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Reflecting university image in the era of digitalization

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ABSTRACT

The digital transformation of Higher Education institutions affects their teaching, research, and administrative functions, ultimately shaping their public image. This study examines the factors that influence graduates' perceptions of university image, focusing on socio-demographic characteristics, university experience, employment-related outcomes, and digitalization dimensions such as information quality, online communication, learning quality, social media presence, and electronic Word of Mouth (e-WOM). A nationwide survey was conducted among 600 Spanish graduates using structured questionnaires with validated scales. Data were analyzed using binary logistic regression. The findings reveal that graduate identification with the institution, the quality of shared information and websites, and e-WOM is significantly associated with the perceived image. Additionally, job market insertion plays a crucial role. The findings suggest the relevance of strategically managing digital presence and communication, especially on social media. By integrating digitalization into image-building strategies, the study offers a novel framework for understanding how institutional image is constructed in the digital era.

1. Introduction

Institutions of higher education have undergone substantial transformations over recent years, largely driven by technological and social trends towards digitalization (Ghemawat, 2017). These changes have affected not only the operational dynamics of universities but also their role in society and the expectations placed upon them by various stakeholders. In this scenario, digitalization is increasingly viewed as a fundamental force shaping the present and future of higher education, as it integrates and redefines all aspects of academic processes (Kryshtanovych et al., 2023).

In the field of marketing, the concept of image is essential when designing strategies aimed at influencing how individuals perceive and respond to organizations. Image is a multifaceted construct that results from the interaction between beliefs, attitudes, impressions, and culturally conditioned interpretations. It can be projected by companies, places (e.g., a city or a tourist destination), institutions, or even individuals (e.g., a leader, a celebrity, etc.), and it does not necessarily align with objective or verifiable characteristics of the subject it refers to. Instead, it emerges from subjective evaluations shaped by personal experiences and broader social or cultural frameworks (Barnett et al., 2006).

When applied to the context of organizations, image refers to how the institution is viewed by its various audiences. According to Argenti and Druckenmiller (2004), image reflects an organization's identity and corporate brand, understood through the lens of the stakeholders who interact with it. Different audiences may hold divergent images of the same organization, depending on their relationship with it and the dimensions they prioritize. This often leads to an overlap with the concept of reputation, although important distinctions remain. Reputation involves the shared perceptions of a group and is often considered more stable and rooted in collective consensus (Fombrun, 1996; Fombrun & van Riel, 1997). While image may vary depending on specific features or experiences, reputation tends to consolidate broader and more global evaluations over time (Faraoni et al., 2024). This distinction is particularly relevant in higher education, where universities can be perceived in very different ways depending on whether the focus is on academic quality, social responsibility, internationalization, or graduate outcomes. Moreover, the same institution may be evaluated positively in one respect and negatively in another (Abratt & Kleyn, 2012), further reinforcing the complexity of its image.

Some studies already explored how image operates in the university setting, including how it varies across international branch campuses (Wilkins & Huisman, 2015). However, the topic remains

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underdeveloped compared to other domains such as corporate branding or consumer perception. In this sense, the adaptation of image-related concepts from the business sector to higher education represents both a theoretical challenge and an opportunity for innovation.

In recent years, the COVID-19 pandemic has served as a powerful catalyst for digital transformation in universities. The need to quickly adopt hybrid or fully online teaching modalities forced institutions to reorganize their structures and workflows to accommodate digital formats (Bonfield et al., 2020). As a result, the digital component has become increasingly central to the academic experience and to how universities are perceived by students and society at large. This shift has also highlighted the growing importance of digital competencies and infrastructures within the university context (Núñez-Canal et al., 2022).

Digitalization, understood as a continuous and multidimensional process, affects both individuals and organizations on several levels (Jain & Jain, 2022). It involves not only the use of technology but also a broader cultural and strategic transformation, where processes are redesigned, roles are redefined, and new capacities are developed to maximize the benefits of digital tools (Hess et al., 2016). This transformation influences how value is created and perceived, and how institutions relate to their audiences. According to Kotler et al. (2010), digitalization reconfigures the organizational DNA through mechanisms such as (1) the generalized diffusion of ideas, information, and public opinion, giving the consumer a role in value creation; (2) globalization in cultural, political-legal, economic, and social areas, causing paradoxical situations within society; and (3) it feeds the growth of a creative market. Alongside globalization and demographic change, digitalization is one of the major forces driving societal evolution (van Kessel et al., 2022).

Digitalization has driven a new global and digital panorama characterized by a new generation of "digital actors" (Ohmae, 2005; Tapscott & Williams, 2008), individuals that, as consumers, have increased their empowerment in terms of choice, consumption, and the expression of their opinions. The transition from an information society to a digital society (Berry, 2016) also has expanded the channels through which graduates form and express their impressions of their alma mater. As a result, the image of the university is increasingly shaped by digital interactions and narratives, many of which are beyond the institution's direct control.

Adopting an exploratory approach, the study does not aim to test formal hypotheses grounded in a consolidated theoretical model, since the literature in this field is still emerging, but rather to address a set of research questions. These questions seek to clarify how elements such as information quality, learning experience, institutional communication, social media presence, and e-WOM may shape perceptions of university image. This study integrates multiple dimensions of universities' digitalization (digital maturity, information quality, website quality, and social-media/e-WOM behavior) together with labor market insertion outcomes to examine their relationship with perceived institutional image. Drawing on a national sample of Spanish graduates, the analysis provides broad coverage across fields and institutions. Logistic regression is employed to quantify associations, and odds ratios with 95 % confidence intervals are reported to enable an interpretable assessment of the relative contribution of each factor. This integration of constructs, data scope, and transparent modeling is a key strength of the study.

The analysis also considers the impact of the COVID-19 pandemic as a contextual factor. While the study is grounded in the Spanish higher education system, the phenomena addressed might be relevant for other countries facing similar digital transitions. By focusing on the graduate perspective, this work provides a foundation for future research that could incorporate additional elements, such as institutional policies and strategic decisions, in order to deepen our understanding of how universities manage and project their image in the digital era.

Understanding how digitalization may influence the perceived image of universities, particularly from the perspective of graduates, represents an important step in addressing a theme that is still insufficiently explored. This paper seeks to contribute to that endeavor by offering an initial analytical approach focused on the perceptions of graduates, who, as former students, are in a privileged position to evaluate the effects of their academic experience over time. Rather than aiming to provide definitive conclusions, the present work formulates a set of research questions that reflect the need to understand the current transformations in university image under the influence of digital change.

