Higher education managers' perspectives on quality management and technology acceptance: A tale of elders, mediators, and working bees in times of Covid-19

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ABSTRACT

The Covid-19 pandemic has emphasized the role of educational management information systems (EMIS) for quality management (QM) in higher education, and set new directions for post-pandemic studies. Successful implementation of QM processes depends largely on managers' perceptions about quality and educational technology. However, higher education managers' profiles regarding these quality perceptions and their EMIS acceptance have been insufficiently investigated so far. In response to this research gap, we identified such profiles based on a quantitative survey of $N = 70$ managers from Chilean higher education institutions during the Covid-19 pandemic. A cluster analysis revealed three distinct manager types: "Elders" (oldest participants, almost equally distributed across positions, with least frequent EMIS access, moderate EMIS acceptance, and highest QM perceptions), "Mediators" (in operational and middle-management positions, with moderately frequent access to EMIS, and lowest EMIS acceptance and QM perceptions), and "Working Bees" (younger females in operational positions, with most frequent EMIS access, highest EMIS acceptance, and moderate QM perceptions). Knowledge of these profiles may enable customized training in the recovery after the Covid-19 pandemic.

1. Problem statement

The vigorous development and implementation of information systems have impacted jobs, leading humans to search for coping strategies with the resulting requirements and appropriate support to integrate these strategies into daily life and work (Wang et al., 2020). In higher education, a prominent aspect of this impact is the current character of quality management (QM) assisted by educational management information systems (EMIS) (González-Bravo et al., 2021). In the following, in line with several definitions from the literature (e.g., Dzimińska et al., 2018; European Association for Quality Assurance in Higher Education, 2015), we define QM as the permanent and systematic effort of an organization to improve its quality standards and fulfill its mission purposes. QM begins with the commitment to compliance with external certification and accreditation standards. Over time, QM is sustained

and consolidated, on the one hand, through internal quality mechanisms and systems with a robust planning and monitoring component and, on the other hand, through the cultural changes necessary for continuous improvement at all levels of the institution. QM emphasizes continuous development and improvement rather than just responding to external certifications. In addition, it has a strong component of cultural change, in which the different members of the organization are committed to continuous improvement (González-Bravo et al., 2019). This results in measures taken regularly at institutional level to ensure the quality with an emphasis on improving quality as a whole (Dzimińska et al., 2018).

In this context, strategies for coping with QM demands and the possibilities of organizational support are a current research topic (Gonzá lez-Bravo et al., 2020; Sanchez-Ruiz et al., 2019; Venkatesh, 2020). Furthermore, the Covid-19 pandemic has exacerbated the impact of technology on jobs, including QM, in higher education (HE) (Iivari

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et al., 2020; Schaffhauser, 2020) and has increased the need for the coping strategies mentioned above. While understanding these in the context of the Covid-19 pandemic is a further research topic that recently emerged (Iglesias-Pradas et al., 2021; Oksanen et al., 2021; Venkatesh, 2020), the main actors of QM in HE, i.e., the managers, have been insufficiently studied, particularly concerning training aimed to improve their leadership skills (Alexander et al., 2019; González-Bravo & Valdivia-Peralta, 2015).

Covid-19 has been the first significant pandemic in the digital age, offering a learning opportunity to be more prepared for future pandemics, for example, through an IT strategy aligned with organizational objectives (Papagiannidis et al., 2020). At the same time, Covid-19 has accelerated the rate of organizational change in terms of the nature of job outcomes, structure, and demands (Mohamed Hashim et al., 2021; Venkatesh, 2020), shedding light on the limitations and obsolescence of some EMIS and highlighting their untapped potential for a successful post-Covid-19 recovery (UNESCO, 2021). If these EMIS are enhanced and taken advantage of in a context of educational quality management, they may be able to inform effective education planning and management with a greater scope, connecting, for example, disaggregated administrative data with learning process data (UNESCO, 2021).

Being positioned at the intersection of this triple research gap (i.e., HE-QM strategies, Covid-19 impact on HE, and HE manager individual profiles), we focus this study on HE managers' coping with current job changes, particularly their attitudes towards and acceptance of EMIS. Understanding these in relationship with managers' profiles may suggest possibilities of organizational support (i.e., customized training), thus increasing the quality of HE (Shawyun, 2021) by strengthening the key role that managers play in articulating different expectancies, perceptions, and subcultures within the organization (Bendermacher et al., 2017). The study was conducted in Chile, a country with acute demands of QM in HE due to the historical development of HE in the past three decades (González-Bravo et al., 2021). As these demands are aligned with a worldwide trend, the findings and conclusions of the study may apply to other countries, as well (Crawford et al., 2020).

The remainder of this paper is structured as follows: a conceptual background regarding the concepts of accreditation and QM in HE, HE managers' perspectives on QM and accreditation, and EMIS acceptance and use for QM. After presenting the research question and methods, a cluster analysis is performed. Finally, we discuss the findings with regards to their managerial consequences, limitations, and research consequences for recovery after pandemics.

2. Conceptual background

2.1. Quality management and accreditation in higher education

During the last few decades, political authorities and HE managers worldwide have been rethinking tertiary education to meet current society requirements regarding quality and continuous improvement, accountability, and qualification frameworks (González-Bravo et al., 2021; Tsiligiris & Hill, 2021). This has been triggered by environmental pressures to install quality in HE at the forefront of national political agendas (Duque, 2020), and, in turn, this triggers organizational changes and technological developments inside higher education institutions (González-Bravo et al., 2021; Seyfried & Ansmann, 2018). Among institutions, the process is justified by the increased population access to HE and the existence of higher education institutions (HEIs) of dubious legitimacy (Staub, 2019).

Quality in HE is mainly provided and attested by accreditation, a quality assurance process by which an institution or program undergoes an assessment determining the institution's "compliance with a set of standards defined, reviewed, and critically evaluated by experts in order to ensure quality" (Kumar et al., 2020, p. 157). In a similar vein to QM, accreditation requires input and engagement from a broad array of stakeholders. However, the latter implies a day-to-day focus within an

organizational culture where the continuous improvement processes are integrated into everyday tasks (Staub, 2019). As they consolidate over time, the continuous improvement cycles provided by successive accreditations contribute to the installation of QM mechanisms within the institutions.

