing for Higher Education*, *Public Relations Review*, *Information and Management*, *Scientometrics*, *Information and Management*, *Journal of Consumer Marketing*, *Cities*, *Quality and Quantity*, *Revista Europea de Dirección y Economía de la Empresa*, *Revista Española de Investigación de Marketing-ESIC*, *Distribución y Consumo* or *Investigación y Marketing*.

Professor Teodoro Luque-Martínez's international stays include time spent at Oxford University (UK), Karlsruhe Institute of Technology (Germany), University of Texas-Austin (USA), Ottawa University (Canada) and Indiana University, Bloomington (USA).

Luis Doña-Toledo is Assistant Professor at University of Sevilla and at University of Granada. Previously associate professor at the University of Almería. Member of the group responsible for the Graduates studies carried out by the University of Granada and other important reports. He has participated in eight teaching innovation projects. He has published paper in scientific journals such as *Journal of Marketing for Higher Education*, *International Review on Non-Profit and Public Marketing*, *Sustainability* or *Revista Española de Documentación Científica*. He has published 32 papers in national and international congresses and events. He has a PhD Marketing and Communication. His doctoral thesis is on education in higher education marketing. He is also Coordinator of the Summer Science Campus for teens at the University of Granada. He has participated in various official programs of the Ministry of Education of Spain teaching innovation. Professor Luis Doña-Toledo's international stays include University of Strathclyde (Glasgow) and University of Rouen (France).

Nina Faraoni is a Professor in the Department of Marketing and Market Research at the University of Granada. She holds a PhD degree in Economic and Business Sciences. She actively participates in various research projects and has coauthored scientific articles published in journals including *Studies in Higher Education*, *Journal of Marketing for Higher Education* and *Sustainability*. Furthermore, she is a coauthor of the book *Universidad en el Espacio Iberoamericano: propuestas de futuro para la vinculación universidad-entorno y la promoción del posgrado* and has contributed to the study of the economic impact of the University of Granada. She has authored and coauthored papers presented at conferences such as Aemark, Aedem, Cimas and Redue Alcue. Her research focuses on topics related to universities, reputation management and their impact on rankings, as well as marketing audits. Nina Faraoni is the corresponding author and can be contacted at: [ninaf@ugr.es](mailto:ninaf@ugr.es)