Chilean Higher Education Managers' Information Systems Acceptance and Quality Management Perceptions

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Abstract

Chilean higher education institutions face pressure to meet quality management (QM) standards and to use educational management information systems (EMIS) for managing the information related to academic activities. This doctoral research addressed the link between the use of EMIS in higher education and the QM processes, on which insufficient research was conducted so far. Against the background of the Unified Theory of Acceptance and Use of Technology and within the QM conceptual framework, I aimed to reduce this research gap by exploring the relationship between higher education managers' EMIS acceptance and QM perceptions, and by identifying specific manager profiles. In Study 1, a systematic review of Chilean literature suggested a close relationship between QM, accountability, and the use of EMIS. However, difficulties in implementation and long-term planning were noted. In Study 2, an instrument to assess perceptions about QM and accreditation was validated. Using this instrument, three different types of managers were identified by a cluster analysis conducted in Study 3: "Elders", "Mediators", and "Worker Bees." These results are in line with previous research, as EMIS usage differs according to a person's position, individual traits, and preferences. Accordingly, a customized training program was recommended, which considered individual needs, staff plans, and the identified manager profiles. As higher education institutions developed plans to invest in more EMIS licenses and implement training, the aforementioned factors may help reduce investment costs. Additionally, the results of this doctoral research lay the ground for designing mass-customized manager training for managers based on their specific profiles and the organization's characteristics.

Zusammenfassung

Chilenische Hochschuleinrichtungen stehen unter dem Druck, Qualitätsmanagement (QM)-Standards zu erfüllen und Bildungsmanagement-Informationssysteme (EMIS) zu verwenden, um die auf akademische Aktivitäten bezogenen Informationen zu verwalten. Diese Dissertation setzt am bisher nur unzureichend erforschten Zusammenhang zwischen dem Einsatz von EMIS in der Hochschulbildung und den QM-Prozessen an. Vor dem Hintergrund der Unified Theory of Acceptance and Use of Technology und im Rahmen des QM-Konzepts wurde der Zusammenhang zwischen der EMIS-Akzeptanz von Hochschulmanagern und der QM-Wahrnehmung untersucht und spezifische Führungsprofile identifiziert. In Studie 1 deutete ein systematischer Überblick der chilenischen Literatur auf einen engen Zusammenhang zwischen QM, Akkreditierung und der Verwendung von EMIS hin. Allerdings wurden Schwierigkeiten bei der Umsetzung und langfristigen Planung der Qualitätsmaßnahmen festgestellt. Davon ausgehend wurde in Studie 2 ein Instrument zur Erfassung der Wahrnehmung von QM und Akkreditierung validiert. Mit diesem Instrument wurden in Studie 3 drei verschiedene Managertypen mittels Clusteranalyse identifiziert. Darauf aufbauend wurde abschließend das Konzept eines maßgeschneiderten Schulungsprogramms vorgeschlagen, das individuelle Bedürfnisse und Personalpläne berücksichtigt. Da Hochschuleinrichtungen planen in mehr EMIS-Lizenzen und -Schulungen zu investieren, können die oben genannten Faktoren dazu beitragen, die Investitionskosten zu senken. Darüber hinaus legen die Ergebnisse dieser Arbeit den Grundstein für die Entwicklung massenindividualisierter Schulungsprogramme für Hochschulmanager auf Basis ihres spezifischen Profils und der Charakteristika der Organisation.

Contents

Introduction

Throughout the world, societies and governments have put increasing pressure on higher educational institutions (HEIs) to implement and improve quality management (QM) and accreditation processes in response to diverse situative factors ranging from globalization and competition to accountability requirements (Kumar et al., 2020). In this sense, HEIs are required by government and society to demonstrate quality and effectiveness, which results in self-assessment, self-regulation, and quality assurance (QA; Lemaitre, 2019). Furthermore, these external demands can revolve around public value: the ethos and values of any public organization, service provider, or profession must be assessed according to their creation of value, understood as better outcomes, services, and trust. Appropriately responding to these demands enables HEIs to generate confidence in the environment, making them more adaptable and stimulating collaborative relationships with the society for the benefit of their students and the entire educational system (Garnett & Ecclesfield, 2008).