In conclusion, this study addresses a specific gap: the lack of quantitative evidence that disaggregates operational dimensions of university digitalization—transactional information quality, website quality, peer-to-peer online conversation, and perceived digital maturity—and examines their association with alumni-perceived university image. We contribute by i) operationalizing these dimensions with validated scales, ii) estimating the probability of high university image using logistic regression, and iii) translating the results into actionable implications for institutional management and alumni communication.

2. Literature review

This section reviews the most relevant literature on university image, graduate perceptions, and the role of digitalization in higher education. It is organized around key thematic areas that underpin the study's conceptual framework and motivate the research questions.

2.1. Image

The concept of image is widely addressed in management literature, and it is generally understood as a complex, multidimensional construct with a strong subjective component, which makes it inherently difficult to measure. Image is closely linked to product and service attributes, but also to the benefits perceived by consumers and the attitudes these elements evoke in them.

In one of the early foundational definitions, Aaker and Equity (1991) described brand image as the set of associations in a person's mind that adds value to a product or service. Similarly, Keller (1993) referred to image as the collection of brand-related associations that consumers can recall, structured around three key dimensions of brand knowledge: favorability, strength, and uniqueness.

A wide range of entities can be said to have an image. For instance, cities and tourist destinations are shaped by their image, which influences the decisions of potential visitors (Kotler, 2002; Kotler et al., 1993). In this context, research has sought to identify image dimensions (Del Barrio-García et al., 2009) and their relevance for strategic urban planning (Luque-Martínez et al., 2007), benchmarking (Luque-Martínez & Muñoz-Leiva, 2005), and destination management (Echtner & Ritchie, 1993). These studies illustrate how image plays a role in shaping behavioral intentions and evaluations of place-based experiences.

When applied to the business domain, image tends to be more directly linked to organizational actions and positioning strategies than to general attitudes (Cretu & Brodie, 2007). It reflects not only consumer perceptions of specific products or services but also values and corporate identity. It is thus related to reputation, although the two concepts are not interchangeable (Fombrun, 1996). While image reflects immediate perceptions, reputation is often associated with a more global, shared assessment that evolves over time.

From a strategic perspective, a positive and recognizable image is associated with greater efficiency and stronger brand positioning (Park et al., 1986). It may enhance the perceived value of offerings (Cretu & Brodie, 2007), encourage loyalty (Yoo et al., 2000), and influence consumer behavior (Sudaryanto et al., 2021). These relationships, although extensively discussed in corporate contexts, may offer a useful foundation for exploring how image operates in other types of organizations. Examples such as those offered by Kotler and Keller (2016) reinforce the connection between strategic brand actions and public perception. Likewise, other authors have examined the interplay between image and reputation (De Leaniz & del Bosque Rodríguez, 2016; Panda et al.,

2019), suggesting that both functional and emotional image components may shape reputation formation.

In the field of higher education, research has begun to acknowledge the role of image in how universities are perceived by their stakeholders (Brown & Mazzarol, 2009). Although the concept is still being adapted to the particularities of the academic context, some studies have attempted to identify the sources that shape students' perceptions. Clemes et al. (2008), for instance, highlighted the influence of both external community narratives and personal experiences in shaping these perceptions.

One recurring theme in the literature is the role of image in student recruitment. For Sung and Yang (2008), institutional image is the key factor influencing prospective students' decision-making. Luque-Martínez and Del Barrio-García (2009) proposed a causal model to assess university image from the perspective of multiple stakeholder groups. For these authors, corporate image served as a proxy for the attractiveness of an institution.

Research has also linked image to post-experience perceptions. Alves and Raposo (2007) identified image as one of the main drivers of student satisfaction, a relationship confirmed in further work by Alves (2011), who noted that image influences the perceived value of university experience. This, in turn, can impact student loyalty (Alves, 2011; Alves & Raposo, 2010). Although these relationships have been empirically studied, they remain open to further exploration, especially in evolving digital contexts.

A related strand of research considers the influence of student identification with the institution. Mael and Ashforth (1992) found that such identification affects alumni loyalty. Later, Lee et al. (2019) supported the idea that identification is closely tied to institutional image and that this connection influences wellbeing, satisfaction, and loyalty. These findings, although context-specific, offer a basis for further inquiry into how image interacts with affective dimensions. Moreover, image may extend beyond the student body and influence the university's standing in the surrounding environment, as observed in the case of British and US institutions, where positive student perceptions are reflected in the university's social prestige (Sung & Yang, 2008).

Other studies link image to brand equity (Yoo et al., 2000) and examine its relationship with factors such as price and culture in shaping purchasing decisions (Sudaryanto et al., 2021). Cretu and Brodie (2007) also reported that brand image influences perceived quality, which in turn affects value, satisfaction, and ultimately, loyalty (Gallarza & Saura, 2006).

A relevant issue in this field is the identification of the variables that shape image. Besides product- or service-related factors, sociodemographic characteristics have also been considered. For instance, younger consumers tend to be drawn to modern and innovative brand images, while older individuals may favor traditional ones. Aaker (1997) introduced the idea of brand personality dimensions and suggested that user characteristics may influence image formation. Similarly, Solomon (2018) has noted the role of sociodemographic and psychographic factors in shaping brand perceptions.

Consumption habits, income, lifestyle, and cultural values have also been found to moderate perceived image (Holt, 2002; White & Dahl, 2006). In the university context, professional outcomes after graduation may also contribute to image formation. Work conditions, satisfaction with employment, and the perceived relevance of university training to job market demands are all factors that may influence retrospective evaluations of university experience (Doña-Toledo & Luque-Martínez, 2020; Greene & Miller, 1996; Riggert et al., 2006; Warn & Tranter, 2001). These evaluations, in turn, shape broader perceptions of image and reputation (Espinoza et al., 2019).

Finally, interpersonal recommendations and informal feedback have been highlighted as influential in shaping image, particularly in relation to the on-campus experience (Wilkins & Huisman, 2015). This underscores the relevance of word-of-mouth mechanisms in the construction and transmission of institutional image.