Accreditation is focused on how an institution is oriented towards an ideal of excellence in quality, demonstrating specific results, established tradition, impact, and social recognition. Furthermore, it encourages self-regulation, self-assessment, and continuous improvement, promotes the suitability and soundness of higher education institutions, and strengthens the substantive functions contained in the institutional mission (Vega Angarita, 2020).

2.2. Higher education managers' perspectives on quality management and accreditation

QM requires transparency, fund accountability, research productivity, increased graduation rates, and, above all, effective teaching and learning. In technical terms, QM includes measures taken regularly at system and institutional level in connection with internal and external evaluation processes, progressive improvement, continuous monitoring of processes, resource management, and incorporation of corrective measures (Dzimińska et al., 2018; Pulido-Rocatagliata & Espinoza-Díaz, 2018). Often, however, these measures are not implemented uniformly throughout the institution. Some academics perceive quality processes as excessive control of their academic development, and value accreditation as a moderately positive process, while HE managers evaluate it as highly positive (Cardoso et al., 2013; González-Bravo et al., 2020a,b; Stensaker et al., 2011).

Managers' perceptions about accreditation can be grouped into several dimensions. According to González-Bravo et al. (2020), these are: institutional relevance of accreditation, objectivity of accreditation evaluation, internal quality unit relevance for accreditation, value of accreditation to the educational system, continuous QM value, and student participation value. Due to the diversity within educational institutions regarding QM and accreditation perceptions, understanding how the factors mentioned above are configured by manager profiles is a requisite for institutional strengthening.

2.3. The acceptance of educational management information systems and their use for quality management

The EMIS integration in quality assurance mechanisms allows and supports information management to maintain organization quality standards (Fardella et al., 2020; Garg & Shukla, 2017). EMIS must be efficient and fit for their purpose, have an appropriate articulation with the quality system, and show relevant data collection and analysis capabilities. In this sense, it is important to assess managers' EMIS perceptions, for example, to support self-evaluation, accreditation, or quality assurance. EMIS are accepted in varying degrees by academics and managers, depending on many factors: quality culture, cultural and organizational resistance, individual experience, information, critical success factors, stakeholders, post-implementation follow-up, support, positions, among others (González-Bravo et al., 2021; Thompson et al., 2018).

In HE, the role of EMIS depends on user's – i.e., the manager's – position and access to data. Danaiata et al. (2018) distinguish four levels of access to organizational data related to the managers' positions: (a) the top management, i.e., the rector, who accesses the data and uses it from a strategic thinking perspective; (b) the middle management, e.g., deans and vice deans who use it for tactical decision making and thinking using processed data, (c) operational management, i.e., the department directors who take operational decisions, automating daily tasks by processing and controlling available data, and (d) the operational level, i.e., system users who are responsible for quality data input. The specific requirements of each level depend on specific internal or

external demands (such as accreditation or QM): transparency, teaching and learning, and reporting to the government (Chaurasia et al., 2018). In fact, while HE managers permanently require data to inform decisions, middle management positions (below dean level) must deal with tactical planning decisions (Rezvani, 2017; Shawyun, 2021), and managers like program directors have extensive use due to their concern about students' daily needs (Opazo et al., 2019). Despite differences, an optimal EMIS use implies a collaborative effort that involves the entire organization (Alexander et al., 2019; Shawyun, 2021).

A well-established measure instrument of information system acceptance is the Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh et al., 2003), which synthesizes several available models of technology acceptance into a unified one, and its objective is to estimate the adopting probability of new technologies and understand the acceptance factors (Ammenwerth, 2019; Dwivedi et al., 2017). The model conceives the use of technology as predicted by behavioral intention (BI) and facilitating conditions (FC). In turn, the behavioral intention to use a technology is predicted by performance expectancy (PE), effort expectancy (EE), and social influence (SI). Gender, age, experience, and voluntariness of use moderate the relationships between the acceptance variables (Ammenwerth, 2019).

UTAUT is a useful model to assess the success of introducing a new EMIS, helping to understand the factors of EMIS acceptance in most different cultures around the world. Mukred et al. (2019) applied the UTAUT platforms and specific software used in Malaysia to track and store HE records and related metadata; Phahlane and Kekwaletswe (2014) applied UTAUT to management information systems in South Africa; in Brazil, da Silva and Watanabe (2017) surveyed the acceptance and use of the SINGU academic management system. HE management research, particularly EMIS acceptance and QM research, relies so far on a nomothetic approach, limiting the applicability of this knowledge. However, these limits can be overcome by considering individual differences (Woo et al., 2018).

3. Research question

To summarize the literature overview outlined above, HE institutions need to implement QM systems and undergo accreditation processes. Managers in different positions play a leadership role in these processes, and use EMIS. Successful implementation of EMIS for advancing QM and accreditation builds on positive managers' perceptions of QM and accreditation, which informs new cycles of improvement and demonstrates the relationship between both variables within HEIs. However, managers' perceptions about QM and accreditation and the acceptance and use of EMIS have been insufficiently investigated and display differences according to managers' HEI positions. Knowing manager profiles may allow more effective implementation of the EMIS, which may allow institutions to strengthen QM. Therefore, in this study, we address the following research question:

Which higher education manager profiles can be identified based on managers' perspectives on QM, accreditation, and EMIS acceptance?

4. Methods

4.1. Research design

A quantitative descriptive approach including dimensionality reduction was used to answer the research question.

4.2. Population and setting

The examined population was comprised of administrative staff with management positions or administrative responsibilities at a traditional (more than 100 years old), private and nonprofit (all financial surpluses are reinvested in the same university) Chilean university outside the capital. This population consisted of 240 persons, called key managers because they have access to, and regularly use the EMIS, a system initially introduced in 2008 with the aim to improve academic information management capacities, incorporate institutional performance information, make comparisons, support the decision-making process, and thus contribute to the Chilean tertiary education (Mora et al., 2009).