HEIs have developed, bought, or adapted information systems to manage academic, non-academic, and administrative processes, mainly because these information systems make services less expensive, more accessible, faster, and more accurate. As a result, educational management information systems (EMIS) have become indispensable for providing accountability and facing quality management processes (Gunawardhana & Perera, 2015; UNESCO, 2021).

Particularly in Chile, the value acquired by information provision, transparency, and accountability is noteworthy, given the widespread use of information systems and, on the other hand, a social context of distrust towards HEIs (Dussaillant & Guzmán, 2014). As Lemaitre et al. (2012) pointed out, while improving the information management processes emerged due to external demands of accountability and

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accreditation processes, the information took a leading role in quality management. HEIs answered this growing need by incorporating several technological tools and including EMIS for academic management. At the same time, differences in terms of EMIS acceptance and use for QM purposes emerged between institutions, or among different managing positions.

The doctoral research presented in the following aimed to reduce this gap in research and practice by exploring the relationship between HE managers' EMIS acceptance and QM perceptions, and by identifying corresponding HE manager profiles.

Theoretical Framework

Educational Management Information Systems (EMIS)

Enterprise resources systems applied to HE, also named academic information systems (Kayanda et al., 2020) or more often educational management information systems (EMIS), are increasingly used in HE to obtain better information, results, and consequently prestige (Gunawardhana & Perera, 2015; Haris et al., 2017). Through their usage, managers obtain feedback about their decisions, correct deviations (Martins et al., 2019), and improve student education, achieving better results in shorter periods: implementing cutting-edge technology speeds up HEIs, transforming processes to achieve outstanding results (Dlamini, 2015). Although nowadays companies of all kinds use computer systems to improve their operations and production processes, universities differ from other organizations in that EMIS technologies are used for academic purposes and not just in terms of production outcomes (Chaushi et al., 2018; Opazo et al., 2019). For example, EMIS could include information about the student learning process, customers, workforce, leadership and governance, and budgetary, financial, and market results (Beard & Humphrey, 2014).

In terms of definition, an EMIS is "a comprehensive software system integrated across the various operation units in the institutes, and it is producing, managing, and disseminating educational data and information, usually within the institute and sometimes with national ministry or department of education" (Nanayakkara, 2017, p. 7). Following UNESCO (2021), they have several functions and specific organizational values; support decision-making, analysis, policy formulation, planning, monitoring, and management.

In a well-developed HE quality culture, EMIS must be efficient and fit for its purpose, have an appropriate articulation with the quality system, and show good collection and analysis capabilities of relevant data (Tavares et al., 2015). This is established in the seminal work of Fok et al. (2001), where the authors stated that organizations with more advanced levels of total quality management will make a more meaningful use of information systems focused on social goals (for example, increasing job satisfaction and morale), where strategic communications play a strategic role in the interaction between quality practices in higher education and information management, planning and goal setting (Bendermacher, oude Egbrink, Wolfhagen, Leppink, et al., 2017; Bendermacher, oude Egbrink, Wolfhagen, & Dolmans, 2017).

Following the statement of Tavares et al. (2016), in the context of contemporary challenges for HEIs, the internal QA systems must include an articulation with information systems, besides the existence of continuous quality improvement and a quality policy, formal mechanisms, and structures, the participation of stakeholders and information transparency. The challenge for the contemporary HEIs is to combine a well oriented and achievable institutional strategy with appropriate information systems and information technologies (Bytheway et al., 2017; Laurett & Mendes, 2019), allowing the implementation of quality key elements using technology-enabled processes and components (Varouchas et al., 2018).

Quality Management

In the so called new managerialism (Deem, 1988), the control of processes and the involvement of managers in them are mechanisms for increasing efficiency and reducing costs. This involves a strong component of accountability and performance measurement as substantial parts of the operational management and fundamental pillars for adopting quality management practices in the public sector. In the case of higher

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education, this implies accountability, achieved through the achievement of goals based on the design of objectives and specific quantitative indicators. In the new managerialism, the HEI users are regarded as clients who have certain rights and should be treated as such (Tsiligiris & Hill, 2021).