2.2. Digitalization

The process of digitalization entails the expansion of organizational activity into a parallel virtual environment, where new forms of information and interaction emerge. This evolution introduces novel processes that unfold both on the web and across social media platforms, with the potential to shape how institutions are perceived and evaluated. In this sense, digitalization contributes to the construction of organizational image, adding dimensions that may differ from traditional communicative and relational frameworks (Tuten, 2023).

Labrecque et al. (2013) explored how technological change reconfigures the sources of consumer power and the implications such shifts may have. In their view, digitalization facilitates not only user-generated content but also creative engagement and experience-sharing, both of which have implications for the construction of brand image. This perspective is echoed by Gensler et al. (2013), who also highlighted the participatory and distributed nature of brand-related narratives in digital environments.

Social media has become the main space where such experiences are shared. Its influence extends beyond individual interaction, as it can generate forms of social capital and produce certain relational or informational benefits (Ellison et al., 2007). These dynamics can have indirect or direct effects on the perceived image of an institution, although the specific nature of such effects still warrants further exploration.

The business sector offers illustrative examples of this process. Kuksov et al. (2013) examined how firm-generated brand content interacts with consumer discussions online, observing effects on brand image. Their findings suggest that strategic silence, avoiding certain types of content, can sometimes be as impactful as active communication in the context of image management within networked environments. This interplay of presence, absence, and user reaction reflects the complexity of image formation in the digital sphere.

In higher education, digitalization and growing demands for transparency invite institutions to reflect on their positioning and future readiness (Valdés et al., 2021). Universities are increasingly required to not only adapt their internal structures but also to develop strategies for the preparation and dissemination of information, as these capabilities are becoming critical to institutional success (Balyer & Öz, 2018). At the same time, digital transformation is not without cost or tension. The literature also acknowledges the challenges associated with adaptation, such as the anxiety or stress stemming from difficulties in mastering new tools, which are now embedded in daily academic and professional routines (González-López et al., 2021).

Other lines of research address the intersection between service quality, digital content, and perceived institutional image. Udo et al. (2011), for instance, argued that in the context of university teaching, the quality of the learning experience and the functionality of the institution's website can influence both satisfaction and image. This line of reasoning aligns with the findings of Shehzadi et al. (2021), who suggested that online service quality and access to relevant information enhance students' learning networks, increase satisfaction, and generate more positive electronic word of mouth, which in turn may reinforce a university's image. However, e-WOM does not always operate positively. Negative feedback, especially when driven by motives such as disappointment or retaliation, may compromise brand value and institutional image (Kumar & Purbey, 2018). These findings indicate the ambivalent nature of digital feedback loops, which institutions may benefit from monitoring and understanding more deeply.

The rapid acceleration of digitalization during the COVID-19 pandemic further underscored its transformative potential. According to Márquez-Ramos (2021), the pandemic catalyzed changes that enhanced collaboration between academia and industry, encouraged innovation, and promoted institutional flexibility and inclusion. Nevertheless, these benefits are not universally guaranteed. The degree of digital maturity, particularly in terms of skills and infrastructure, can

mediate the quality of organizational relationships, especially in extraordinary situations such as a global health crisis (Forliano et al., 2023). This nuance is crucial in understanding the uneven impact of digital transformation across institutions.

Taken together, literature suggests a complex and still-developing relationship between digitalization and institutional image. Digitalization appears to interact with a variety of dimensions, information quality, service delivery, online visibility, and user feedback, that may contribute to how institutions are perceived. However, further research is needed to examine these relationships more systematically and to better understand the role of institutional strategies in navigating this evolving landscape. In light of the above, the following section outlines the research questions that guide this exploratory study.

3. Objective and research questions

Based on the conceptual foundations reviewed, it becomes evident that both image and digitalization are multidimensional constructs whose interrelations remain insufficiently explored in the context of higher education. While prior studies offer valuable insights into specific links, such as those between service quality, online presence, and perceived value, there is still a lack of comprehensive frameworks that explain how digital transformation processes may influence institutional image from the perspective of graduates. In response to this gap, the present study proposes a set of research questions that aim to explore these emerging dynamics. The objective is exploratory and seeks to assess whether specific dimensions of digitalization are associated with alumni-perceived image, offering decision-relevant signals for institutions.

This analysis was centered on universities, such that experience with the organization has to do with the type of university, the field of studies, educational results referring to employment gains and, finally, the perception of effort within the university in the process of digitalization.

Building on this rationale and the gaps identified in the literature, we translate the proposed framework into the following objective and research questions:

- $RQ_{SOCIOECON}$: Will university image be perceived in a different way, depending on sociodemographic characteristics? in particular:
  - $RQ_{SOCIOECON1}$: Will different evaluations of university image be dependent upon the sex of the survey respondents?
  - $RQ_{SOCIOECON2}$: Will different evaluations of university image be dependent upon the income level of survey respondents?
- RQ_{EMPLOY}: Will different evaluations of university image be dependent upon the employment conditions of graduates?
  - $RQ_{EMPLOY1}$: Will different evaluations of university image be dependent upon graduates holding either permanent or temporary employment conditions?
  - $RQ_{EMPLOY2}$: Will university image be dependent upon either full-time or part-time working conditions?
  - $RQ_{EMPLOY3}$: Will university image be dependent upon the alignment between employment and course of study?
- RQ_{UNIV}: Will university image be dependent upon the type of university and the field of studies?
  - RQ_{UNIV1}: Will the evaluations of university image differ between public and private institutions?
  - RQ_{UNIV2}: Will the evaluations of university image differ according to the field or the area of studies of the respondents?
- RQ_{COVID}: Will university image be dependent upon the respondent having followed university studies before or during the COVID-19 pandemic?
- $RQ_{DIGITAL}$: Will university image be dependent upon the efforts of universities to advance towards digitalization? In particular, because of the following aspects related to digitalization:
  - $RQ_{DIGITAL1}$: Learning quality?
  - $RQ_{DIGITAL2}$: Quality information?
  - $RQ_{DIGITAL3}$: Social media?
  - $RQ_{DIGITAL4}$: Web quality?
  - $RQ_{DIGITAL5}$: Digital quality?
  - $RQ_{DIGITAL6}$: e-WOM?
- $RQ_{IDENTIFICATION}$: Will the university image depend on student identification?