While the invitation to the survey was sent to this entire population, 80 subjects answered the surveys, and only $N = 70$ key managers provided complete responses. From these, 29 (41.4%) were male (aged $M = 55.54$; $SD = 8.65$) and 41 (58.6%) female (aged $M = 48.74$; $SD = 8,14$). Their positions were among the following:

0) No present managing positions but administrative responsibilities (8 participants, 11.4%)
1) General managing positions (1 participant, 1.4%)
2) Program director (20 participants, 28.6%)
3) Graduate program director (8 participants, 11.4%)
4) Department director (17 participants, 24.3%)
5) Associate dean (8 participants, 11.4%)
6) Academic secretary (2 participants, 2.9%)
7) Dean (6 participants, 8.6%)

Given this distribution, the positions were labeled as strategic positions (14 participants, i.e., 20%: dean, associate dean, general secretary of university), middle management positions (19 participants, i.e., 27.1%: department director, academic secretary), or operational positions (37 participants, i.e., 52.9%: program director, graduate program director, no present managing positions but administrative responsibilities, general managing positions).

4.3. Data collection instruments

4.3.1. EMIS acceptance

An adaptation of the UTAUT questionnaire of Venkatesh et al. (2012) was used to assess EMIS acceptance. The original instrument entails five subscales: performance expectancy (PE), effort expectancy (EE), social influence (SI), facilitating conditions (FC), and behavioral intention (BI). The instrument had been translated to Spanish and validated by Michel-Madera et al. (2012), and previously applied in Chilean academic environments by Gonzalez-Bravo et al. (2020). The instrument reliability was good to very good for PE (4 items, α = 0.89), EE (4 items, α = 0.89), SI (4 items, α = 0.86), and BI (7-items, α = 0.89), and acceptable for FC (4 items, α = 0.66). The complete instrument is provided in Appendix 1.

4.3.2. Perceptions about quality management/accreditation scale (QMAS)

This instrument was developed and validated by González-Bravo et al. (2020) and contained 18 items assessing six dimensions of the perceptions about accreditation and QM. In this study, too, all subscales displayed at least acceptable internal reliability: institutional relevance of accreditation (IRA) (5 items; α = 0.88), objectivity of accreditation evaluation (OAE) (3 items; α = 0.69), internal quality relevance (IQURA) (3 items; α = 0.75), value of accreditation to the educational system (VAES) (2 items; α = 0.77), continuous QM value (CQMV) (3 items; α = 0.71), and student participation value (SPV) (2 items; α = 0.88).

4.3.3. EMIS access frequency

Access frequency of the key users to EMIS in 10 months, during the Covid-19 pandemic period, was downloaded from the EMIS log files.

4.3.4. Data collection and analysis

Upon approval from the ethics committee, the invitations to respond to the online survey were sent out by the Directorate of Strategic Development of the University. These invitations informed participants about study aims and procedures, confidentiality of data processing, ethics issues, and researchers' contact data.

For the data analysis, we chose the k-means cluster analysis, building upon a hierarchical cluster analysis to identify possible clusters (Garone et al., 2019). This procedure requires fewer computing resources than, e. g., latent class analysis, and allows much interpretative freedom to the researcher (Yim & Ramdeen, 2015). Moreover, it has been used previously in higher education settings (Garone et al., 2019). We processed the collected data using IBM SPSS Statistics version 27.

5. Results

In a first step, we examined the inter-construct correlations for the of UTAUT and QMAS subscales (Table 1). As some of the constructs were related to each other with the strongest correlation $r = .719$, we proceeded to the dimensionality reduction using the four UTAUT subscales (PE, EE, SI, FC), the six QMAS subscales (IRA, OAE, IQURA, VAES, CQMV, SPV), age, and EMIS access frequency, equally weighted, in the k-means cluster analysis. An inspection of the agglomeration schedule and of the scree plot obtained from the hierarchical cluster analysis, as well as the dendrogram revealed five, four, or three possible clusters within the sample. The five-cluster solution included one cluster with 1 case and another one with 2. In the four-cluster solution, there was a cluster with 2 cases. In order to avoid such very small clusters that may not be easy to interpret and generalize, we adopted the three-cluster solution, in which the cluster sizes were better balanced. A particular treatment for missing values was not necessary, as the 10 participants who had provided incomplete data were excluded from the beginning.

From the 70 participants in total, 40 managers were classified into cluster 1 (57.1%), 23 into cluster 2 (32.9%), and 7 into cluster 3 (10.0%). The gender distribution by cluster is as follows. Cluster 1: 12 females (30%), 28 males (70%); Cluster 2: 11 females (47.8%), 12 males (52.2%. Cluster 3: 6 females (85.7%), 1 male (14.3%) as displayed in Table 1. The clusters were compared based on gender distribution and the position of participants. Regarding gender, applying the Fisher exact test, we found a significant association between cluster membership and gender ($p = .014$), in line with the unequal distribution of gender across clusters described above. Regarding position, no significant association between cluster membership and position ($p = .124$) was found. Distributions according to gender and the type of position are presented in Table 2.

Considering the small cluster sizes possibly with non-normal distributions, a non-parametric Kruskal-Wallis test was performed to test the differences between clusters in terms of the measured variables assess clusters' QMAS, EMIS, Age and EMIS access frequency differences. Due

to scale differences, absolute values and z scores are shown for each measure. These results are represented in Table 3 and Fig. 1.

Significant differences among clusters were found for all variables considered, including age, EMIS access frequency, and UTAUT and QMAS subscales. Cluster 1 (in the following called "Elders") was mostly a men's cluster and included older participants than Cluster 2. Cluster 1 participants showed the lowest EMIS access frequency, had scores located in an intermediate range in all scales of the UTAUT, except for SI, where it presented the highest scores of the three clusters. This indicated that the "Elders" strongly perceived that relevant others believed they should use the new system. Their QMAS scores were also higher than those of Cluster 2, with four scales where the highest scores appeared (IRA, IQURA, VAES, and CQMV). This pattern describes a view of the accreditation process as a legitimate way to quality improvement, an acknowledgment of the quality assurance unit with its functions performed within the university, and the valuing of accreditation to the educational system overall. Cluster 1 participants considered peer-reviewers, and their accreditation process assessment were useful and objective, and valued continuous QM.