Applied to Higher Education, a QA system has been defined as "set of mechanisms and processes aimed at controlling, guaranteeing and promoting the quality of higher education institutions" (CNA-Chile, 2015, p. 4). Quality assurance considers mechanisms, procedures, and processes to achieve the desired quality standard. Unfortunately, in Latin America, the quality processes and mechanisms described above are often implemented in many institutions to respond to external standards rather than following a deep and complete understanding of the quality culture (González-Bravo et al., 2020). QA must be a cyclical process to ensure this quality and improvement. It must consider at least one measure of educational quality, a standards-based judgment, and progress based on priorities and plans (Dolmans et al., 2003), external QA agents – for example, government or private agencies – and internal ones, which the institutions create and manage (Cabrera Lanzo, 2018). QA involves a strong accountability component, testing against standards, and ultimately control (CNA-Chile, 2015).

The traditional concept of QA is currently being replaced by the idea of QM, which emphasizes continuous development and improvement rather than simply responding to external certifications. QM is an organization's permanent and systematic effort to improve its quality standards and fulfill its mission; it 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 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 Additionally, it has a strong component of cultural change, in which each and every member of the organization is committed to continuous improvement (González-Bravo et al., 2021). This organizational commitment results in measures taken regularly at institutional level to ensure quality, emphasizing the improvement of quality as a whole (Dzimińska et al., 2018).

Quality Management in Higher Education Institutions

Although the policies and processes of an internal institutional quality system – which already takes the form of quality management cycles – support the development of a quality culture (European Association for Quality Assurance in Higher Education, 2015), a genuine quality culture occurs when the academic community stop wondering what should be done and begin to wonder what can be done better (Dzimińska et al., 2018).

Quality in higher education is mainly provided and attested by accreditation, a QA 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 to ensure quality (Kumar et al., 2020). Accreditation requires input and engagement from a broad array of stakeholders, similar to quality management; 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 accreditation contribute to installing quality management mechanisms within the institutions.

Accreditation is focused on how an institution is oriented toward an ideal of excellence in quality, demonstrating specific results, established tradition, impact, and

social recognition1. It encourages self-regulation, self-assessment, and continuous improvement, promoting higher education institutions' suitability and soundness, and strengthening the substantive functions of the institutional mission (Vega Angarita, 2020). Quality management requires transparency, fund accountability, research productivity, increased graduation rates, and, above all, effective teaching and learning. In technical terms, quality management 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).

With the purpose of appropriate implementation of QM in HEIs, it is essential to know actors' perceptions. The literature regarding perceptions of quality and accreditation in HEIs is currently dominated by three major approaches, according to the functional roles of the population of interest within the educational centers. The first approach includes studies that compare perceptions between different institutional levels. In this regard, the most relevant research was conducted by Putnam (2000), who included presidents, full-time faculty, chief administrative officers, governing board members, and governing board members, and by Vieira (2002), who included students and faculty. The second approach comprises studies focusing on assessing the students' perceptions (Cardoso, 2009; Volkwein et al., 2007). Finally, the third perspective stems from studies focused on evaluating the perceptions of managers and academics about these issues (Cardoso et al., 2013; Cardoso et al., 2015; Cardoso et al., 2018; Gregorutti & Bon, 2012; Newton, 2002; Trullen & Rodríguez, 2013).

The Historical Breakpoint in Quality Management for Higher Education

Pedraja-Rejas and Rodríguez-Ponce (2015) mention five factors that triggered this global trend toward the pursuit of quality in HE: Increasing student demand and diversity, new institutions and scholars who often have lower-rated or partial contracts, incomplete and asymmetric distribution of decisions related to information, labor market internationalization, and lack of public accountability of public funds/resources. Thus, quality policies have occupied a central place in higher education; they have spread widely, and will remain highly relevant, producing a growing debate about their significant impacts and outcomes (Zapata & Tejeda, 2016). The emergence of a wide diversity of HEIs has determined that it is impossible to conceive a single ideal model of the University, which must be imitated. Additionally, governments began requiring accountability in response to political and economic reasons.