4. Method and data

The study adopts a quantitative, cross-sectional, and explanatory design, with the aim of identifying the factors associated with graduates' perceptions of university image, a process summarized in Fig. 1. The fieldwork (May 2023) was conducted by a professional market-research firm using random selection within its national online panel of residents in Spain. Eligibility criteria were having obtained a university degree in 2017 or later; residence in Spain; age $\geq$18 years. To support national coverage and comparability, it monitored sex and field-of-study distributions and compared them against official SIIU statistics (Integrated University Information System); the final sample (N = 600) reasonably reflects the system's structure (approximately 63 % women; Social Sciences $\approx$ 45 %). The questionnaire was self-administered online. Accepting that the requirements of the simple random sampling were met with a confidence level of 95.5 % and assuming maximum heterogeneity (p = q = 0.5 the sampling error is $\pm$4.1 %. Participation was voluntary, anonymous, and preceded by informed consent. No identifiable or sensitive data were collected, and overall risk was minimal. The study complied with the ICC (2016) and ESOMAR/GRBN guidance (2021). Given the use of anonymous online survey data at minimal risk, and in accordance with our institutional policy for such designs, prior ethics committee review was not required. Data was processed solely for academic purposes.

All respondents held university degrees awarded in 2017 or later, allowing for comparisons between graduates from before (2017–2019) and after (2020–2022) the onset of the pandemic. The questionnaire included items related to the research questions, such as sociodemographic characteristics, employment status, and the alignment between employment and academic background (for those employed). The sample is predominantly composed of women (63 %). Graduates' academic fields included 6.7 % from Arts and Humanities, 45.4 % from Social Sciences, 18 % from Engineering, 9.7 % from Experimental Sciences, 16 % from Health Sciences, and 4.3 % from unspecified areas, that are consistent with national trends in Spain.

According to data from the Sistema Integrado de Información Universitaria (SIIU) of the Spanish Ministry of Science, Innovation and Universities, the proportion of female graduates is approximately 60 %, compared to 40 % male, and the proportion of Social Sciences graduates is around 49 %. Therefore, it is reasonable that our sample includes a higher percentage of women (63 %) and a predominance of Social Sciences graduates (45.4 %). In sum, the sample composition closely resembles that of the Spanish university system, as shown in Fig. 2.

The questionnaire included validated scales from the literature, measuring dimensions such as learning quality, information quality, social media, website quality, digital maturity, e-WOM, and institutional identification (Table 1), which were categorized as binary variables. Likewise, the 1–5 image scale was recoded into a binary criterion to facilitate interpretability in terms of high/very high institutional image versus other evaluations. Specifically, values 4–5 were coded as "high image," and values 1–3 (including the midpoint 3) were coded as "non-high." This decision prioritizes a clear managerial distinction and yields odds ratios that are straightforward to communicate. (Luque-Martínez, 2012). This categorization allows the estimation of effects based on high and low perception levels, offering a more parsimonious distinction, especially useful when decision-making often relies on binary thresholds.

The study draws on two complementary and robust analytical

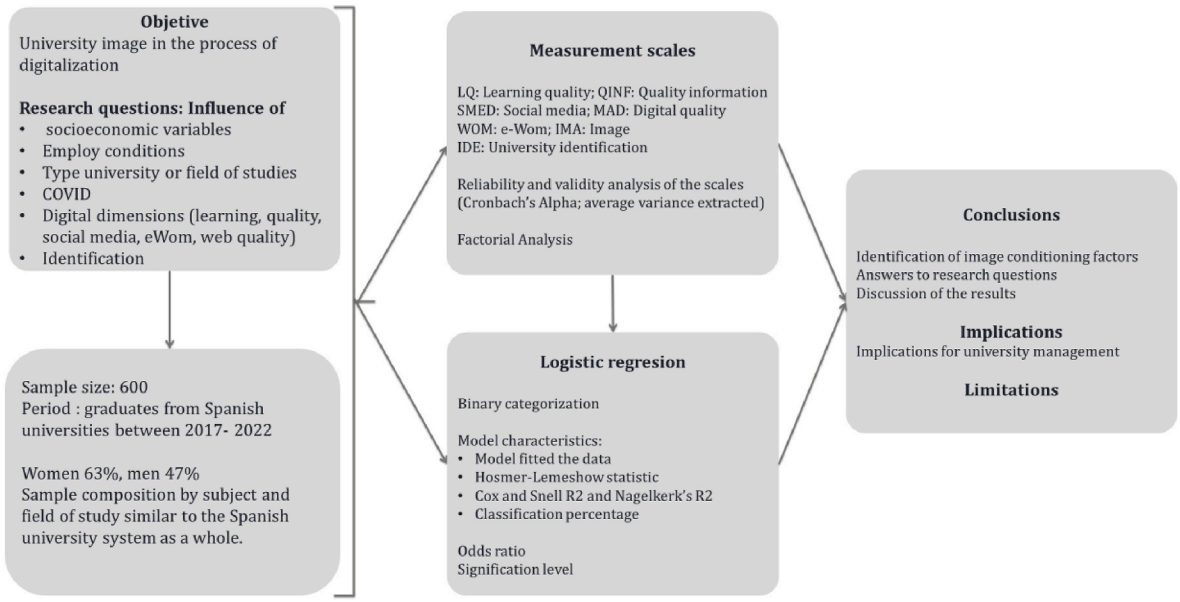

Fig. 1. Outline of the research process followed
Source: Authors' elaboration.

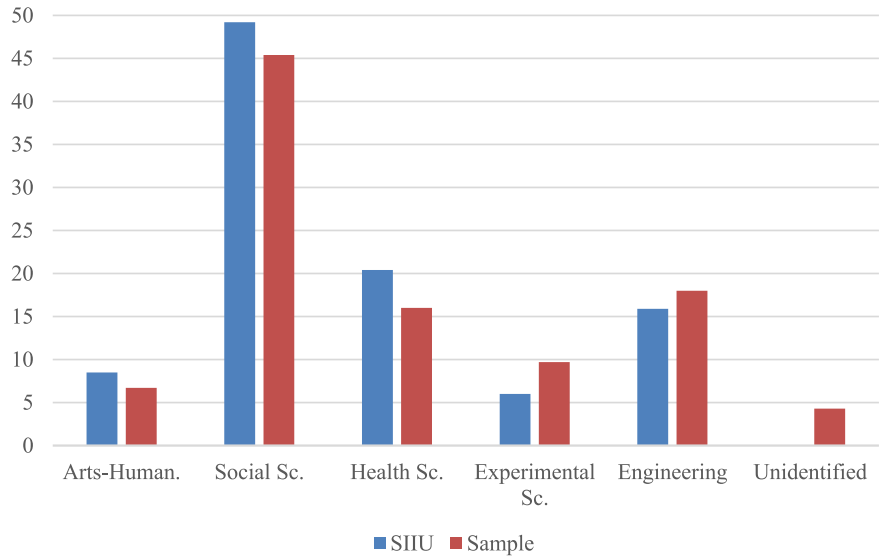

Fig. 2. Composition of the study sample compared to the Spanish system period average
Source: Authors' elaboration based on SIIU (Ministry of Science, Innovation and Universities of Spain).