Participants in Cluster 2 (in the following called "Mediators"), were younger than Cluster 1 with an almost equal distribution between male and female, mainly in operational and middle-management positions. Although they had an EMIS access frequency between Clusters 1 and 3, they displayed the lowest scores in all UTAUT and QMAS subscales. In the internal analysis of their scores, besides the EMIS access frequency, the highest scores were measured in EE (meaning that they expect EMIS to be easy to use) and SPV, showing that they expected students to participate in QM processes within the institution.

Cluster 3 (in the following called "Working Bees") included mainly females, and the youngest participants had the highest number of EMIS access frequency and the highest scores in four of the five UTAUT subscales (PE, EE, FC, and BI). Even on SI, where Cluster 3 showed slightly lower scores than Cluster 1, the scores remained higher than those of Cluster 2. The QMAS scores were higher than in Cluster 2, but lower than in Cluster 1 in four of six subscales. The exceptions were OAE and SPV. This may point at more grounded knowledge of the accreditation and quality assurance process, both at peer-reviewers and student levels.

6. Discussion

This study aimed to identify HE managers' profiles concerning their QM and accreditation perceptions (QMAS) and acceptance of the educational management information systems (EMIS), gender, age, and

Table 1
Inter-construct correlations.

	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Age	_	-.245*	.068	-.210	.105	.029	-.030	.218	.200	.049	.276*	.238*	-.030
2. EMIS Access Frequency	-.245*	_											
UTAUT													
3. Performance Expectancy (PE)	.068	.154	_										
4. Effort Expectancy (EE)	-.210	.268*	.575**	_									
5. Social Influence (SI)	.105	-.001	.448**	.287*	_								
6. Facilitating Conditions (FC)	.029	.159	.560**	.719**	.331**	_							
7. Behavioral Intention (BI)	-.030	.221	.619**	.509**	.421**	.577**	_						
QMAS													
8. Institutional Relevance of Accreditation (IRA)	.218	-.074	.406**	.208	.220	.280*	.182	_					
9. Objectivity of Accreditation Evaluation (OAE)	.200	.042	.343**	.245*	.219	.336**	.207	.521**	_				
10. Internal Quality Unit Relevance for Accreditation (IQURA)	.049	-.063	.116	-.039	.275*	.017	.117	.225	.321**	_			
11. Value of Accreditation to Educational System (VAES)	.276*	-.160	.257*	-.020	-.005	.103	.165	.518**	.609**	.268*	_		
12. Continuous Quality Management Value (CQMV)	.238*	-.257*	.284*	.057	.276*	.334**	.211	.686**	.396**	.392**	.547**	_	
13. Students' Participation Value (SPV)	-.030	-.016	.258*	.217	.270*	.288*	.201	.242*	.359**	.173	.167	.159	_

$*p < .05; **p < .001.$

Table 2

Distribution of Gender and Type of Position by Cluster (absolute values and, between parenthesis, percentages from clusters).

Cluster	Cluster 1 "Elders" ($n_1 = 40$)			Cluster 2 "Mediators" ($n_2 = 23$)			Cluster 3 "Working Bees" ($n_3 = 7$)		
Gender	Female	Male	Total	Female	Male	Total	Female	Male	Total
Strategic positions	2 (5%)	9 (22.5%)	11 (27.5%)	0 (0.0%)	3 (13%)	3 (13.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Middle-management positions	3 (7.5%)	8 (20%)	11 (27.5%)	2 (8.7%)	5 (21.7%)	7 (30.4%)	1 (14.3%)	0 (0.0%)	1 (14.3%)
Operational positions	7 (17.5%)	11 (27.5%)	18 (45%)	9 (39.1%)	4 (17.4%)	13 (56.5%)	5 (71.4%)	1 (14.3%)	6 (85.7%)
Total	12 (30.0%)	28 (70.0%)	40 (100%)	11 (47.8%)	12 (52.2%)	23 (100%)	6 (85.7%)	1 (14.3%)	7 (100%)

position at the university. Our results revealed three distinct manager types: the "Elders" (oldest participants, mostly males, almost equally distributed across positions, with the least frequent EMIS access, moderate EMIS acceptance, and highest QMAS scores), the "Mediators" (in operational and middle-management positions, complying with university policy but not fully valuating QM, with moderately frequent access to EMIS, the lowest EMIS acceptance, and QMAS scores), and the "Working Bees" (mainly younger females in operational positions, with most frequent EMIS access, the highest EMIS acceptance, and moderate QMAS scores).

These results are in line with recent studies that indicate EMIS usage differs according to the person's position at the university (Danaiata et al., 2018), with a more frequent EMIS usage in operational positions in the universities (Opazo et al., 2019). Regarding perceptions of quality management and accreditation according to position, our results reflect assertions of Cardoso et al. (2013) and González-Bravo et al. (2020): "Working Bees" find greater value in QM and accreditation than "Mediators", but always less than "Elders" do. "Working Bees" deal with multiple angles of educational quality improvement (Opazo et al., 2019), which starts from viewing a global program perspective (retention, progression, employment rates) and ends with a highly engaged director who knows very well the individual progress and academic and personal situation of their students (Elizondo & Román, 2019): managers' responses were based on their daily experience of EMIS use, even in those questions related to QM.

Notably, these findings emerged in the context of a particular type of university: traditional, private, and nonprofit, located outside of the capital, Santiago de Chile, where the material and intellectual resources concentrate. This set of characteristics make an interesting case within the Chilean educational system, suggesting that here efficient quality management processes were sustained in the long term. Thus, the studied university may be seen as a reference within the current efforts to attenuate the differences between state and for-profit HEIs in Chile as well as in other countries (e.g., Baird et al., 2019).