Table 1
Information on the construct measurement scales.

Construct	Items	Cronbach's alpha	AVE	Source
LQ: Learning quality	6	0.87	0.61	Udo et al., 2011
QINF: Quality information	7	0.89	0.61	Zhou et al., 2014; Shezadi et al., 2021
SMED: Social media	7	0.92	0.66	Ellison et al., 2007
WEB: Web quality	4	0.89	0.76	Ray, Ow & Kim, 2021
MAD: Digital quality	7	0.91	0.65	Forliano et al. (2023)
WOM: e-Wom	4	0.90	0.77	Lee et al., 2019
IMA: Image	3	0.84	0.76	Luque & Del Barrio, 2009
IDE: University identification	7	0.91	0.65	Mael & Ashforth (1992)

strategies. First, an exploratory factor analysis (EFA) was conducted to assess the validity and unidimensionality of the measurement constructs. Using principal component extraction with Varimax rotation, each scale demonstrated a one-factor solution with eigenvalues greater than 1, supporting their structural coherence. All constructs achieved high internal consistency, with Cronbach's Alpha values above 0.80 and average variance extracted (AVE) values above 0.60 (Table 1). These results validate the reliability and convergent validity of the latent variables used in the model. Second, a binary logistic regression was applied to examine the influence of socio-demographic factors, university experience, and digitalization dimensions on perceived university image. This technique is particularly appropriate for estimating the probability of a dichotomous outcome and allows for identifying the relative contribution of each independent variable while controlling for others. The combination of validated constructs and a multivariate

analysis technique strengthens the explanatory power and replicability of the study (Peng et al., 2002).

Binary variables:
- sex (SEX);
- in work (EMPLOY);
- in permanent employment (EMPL_PERM);
- in temporary employment (EMPL_TEM);
- in full-time work (EMPL_FULL);
- in part-time work over half a day (EMPL_PART > HALF);
- in part-time work less than half a day (EMPL_PART > HALF);
- type of university: public/private (UNIV);
- alignment work-studies (ADEC);
- graduation before or after pandemic (COVID).

Categoric variables with more than two categories:
- income level: low, medium, high (INCOME);
- area or field of study: arts-humanities, social sciences, experimental sciences, technical courses, health sciences, and others (FIELD).

In addition, the variables were included that measure the evaluation of the effort of universities in relation to the digitalization process, identification with the university and the dependent variable. Table 1 shows the number of items included in each construct, which ranges from 3 to 7 items. Cronbach's Alpha and the variance extracted were also specified in each case when applying factorial analysis. Each construct showed levels of 0.8 and 0.06, respectively, in each case, which were above the minimums established as recommendable (Hair et al., 1995). The mean value was used.

The variable 'university image' was recoded into a binary variable: a low-level (more negative) image, assigned a value of 0 (for values below 3 on a 1-to-5 scale), and a high-level (more positive) image, assigned a value of 1 (for values above 3 on the same scale).

Rather than predicting, the aim is to identify the meaning and the importance of the influence of the independent variables (constructs and other characteristics that are indicated). So, a logistic regression analysis (Luque-Martínez, 2012) was applied, with a value of 0 for a low-level image and 1 for a high-level image.

In the following logistic regression model, the probabilities of a high-level image (p_i) and a low-level image (1- p_i) were, respectively:

$$p_i = \frac{e^Z}{1+e^Z};\ \text{also}\ p_i = \frac{1}{1+e^{-Z}}\ \text{ and }\ (1-p_i) = \frac{1}{1+e^Z}$$

Where Z:

$$\begin{aligned} Z_{IMAG} = {} & \beta 0 + \beta 1 SEX + \beta 2\text{INCOME} + \beta 3\text{EMPLOY} + \beta 4\text{EMPL}_{\text{PERM}} \\ & + \beta 5\text{EMPL}_{\text{TEM}} + \beta 6\text{EMPL}_{\text{FULL}} + \beta 7\text{EMPL}_{\text{PART}>\text{HALF}} + \beta 8\text{EMPL}_{\text{PART}<\text{HALF}} \\ & + \beta 9\text{UNIV} + \beta 10\text{ADEC} + \beta 11\text{COVID} + \beta 12\text{FIELD} + \beta 13\text{LQ} \\ & + \beta 14\text{QINF} + \beta 15\text{SNET} + \beta 16\text{WEB} + \beta 17\text{MAD} + \beta 18\text{EWOM} \\ & + \beta 19\text{IDE} \end{aligned}$$

University image is treated as a non-linear function of the independent variables, including demographic characteristics, university experiences, employment outcomes (EMPLOY), and digitalization-related dimensions. The estimation of the parameters through a binary logistic regression analysis meant that the independent variables that determine the dependent variable, in this case, image, could be identified, as well as which category had a higher incidence and in doing so, it could be quantified (Luque-Martínez, 2012). In the case of various categories, the comparison was always established with regard to the last category.

5. Data analysis

The binary logistic regression analysis was conducted using IBM SPSS v.28 software, with the ENTER method (also known as the 'forced entry method', is a technique used in logistic regression as well as in multiple linear regression within statistical analysis, especially when working with software such as SPSS). The non-significative Hosmer-Lemeshow statistic (Chi-square = 4.08; df = 8; p = 0.85) of the model fitted the characteristics of the data. The omnibus tests on the coefficients of the model also confirmed that the model fitted the data (p = 0.00). The explanatory capacity of the variance of the dependent variable was moderate to high, as the Cox and Snell R2 values (40.9 %) and Nagelkerk's R2 squared (55.1 %) values showed. All variables have a VIF less than 4, except for two, which remain below 4.5. All variables exceed the 0.2 tolerance. Therefore, no multicollinearity problems are evident.

The model presented an acceptable data classification percentage (80.6). In short, the model presented good indicators to identify the most decisive variables for the formation of a high-level image.

The specifications of the model are shown below (see Table 2):

$$\begin{aligned} Z_{IMAG} = {} & -11.75 - 0.496SEX^{***} + 0.60\text{INCOME}(1) + 0.45\text{INCOME}(2) \\ & + 0.65\text{EMPL}_{\text{PERM}}{}^{**} + 0.11\text{EMPL}_{\text{FULL}} + 0.68\text{EMPL}_{\text{PART}>\text{HALF}} \\ & + 0.21\text{UNIV} + 0.28\text{ADEC} + 0.04\text{COVID} + 1.14\text{FIELD}(1)^{**} \\ & + 0.30\text{FIELD}(2) + 1.22\text{FIELD}(3)^{***} + 0.50\text{FIELD}(4) - 0.08\text{FIELD}(5) \\ & + 0.55\text{LQ}^{***} + 0.95\text{QINF}^{*} - 0.90\text{SNET}^{*} + 0.53\text{WEB}^{**} + 0.16\text{MAD} \\ & + 0.93\text{EWOM}^{*} + 0.52\text{IDE}^{**} \end{aligned}$$

$$^{*} = 0.01;\ ^{**} = 0.05;\ ^{***} = 0,10$$

The independent variables that presented the highest significance levels were in reference to the dimensions of digitalization (Table 2).

- Higher perceived university image was associated with quality of the information that the university supplied, QINF (con B = 0.95; SE = 0.36; p-value = 0.01 with a Exp(B) = 2.58). The likelihood of having a high-level image, for each point higher than QINF, was 2.58 times greater on a 1-to-5 point scale.
- In coherence with the above, although at a lower intensity, the quality of the university website also had a positive influence on image: WEB (B = 0.53; SE = 0.24; p-value = 0.03 with an Exp(B) = 1.64). For each point on a scale of 1-to-5 that the website (WEB) was

Table 2
Results of the logistic regression for the dependent variable: university image.

	B	SE	Wald	Sig.	Exp (B)	Exp(B) C.I. 95 %	
						Lower	Lower
SEX	0.50	0.29	2.85	0.09	1.64	0,92	0,92
LQ	0.55	0.31	3.09	0.08	1.73	0,94	0,94
QINF	0.95	0.36	6.85	**0.01**	2.58	1,27	1,27
SNET	−0.90	0.23	15.67	**0.00**	0.41	0,26	0,26
WEB	0.53	0.24	4.92	**0.03**	1.70	1,06	1,06
MAD	0.17	0.32	0.27	0.60	1.18	0,64	0,64
IDE	0.52	0.21	6.12	**0.01**	1.68	1,11	1,11
WOM	0.93	0.21	19.52	**0.00**	2.53	1,68	1,68
EMPL_PERM	0.65	0.33	3.95	**0.05**	1.92	1,01	1,01
EMPL_FULL	0.12	0.82	0.02	0.89	1.12	0,23	0,23
EMPL_PART > HALF	0.69	0.82	0.70	0.40	1.98	0,40	0,40
COVID	0.04	0.29	0.02	0.88	1.04	0,59	0,59
INCOME			2.20	0.33			
INCOME (1)	0.60	0.50	1.43	0.23	1.82	0,68	0,68
INCOME (2)	0.45	0.33	1.84	0.18	1.56	0,82	0,82
UNIV	0.21	0.43	0.24	0.63	1.24	0,53	0,53
FIELD			11.25	**0.05**			
FIELD (1)	1.14	0.60	3.67	0.06	3.13	0,97	0,97
FIELD (2)	0.30	0.69	0.19	0.66	1.35	0,35	0,35
FIELD (3)	1.22	0.66	3.45	0.06	3.40	0,93	0,93
FIELD (4)	0.50	0.64	0.61	0.44	1.65	0,47	0,47
FIELD (5)	−0.08	0.79	0.01	0.92	0.92	0,20	0,20
ADEC	0.29	0.30	0.92	0.34	1.33	0,74	0,74
Constant	−11.75	1.57	56.07	0.00	0.00		

evaluated at a higher (better) score, the likelihood of the image being "at a higher level" was 1.64 times greater.

- e-WOM also wielded great influence on the perceptions of image (B = 0.93; SE = 0.21; p-value = 0.00 with a Exp(B) = 2.53). When e-WOM was scored one point higher, it implied a 2.53 times greater likelihood of a higher score for image.
- Finally, Quality of Learning (LQ) presented a quasi-significative (p = 0.08) positive influence on image.
- On the contrary, greater social media intensity was negatively associated with perceived image. So, one point higher on SNET (B = −0.90; SE = 0.23; p-value = 0.00 and with an Exp(B) = 0.41) meant that the likelihood of a high-level image was 0.451 times greater than the likelihood of a low-level image.

Identification with the university also affected image in a positive way, at a similar intensity: IDE (B = 0.52; SE = 0.21; p-value = 0.01 con un Exp(B) = 1.70). One point higher on IDE meant a 1.7 times higher likelihood of a high rather than a low-level university image.

Among the other remaining variables, being in permanent employment was the only one to have a significative influence, EMPL_PERM (B = 0.65; SE = 0.33; p-value = 0.05 with an Exp(B) = 1.92). Having permanent employment also doubled the probability of having a high-level image.

The variable 'Field Study' (FIEDL) results were at the limit of any significant meaning. The graduates of conventional studies such as Humanities and Experimental Sciences presented a higher-level (better) image of the university. Finally, the variable SEX presented a slight influence (quasi-significance of p = 0.09), the female survey respondents expressing a more favorable image of the university.

The remainder of the variables such as income levels, graduating before or after COVID-19, type of university, and alignment of employment with studies followed presented no significant influence.

6. Conclusions, recommendations, limitations

Organizational image is commonly linked to consumers' choices in prior literature (Desveaud et al., 2024; Sarpong & Zungu, 2025). In the case of universities, the students themselves are their final consumers. Cultivating and managing institutional image must therefore be integrated into organizational planning and decision-making processes. These elements are often associated with more or less favorable image assessments.

These results should be interpreted as associations conditional on measured covariates. Responding to the research questions that have been proposed, and in accordance with the results obtained in the context of digitalization and the pandemic, the socio-economic characteristics ($RQ_{SOCIOECON}$) of the respondents are of no great relevance to the formation of university image. Only the variable 'SEX' appeared significant, but at a marginal significance level around 10 %, while income level had no effect.