The traditional, private, and nonprofit character of the university may also explain a finding that might look surprising at a first sight. Indeed, the kernel of the manager group seems to be the "Elders", who were also the oldest participants and male, while the fewer, younger and female "Working Bees" seem to build a thin layer at the periphery of the manager group. In terms of communities of practice (Lave & Wenger, 1991; Wenger, 1999), these findings might suggest that the "Elders" were the central participants, the "Working Bees" the peripheral participants, and the "Mediators" the intermediate experts. On the other hand, participants' position was not significantly associated with their cluster membership, and the "Elders" filled nearly half of the operational position, where there were three times as many "Elders" as "Working Bees." From this perspective, not all "Elders" appear to be the central participants. This contradiction can be resolved by considering participants' trajectories in communities of practice. According to Lave and Wenger, in time, the newcomers become oldtimers, the novices experts, and the peripheral participants central. This is only an ideal

development that, in practice, may be different. However, in a traditional organization like the one we studied, the members may stick to an ideal trajectory that may begin at the intersection of the "Working Bees" cluster with the operational positions and culminate in the opposite corner, at the intersection of the "Elders" cluster with the strategic positions. On the other hand, as the number of manager positions in every organization is prominently limited, and particularly scarce at the top of the pyramid, some of the managers may stay on the lower positions and remain "Working Bees." As a result, some operational positions may become free for freshmen—or maybe much more for freshwomen, as in younger generations genders are better balanced. Of course, this description is highly speculative, and needs to be substantiated by additional research. As recent research on communities of practice suggests (e.g., Nistor et al., 2020), participants' roles and trajectories can be identified based on their digital footprints in various information systems.

6.1. Managerial consequences

In terms of managerial consequences and lessons for post-pandemic recovery, our results invite researchers and HEIs to learn in greater detail the specific characteristics of their managers in different positions when interacting with EMIS to contribute to quality management in their HEI. Managers' expectations, strategic vision, operational and tactical dependencies unfold in a scenario of interaction with students, academics, and other managers, but at the same time with a challenging and changing environment. This richness and set of elements should be investigated in the future with qualitative techniques. At the same time, it should be integrated in the HEI's strategic management (for example, rectorate or board of directors).

Moreover, the findings support the importance of reinforcing the value of QM during "Mediators" training (particularly middle-managers), ideally supporting the initiatives they implement tactically, with a higher EMIS use. This emphasis will allow them to improve organizational change processes, becoming effective bridges between the strategic management of the "Elders", and the practical knowledge that the "Working Bees" have. On the other hand, from the perspective of the original UTAUT, this is relevant insofar as it suggests that training, as well as facilitating conditions, may buffer the costs of EMIS adoption (Kayanda et al., 2020; Magsamen-Conrad et al., 2020).

A customized training program that considers individual needs and staff plans is highly recommendable (van Wyk, Crouch, vanWyk, & Crouch, 2020) and may build upon the different manager profiles identified in this research, previously identifying which position-specific requirements will appear in a QM context (Musti, 2020). These position-specific requirements, associated with HE environments, correspond to the professional barriers named by Mercader and Gairín (2020), which are different from contextual, organizational, and personal barriers. Given said interaction of contextual, organizational and personal factors, a permanent organizational diagnosis is required (Mercader & Gairín, 2020). On the other hand, our results agree with

Table 3
Absolute Values, Z-scores of the Clusters, and Kruskal-Wallis Test Results for Differences between Clusters (z values between parentheses; statistical significance *p < .05; **p < .01).

Cluster	Cluster 1 "Elders" (n1 = 40)	Cluster 2 "Mediators" (n2 = 23)	Cluster 3 "Working Bees" (n3 = 7)	Kruskal-Wallis test results	Post-hoc tests (Mann-Whitney U Test)
Age	56.06 (.43)	48.87 (−.38)	46.16 (−.68)	H (2) = 13.79, p < .001	2 < 1** 3 < 1**
EMIS Access Frequency	1.5 (−.28)	2.3 (−.07)	12.14 (2.46)	H (2) = 20.03, p < .001	1 < 3** 2 < 3**
UTAUT subscales					
Performance Expectancy (PE)	22.10 (.24)	17.26 (−.67)	25.29 (.85)	H (2) = 21.93, p < .001	2 < 1** 2 < 3**
Effort Expectancy (EE)	21.35 (.13)	18.61 (−.43)	26.00 (1.07)	H (2) = 16.28, p < .001	2 < 1* 1 < 3** 2 < 3**
Social Influence (SI)	13.03 (.31)	8.65 (−.54)	12.00 (.11)	H (2) = 11.49, p < .001	2 < 1**
Facilitating Conditions (FC)	21.83 (.29)	17.22 (−.68)	25 (.97)	H (2) = 23.44, p < .001	2 < 1** 1 < 3* 2 < 3*
Behavioral Intention (BI)	39.28 (.21)	31.30 (−.53)	43.71 (.62)	H (2) = 11.84, p < .001	2 < 1**
QMAS subscales					
Institutional Relevance of Accreditation (IRA)	22.40 (.52)	18.04 (−.77)	21.00 (.10)	H (2) = 24.83, p < .001	2 < 1** 2 < 3*
Objectivity of Accreditation Evaluation (OAE)	11.85 (.47)	9.09 (−.88)	12.57 (.82)	H (2) = 30.42, p < .001	2 < 1** 2 < 3**
Internal Quality Unit Relevance for Accreditation (IQURA)	12.03 (.28)	9.30 (−.56)	11.57 (.14)	H (2) = 11.59, p < .001	2 < 1**
Value of Accreditation to Educational System (VAES)	8.58 (.43)	6.30 (−.74)	7.71 (−.02)	H (2) = 18.22, p < .001	2 < 1**
Continuous QM Value (CQMV)	12.33 (.61)	8.70 (−.79.)	9.29 (−.56)	H (2) = 33.73, p < .001	2 < 1** 3 < 1**
Students' Participation Value (SPV)	7.88 (.17)	6.39 (−.45)	8.71 (.51)	H (2) = 7.89, p = .02	2 < 1* 2 < 3*

those obtained by Zhao et al. (2020), who state the value of training to stimulate EMIS usage by employees.

Furthermore, based on the concept of institutional support, previous evidence shows how organizational policies significantly assist users in their effective EMIS usage behavior, promoting the accumulation of knowledge, experience, EMIS understanding about its operation and value, and finally generating positive perceptions (Zhao et al., 2020). Customized training approaches would play an essential role in these

processes and have been suggested as a critical factor for successful implementation (Scherer et al., 2019). Additionally, top management support, an expression of organizational support, contributes to encouraging EMIS use, enhancing employees' trust to use these technologies in daily practice (Lee et al., 2013); meanwhile, middle managers are working in direct contact with employees, playing a key role as facilitators (Sanchez-Ruiz et al., 2019).

People in management positions play a leadership role in these processes, and knowing the profiles of the managers will allow a more effective implementation of EMIS, which will allow institutions to strengthen QM processes better. Identifying HE profiles and training or hiring managers according to these profiles is an approach developed in the last two decades. Concepts like mass customization applied to HE populations (i.e., managers) (Nistor et al., 2010) or person-centered approaches to measuring acceptance or usage (Garone et al., 2019) have been gaining relevance to the extent that organizations must recognize the characteristics that different users exhibit. For example, recognizing these differences enables a more efficient IT design and implementation (Devolder et al., 2012; Pynoo et al., 2011).

In QM, a similar pattern of global implementation, but built on individual characteristics, was observed. Once organizations established clear and transparent objectives, training becomes a means to establish a common working language, displaying its goals and implications. Training customization builds upon a diagnosis of manager performance and needs. An example was recently provided by Aljbour (2021), who identified in thematical terms administrative, technical, and social training needs in Jordanian managers. Operatively, Aveiga Macay and Véliz Briones (2019) proposed a three-stage intervention, which started with sensitization and diagnosis, focusing on determining the initial state of managers' knowledge and skills. Once appropriated instruments were applied, alternatives for training were implemented. In a second stage (planning and organization), objectives and contents were determined, and in a third and final stage (execution, evaluation, and control), according to the levels at which work would be carried out and to managers' needs, training was carried out, and the process was controlled.

From our perspective, a relevant approach in this regard is related to the implementation of Quality 4.0 in higher education, which considers upgrading quality by integrating digital technologies, e.g., to monitor processes, collect and analyze real-time data, and apply these analytics to predict quality problems and maintenance needs (Küpper et al., 2019). This perspective, according to Alzahrani et al. (2021), values customized training in the sense that structured training can be enhanced by the following Quality 4.0 approaches:

- Experience: sharing experiences and lessons learned using social media
- Expertise: developing new expertise through using machine learning and artificial intelligence, and benefiting from mashup apps and augmented or virtual reality
- Appraisal: deploying connected worker schemes for detecting actions and guaranteeing compliance, competency, safety, and efficiency, and
- Management: encapsulating resulting learning in learning management systems and improving training delivery through providing virtual reality-based experiences (Alzahrani et al., 2021).

Certainly, this training needs to be integrated with the organization's strategic objectives, where the expectancies of different positions must be articulated. For example, managers in tactical positions expect short-term success, and this expectancy could be incompatible with long-term changes or cultural transformations (Sanchez-Ruiz et al., 2019). The literature provides evidence that educational policies have had a strong emphasis on the operational perspective in detriment or disconnection with a strategic vision (Valverde Berrocoso et al., 2010).
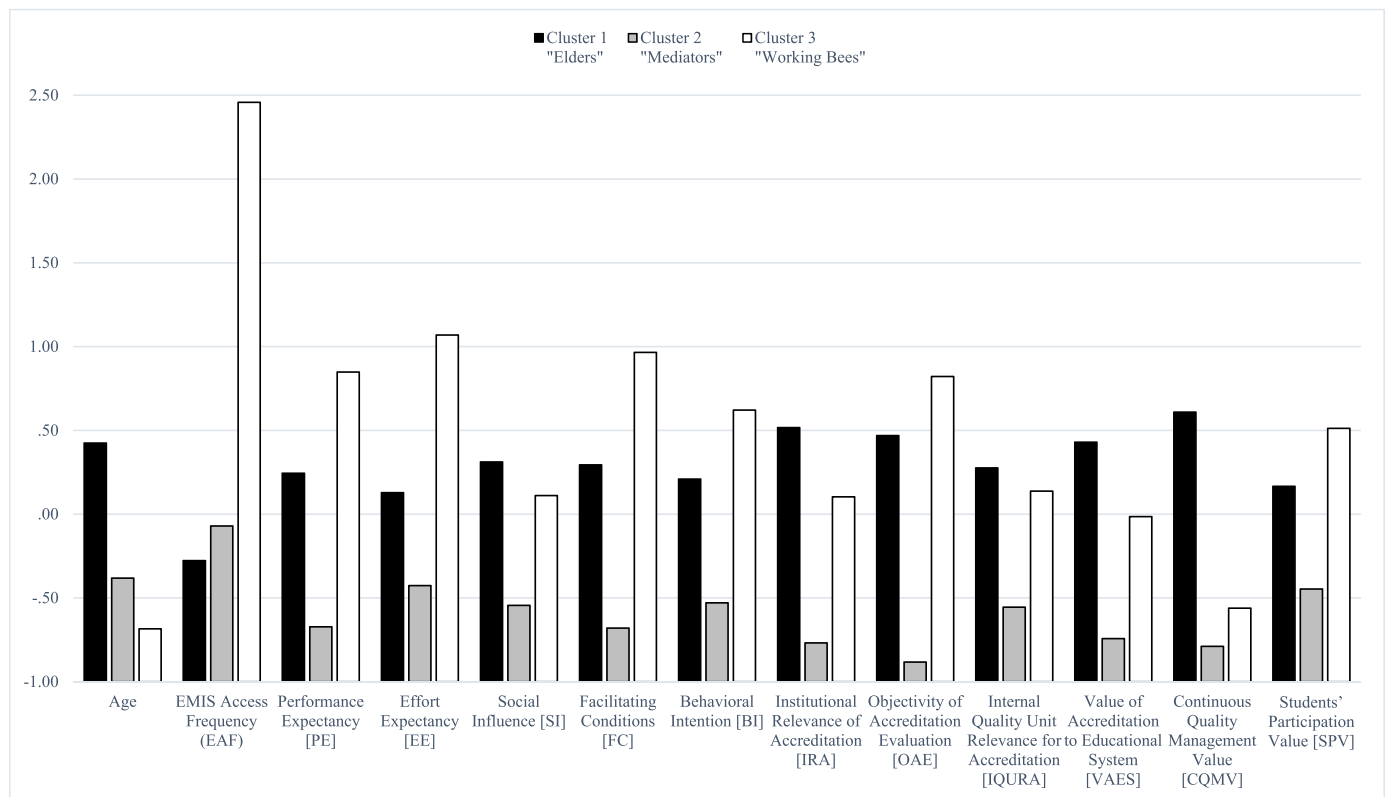
Fig. 1. Z-Scores of the clusters on age, EMIS access frequency, QMAS, and UTAUT scales.