With regard to university experience (RQ_{UNIV}), unlike the field of study, the public or private nature of the university had no noticeable impact. It was the conventional qualifications that had the greater impact more than any other on an improved image of the university among the respondents.

Employment, as a result of university experience, emerged as an important factor. In particular, holding permanent employment (RQEMPLOY), and therefore achieving economic stability, were key factors contributing to a positive image of the university. This result is endorsed in previous studies (Doña-Toledo & Luque-Martínez, 2020; Greene & Miller, 1996; Riggert et al., 2006; Warn & Tranter, 2001). However, having graduated before or after COVID-19 (RQCOVID), in other words, having suffered the consequences, the changes and difficulties during and after the pandemic hardly appeared to affect the image of the university, although it affected other aspects (Forliano et al., 2023).

With regard to the importance of the dimensions of digitalization, (RQDIGITAL), the importance of supplying quality information was quite clear, as was the importance of having a good web page, as means of connecting to students. This has been previously observed by Udo et al. (2011) and Shehzadi et al. (2021). e-WOM, in other words, positive action in the intention to recommend and to speak positively about the institution, implies a good image, as happens in the business world (Kuksov et al., 2013; Gensler et al., 2013). However, social media activity does not necessarily imply a better image. If anything, it is quite the contrary, undoubtedly because of the detrimental effects of social media. This finding of a negative association for social media intensity (SNET) aligns with prior evidence that intense e-WOM can be particularly impactful on consumer evaluations and decision outcomes than positive valence (Kumar & Purbey, 2018; You et al., 2022).

To summarize the relative influence of all independent variables included in the model, Fig. 3 displays the odds ratios and their corresponding significance levels. This visual representation facilitates the interpretation of the logistic regression results and highlights the most relevant predictors of perceived university image.

Of course, and as was to be expected, strengthening identification with the university (MacDonald, 2013) contributes to the formation of a solid image.

All the results were consistent with the theories discussed in the literature. In particular, the premises of McLuhan et al. (1987) on the importance of how information reaches the receptor, according to which 'the medium is the message'. Or, as Hari (2023): 'When we embrace a novel technology, it's akin to donning a fresh pair of spectacles. These lenses, tinted with unique hues, alter our perception of the world.' Information is tightly controlled in the professional communications media, which explains the importance of the quality of the information (QINF) that is transmitted (WEB). Likewise, frequency of recommendation (e-WOM) is improved with identification (IDE). Social media (SMED) deserve special mention when seen as 'earned media (buzz/engagement)', each social media platform has its own characteristics, but that can be highlighted because of the shallowness of the arguments, due to limited space, and because of the immediacy of the reaction, which does little to favor reflection. Another aspect that characterizes social media is the search for followers or friends more than solvency and rigor. One consequence is that social media reinforce negative conversations or the existence of the hostile users rather more than positive conversations, for which reason image may logically be eroded.

One factor that institutions could take into account is image management and an understanding of the factors that can either favor or negatively affect it. A better image means that the university will be more sought after by students, both for undergraduate and postgraduate students and for life-long education. It will also exercise greater attraction for teaching staff and researchers who will prefer that sort of university before other options. It will be even more attractive for other groups such as investors and sponsors, who will see more reason to collaborate with it. For all of the above, the university must care for its image, as was recognized by Brown and Mazzarol (2009) over more than a decade ago.

In view of these results, two priorities emerge for institutions seeking to improve graduates' perceptions of university image. The first is graduate employability. Access to high-quality, stable employment should be enabled through an integrated set of measures, i.e., participation in targeted employability activities (Jackson & Dean, 2023), closer and sustained ties with industry partners, alignment of curricula and co-curricular offerings with documented labor-market needs, and routine monitoring of placement outcomes. Clear ownership of the employability agenda—spanning career services, academic departments, and external relations—helps maintain coherence and continuity over time.

The second priority is the digital domain. Information quality requires explicit governance: accuracy, completeness, timeliness, and accountability for updates. A task-oriented website architecture should

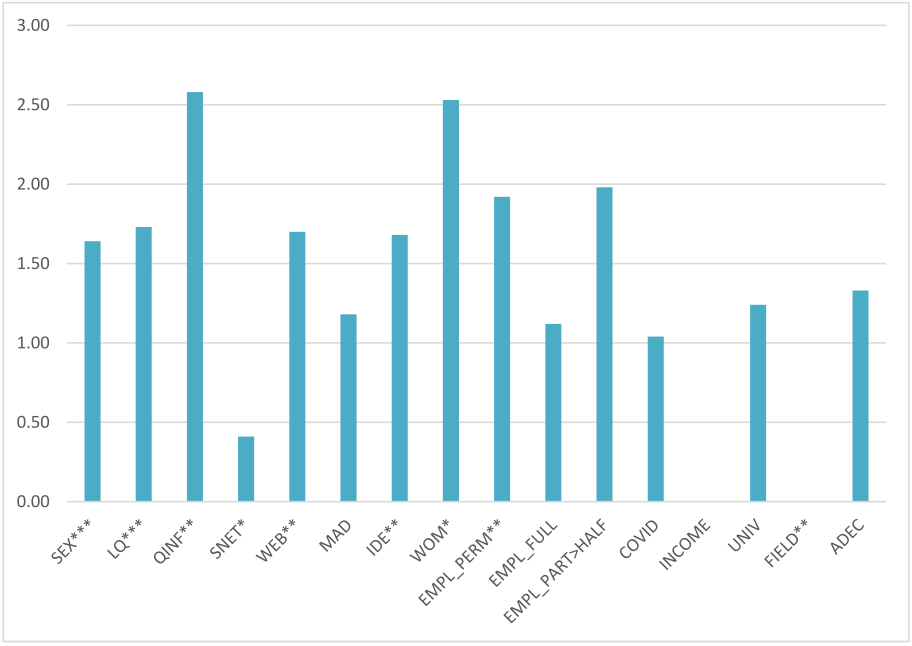

Fig. 3. Representation of odds ratios and significance levels of independent variables
Source: Authors' elaboration.
(* signification level = 0,00; ** signification level = [0,01-0,05]; signification level = [0,05-0,10]).

guide students and alumni to high-frequency tasks with minimal friction, supported by plain-language summaries and accessible design. Non-moderated channels warrant continuous listening; sentiment and topic monitoring can contain negative e-WOM when paired with escalation protocols and transparent follow-through. Stakeholders benefit when practical tools (self-service portals, guidance wizards, and clear contact paths) are available to complete tasks efficiently. Social-media discourse should be handled with care to avoid associations that may erode image.