6.2. Limitations

Some limitations of the study should be mentioned. The sample size of only 70 managers should be considered when interpreting our findings, as it limited our choice of statistical instruments. Furthermore, cluster 3 with only seven participants limited our understanding of the sample structure. Finally, we used nonrandom sampling (the key users agreed to participate voluntarily), which may have resulted in a 'handpick' of the participants. Nevertheless, the three-cluster solution allowed observing significant differences among clusters for all variables considered. Altogether, although we assume that the sample was representative for managers at the institution where this study was conducted, future research should include larger samples including more diversity in terms of participants and institution types.

6.3. Consequences for higher education research

Both the study results and their limitations named above imply several consequences for HE research. Whereas quantitative technology acceptance measures have limited explanatory power in organizational settings (Bagozzi, 2007; González-Bravo et al., 2021), consistently with previous literature, this study suggests that demographic and functional data focused on HE managers' EMIS acceptance and QM and accreditation perceptions can successfully extend the understanding of technology adoption and integration.

A relevant context to be considered in the EMIS acceptance research is the Covid-19 pandemic, which has had an extensive impact on the global HE sector (Crawford et al., 2020), reinforcing the need to maximize and use the online platforms available for QM (Iivari et al., 2020; Schaffhauser, 2020; Tillman, 2020), and boosting largely predicted changes (Barnes, 2020). Here, we concur with Fardella et al. (2020) that the global digital innovation context is one where universities will continue to innovate and will increasingly develop technological management tools "to lead, register and monitor academic" activities

(Fardella et al., 2020, p. 65), i.e., to face complex accreditation challenges. Thus, Covid-19 has opened a window for researchers to foresee more clearly a future where EMIS will be an indispensable input for all HEI managers at strategic, tactical, and operational levels.

The importance of studying the challenges of the already mentioned digital transformation is due to its status "as a response to the Covid-19 pandemic that caused 'forced' a rapid change in work and learning cultures in the HE context" (Nurhas et al., 2021, p. 1), that occurs at the organizational and individual levels. Digital transformation implies a strategic approach that needs to consider the particular and individual characteristics of academics and staff (Nurhas et al., 2021), which implies new uses and augmentation of existing information resources, interactions, and understanding of ICT (Kudyba, 2020). In other words, a clearer collective understanding of the different roles and responsibilities of managers in EMIS use will be provided by the Covid-19 pandemic (UNESCO, 2021). The latter implies taking advantage of existing evidence of different managers' profiles to better adapt to strategic scenarios, aligning overall strategy, and understanding strategic priorities and challenges (González-Bravo et al., 2021; UNESCO, 2021).

The findings of this study also emphasize the need for a better understanding of managers and employees' profiles and distinguishing between operational, tactical, and strategic levels as crucial factors for a successful digital transformation (Heavin & Power, 2018) amplified by the Covid-19 pandemic, in order to reach a more effective implementation of the EMIS, which in turn will allow institutions to strengthen QM. In this context, accurate diagnostic instruments for managers' needs of knowledge and skills and efficient training customization and module implementation are recommendable. The differences and interdependencies between "Elders", "Mediators", and "Working Bees" within QM processes at HEIs, as outlined in this study, will need further refinement in future research. As suggested above, at the end of the discussion section, analysis methods of managers' digital footprints (Nistor et al., 2020) can be developed to identify managers'

roles, trajectories, and training needs.

Further research should be undertaken replicating these findings in other types of Higher Education Institutions (for example, nontraditional or public) and in other countries and to deepen the practical implications of strengthening the use and acceptance of EMIS in QM contexts according to the profiles identified in this study, for example, in customized training. From our perspective, and in line with what Venkatesh (2020) proposed related to the Covid-19 impact on future research in terms of nature of jobs outcomes, structure, and demands, the pandemic may open up a valuable possibility for us to a deeper understanding of manager profiles considering their relationship with QM perceptions and EMIS acceptance. These lessons may be helpful in the future as an unexpected legacy, a responsibility, and a commitment for higher education institutions to improve their quality processes based on the managers' specific experiences and learnings.

Credit author statement

Luis González Bravo: Conceptualization; Data curation; Formal analysis; Investigation; Methodology; Project administration; Roles/ Writing - original draft; Writing – review & editing. Nicolae Nistor: Supervision; Conceptualization; Methodology; Roles/Writing - original draft; Writing – review & editing. Bernardo Castro Ramírez: Supervision; Conceptualization; Investigation. Ilse Gutiérrez Soto: Conceptualization; Investigation; Resources; Software. Marcela Varas Contreras: Conceptualization; Investigation; Resources; Software. Mónica Núñez Vives: Conceptualization; Investigation; Resources; Software. Pía Maldonado Robles: Conceptualization; Investigation; Resources; Software.

Appendix

UTAUT Scale (adapted from Venkatesh et al., 2003; translated into Spanish and validated by Michel-Madera et al., 2012)

Performance Expectancy/Expectativa de desempeño

1. The use of the platform seems useful to me in my work./El uso de la plataforma me parece útil en mi trabajo.
2. If I use the platform, I increase my chances of getting things that are important to me in the workplace./Si uso la plataforma, aumento mis posibilidades de conseguir cosas que son importantes para mí en el ámbito laboral.
3. Using the platform allows me to perform tasks faster./Usar la plataforma me permite realizar tareas más rápidamente.
4. Using the platform increases my productivity as a worker./Usar la plataforma aumenta mi productividad como trabajador.