Alumni engagement complements both priorities. Initiatives that cultivate identification during studies and sustain it after graduation (mentoring, targeted lifelong-learning offers, and ambassador or referral programs) help build belonging and recommendation intent, supporting a healthier conversational climate across digital networks. Together, these practices provide a pragmatic basis for implementation consistent with the dimensions most consistently associated with a favorable image in the present evidence.

Logically, this work is subject to the limitations linked to the study of a sample in Spain, within a special context, because of the peculiarities of its university system. The sample was designed to test the analytic framework rather than to produce population-representative estimates. As such, the results speak to associations within this dataset and are not intended as national prevalence measures of students' perceptions. Moreover, measures of digitalization are time-bound; the scales used at any given moment carry inherent limitations because digitalization is an evolving, transformative process. In addition, response bias cannot be ruled out, although nationwide coverage was verified. Voluntary recruitment within a panel may introduce self-selection and social desirability biases. Dichotomizing university image prioritizes interpretability (the probability of achieving a 'high image') at the cost of losing information about variation within the continuous scale; consequently, the estimated effects pertain to the chosen threshold rather than the entire distribution. The study does not conduct an institution-level analysis, which constitutes a challenge for future research. Another limitation of this study is its exclusive reliance on quantitative methods. Although the use of structured survey instruments and statistical modelling provides valuable insights into the factors influencing university image, such an approach may not fully capture the subjective and context-specific experiences of participants. Future research could benefit from a mixed-methods design that integrates qualitative techniques, such as in-depth interviews or focus groups, to gain a deeper and more nuanced understanding of how graduates perceive and construct the image of their university.

Finally, future studies could further develop this line of research by addressing the concept of reputation, which is distinct from image and typically reflects more stable, collective evaluations related to institutional performance, scientific output, or educational quality. While the present study has focused on the subjective perception of image from the graduates' viewpoint, incorporating objective indicators and stakeholder-based assessments could provide a more comprehensive understanding of how digitalization influences both image and reputation in the university context.

Although employment status is included here as a contextual factor influencing graduates' perception of university image, the concept of employability, which refers to the competencies and conditions enabling individuals to access or improve employment, has not been analyzed. Future research could explore how university digitalization strategies influence graduate employability, integrating insights from both the higher education sector and the labor market.

To conclude, future research might also analyze how specific digitalization policies, communication strategies, or institutional initiatives shape the way universities are perceived by their stakeholders, allowing for a broader and more integrated understanding of the role of digital transformation in the construction of university image.

CRediT authorship contribution statement

Teodoro Luque-Martínez: Supervision, Resources, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Conceptualization. **Nina Faraoni:** Writing – review & editing, Writing – original draft, Visualization, Validation, Supervision, Data curation. **Luis Doña-Toledo:** Writing – review & editing, Validation, Supervision.

Ethics statement

Ethical approval is not applicable to this manuscript.

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Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

ANNEX A. Items of the scales

E-learning quality (Adapted from Udo et al., 2011)
(e-LQ1) The teaching staff and their involvement on teaching platforms are of perceptible quality.
(e-LQ2) Teaching staff respond rapidly through email or the teaching platform.
(e-LQ3) Videocall platforms are appropriate and function properly.
(e-LQ4) The teaching platform of the university is up-to-date.
(e-LQ5) The university teaching platform functions properly.
(e-LQ6) The university has adequate online resources for proper learning processes.
Information quality (Adapted from Zhou et al., 2014)
(QINF1) The university provides accurate information on its different procedures.
(QINF2) The university provides up-to-date information and in real time on its different resources.
(QINF3) The university provides an adequate internal network to communicate with teachers and fellow students.
(QINF4) The university provides an acceptable external network for communication with teachers and fellow students from other universities.
(QINF5) The university frequently updates the information on its platform.
(QINF6) The university offers complete information through its various online channels.
(QINF7) All necessary information is accessible.
Social media (Ellison et al., 2007)
(SMED1) I upload information on whether my university experience forms part of my day-to-day social media.
(SMED2) I like people to know about my university experience on social media.
(SMED3) University social media form part of my routine within my online activity.
(SMED4) University social media are part of effective communication with the university institution.
(SMED5) I consider that I form part of the university community thanks to social media.
(SMED6) I consider that the university makes good use of social media.
(SMED7) I am satisfied with the management of social media by the University.
Quality of the University Website (Adapted from Ray et al., 2011)
(WEB1) It appears that the university has invested a lot of effort in its website.
(WEB2) It appears that the university has invested a lot money in the development of its website.
(WEB3) The landing page of the university website is visually attractive.
(WEB4) The website of the university is well-organized.
Digital maturity/quality (Adapted from Forliano et al., 2023)
(MAD1) The university appears to have an acceptable digital strategy.
(MAD2) All the university website resources give the same impression of quality and image.
(MAD3) The digital presence of the university transmits leadership.
(MAD4) Any administrative procedure or matter in relation to the university can be completed online.
(MAD5) There are sufficient digital resources for teaching.
(MAD6) The teaching staff have sufficient knowledge and experience in digital topics and the latest technologies.
(MAD7) The university gives the impression of being up to date with regard to digital innovations and technologies.
Identification with the university (Mael & Ashforth, 1992)
(IDE1) When someone criticizes my university, I take it personally.
(IDE2) I am very interested in what others say about my university.
(IDE3) When I speak of this university, I usually say “we” instead of “they”.
(IDE4) Any success of my university is my success.
(IDE5) Whenever someone praises this university, I take it as a personal compliment.
(IDE6) If the communications media criticize my university, I feel ashamed.
(IDE7) I feel proud of the online management of my university.
e-WOM (Lee et al., 2019)
(WOM1) I have recommended my university on social media to other people without being asked to do so.
(WOM2) I have recommended my university on social media to people who asked my advice.
(WOM3) I have posted positive comments on my university on social media.
(WOM4) In general, I speak well of my university on various online channels.
Image (Luque-Martínez & Del Barrio-García, 2009)
(IMA1) I have formed a good image of my university.
(IMA2) I have formed a clear image of my university.
(IMG3) I have formed an agreeable image of the university.

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