Effort Expectancy/Expectativa de esfuerzo

5. Learning to operate the platform is easy for me./Aprender a operar la plataforma es fácil para mí.
6. My interaction with the platform is clear and understandable./Mi interacción con la plataforma es clara y comprensible.
7. The platform is easy to use./La plataforma es fácil de usar.
8. It would be easy for me to become skillful in using the platform./ Sería fácil para mí llegar a ser hábil (diestro) en el uso de la plataforma.

Social Influence/Influencia social

9. People who are important to me, think that I should use the platform./Personas que son importantes para mí piensan que debo usar la plataforma.

10. People who influence my behavior, think that I should use the platform./Personas que tienen influencia en mi conducta, piensan que yo debería usar que yo debería usar la plataforma.
11. People whose opinions I value prefer that I use the platform./ Personas cuyas opiniones yo valoro, prefieren que use la plataforma.

Facilitating Conditions/Condiciones facilitadoras

12. I have the necessary resources to use the platform./Tengo los recursos necesarios para usar la plataforma.
13. I have the necessary knowledge to use the platform/Tengo los conocimientos necesarios para usar la plataforma.
14. The platform is compatible with other systems or applications that I use./La plataforma es compatible con otros sistemas o aplicaciones que yo uso.
15. There is a specific person (or group) who can help me if there are problems with the platform./Hay una persona (o grupo) específico que me puede ayudar si se presentan problemas con la plataforma.

Behavioral Intention

16. I predict that I could use the platform during the next year./ Predigo que podría usar la plataforma durante el próximo año.
17. I plan to use the platform during the next year./Planeo usar la plataforma durante el próximo año.
18. I am determined to use the platform for my work, during the next year./Estoy decidido a utilizar la plataforma para mi trabajo, durante el próximo año.
19. I plan to use the platform for my work, during the next year./ Planeo usar la plataforma para mi trabajo, durante el próximo año.
20. I intend to use the platform in the next year./Tengo la intención de usar la plataforma en el próximo año.
21. I will probably use the platform for the next year./Probablemente usaré la plataforma durante el próximo año.
22. I am decided to use the platform for the next year./Estoy decidido usar la plataforma durante el próximo año.

Perceptions about Quality Management/Accreditation Scale (QMAS) (González-Bravo et al., 2020)

Institutional Relevance of Accreditation (IRA)/Relevancia institucional de la acreditación

1. The accreditation process fulfilled the function of publicly ensuring the quality of my institution./El proceso de acreditación cumplió con la función de asegurar públicamente la calidad de mi institución.
2. The accreditation process fulfilled the function of promoting quality in my institution./El proceso de acreditación cumplió la función de promover la calidad en mi institución.
3. Participation in the accreditation process was useful for the faculty and staff of my institution./La participación en el proceso de acreditación fue útil para el profesorado y el personal de mi institución.
4. The accreditation process helped clarify important strengths and concerns of the institution./El proceso de acreditación ayudó a aclarar fortalezas y preocupaciones importantes de la institución.
5. The accreditation process helped my institution gain momentum by addressing significant issues related to accreditation standards./El proceso de acreditación ayudó a mi institución a ganar impulso al abordar temas significativos relacionados con los estándares de acreditación.

Objectivity of Accreditation Evaluation (OAE)/Objetividad de la evaluación de la acreditación

6. The standards set by the CNA are realistic./Los estándares establecidos por la CNA son realistas.
7. The evaluators' recommendations were valid and exhaustive./Las recomendaciones de los evaluadores fueron válidas y exhaustivas.
8. My institution received adequate training on how to prepare for an accreditation visit./Mi institución recibió capacitación adecuada sobre cómo prepararse para una visita de acreditación.

Value of Accreditation to Educational System (VAES)/Valor de la acreditación para el sistema educativo

9. The accreditation process is one of the most important factors in ensuring educational improvement in Chile./El proceso de acreditación es uno de los factores más importantes para asegurar el mejoramiento educativo en Chile.
10. I would worry that the educational quality of higher education institutions could deteriorate if the accreditation process were to end in Chile./Me preocuparía que la calidad educativa de las instituciones de educación superior pudiera deteriorarse si el proceso de acreditación terminara en Chile.

Internal Quality Unit Relevance for Accreditation (IQURA)/Relevancia de la Unidad de Calidad Interna para la acreditación

11. One of the central functions of the (Quality Unit) at (institution name) should be staff development to improve the quality of teaching and learning./Una de las funciones centrales de la (Unidad de Calidad) en (mencione la institución), debe ser la capacitación en temas académicos para el personal, para mejorar la calidad de la enseñanza y el aprendizaje.
12. The Undergraduate and Postgraduate Directorates at (institution name) should design programmes for university–wide curriculum development./Las Direcciones de Pre y Postgrado de la (mencione la institución), deben participar del diseño de los programas para el desarrollo curricular de toda la universidad.
13. The Undergraduate and Postgraduate Directorates at (institution name) must participate in the design of the trainings for the academics to improve the quality of teaching and learning./Las Direcciones de Pre y Postgrado de la (mencione la institución), deben participar en el diseño de las capacitaciones a los académicos para mejorar la calidad de la enseñanza y el aprendizaje.

Students' Participation Value (SPV)/Valor de la Participación del Estudiante

14. Students should evaluate the content of all modules for which they are registered./Los estudiantes deben evaluar el contenido de todas las asignaturas inscritas.
15. Students should evaluate the presentation of all modules for which they are registered./Los estudiantes deben evaluar la presentación y metodología de todas las asignaturas inscritas.

Continuous QM Value (CQMV)/Valor de la Gestión Continua de la Calidad

16. The organization and management model of the (institution name) encourages the evaluation and continuous improvement of all its services and processes./La organización y el modelo de gestión de la (mencione la institución) fomentan la evaluación y mejora continua de todos sus servicios y procesos.
17. Quality management is part of the normal working practices of all staff members in my academic unit./La gestión de la calidad es

parte de las prácticas normales de trabajo de todos los miembros del personal de mi unidad académica.
18. The accreditation process motivates my institution to focus more on assessing student learning./El proceso de acreditación motiva a mi institución a centrarse más en la evaluación del aprendizaje de los estudiantes.

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