The European Case.

The European Association of Quality Assurance in Higher Education (ENQA), created in 2000, comprises QA agencies from the European Union countries and promotes various activities that spread information about QM in HE and facilitate the exchange of QA best practices and developments. The ENQA Standards and Guidelines for Quality Assurance (European Association for Quality Assurance in Higher Education, 2015) attempt to establish European rules and generic guidelines. Under these general principles, European QA methods are diverse, including internal and external evaluation of programs/institutions, accreditation, and audits (Westerheijden et al., 2014).

In the context of the promotion and development of the European Higher Education Area (EHEA), the Bologna process has emphasized the generation of comparable criteria and methodologies for QA. One of the most significant results of this quest is the already mentioned Standards and Guidelines for Quality Assurance, and its

key goal is "to contribute to the common understanding of quality assurance for learning and teaching across borders and among all stakeholders" (Cardoso et al., 2019, p. 250). While program accreditation offers criteria to have transparent and comparable qualifications, the Standards and Guidelines for Quality Assurance in the European Higher Education Area were developed in the context of the Bologna Process as a standard reference framework to guide the work of institutions and agencies in assuring quality. The first part of ESG contains standards and principles for internal QA, but each institution undertakes the implementation of QA systems according to their specific features (Tavares et al., 2015).

These standards were adopted by the ministers responsible for higher education in 2005, following the European Association for Quality Assurance in Higher Education (ENQA) proposals, in cooperation with the European Students' Union (ESU), Higher Education (EURASHE) and the European University Association (EUA). Since that date, many signs of progress have been made in QA and Bologna action lines: for example, qualification frameworks, recognition and promotion of learning outcomes, student-centered learning, and teaching (European Association for Quality Assurance in Higher Education, 2015).

The Chilean Case.

In Chile, laws from 1981 (during Augusto Pinochet's dictatorship) allowing the creation of hundreds of institutions without adequate standards have been gradually modified through successive instruments, regulations, and agencies. In March 1990, the Constitutional Act on Education was issued, and the National Council of Education (CSE) was formed. This law amended the regulatory system with a licensing process for institutions, which required universities to obtain two certificates by the CSE: one of approval of the institutional project and the other regarding the availability of teachers,

educational, economic, financial, and physical resources necessary to perform the institutional project (Barroilhet, 2019).

Everything described above has significantly influenced the Chilean QA policies, generating in practical terms a decrease in HEIs, but with a growing increase in the number of students in the system. Lemaitre (2011) establishes that the historical process for establishing of QA in Chile, after the 1981 reform, can be visualized by the following four steps:

1980-1990: Market deregulation

1990: Organic Constitutional Act on Education (LOCE, Law No. 18962) and regulation of the private system.

1999: Installation of the QA process.

2006: Installation of the national system of QA.

Today, institutional accreditation is required for students who aspire to access the Credit with State Guarantee to complete their undergraduate studies. Accreditation becomes imperative for institutions (Fleet et al., 2014). The HEIs that failed to achieve this minimum level of quality (Pedraja-Rejas & Rodríguez-Ponce, 2015), revealed corruption, or went bankrupt, brought forth serious human, political, and legal issues. According to some authors, "accreditation was from its inception a weak regulatory tool and, in addition, it was crossed by scandals" (Barroilhet, 2019, p. 58).

The most recent action, the approval of the new Law on Higher Education, No. 21,091, introduced substantive changes in terms of QA: all HEIs must undergo mandatory accreditation in the dimensions of Teaching and Results of the Training Process; Strategic Management, and Institutional Resources; Internal QA, and Community Engagement. Additionally, they can accredit Research, Creation, and Innovation (Congreso de Chile, 2018)

In 2019, the National Accreditation Commission of Chile (CNA-Chile) asked 711 institutional authorities and peer reviewers about their perceptions of the progress and challenges in these issues in improving the accreditation law. Among multiple findings, they detected that mandatory integral accreditation for institutions was mentioned in the first place within the changes that will positively affect institutions. The law will stimulate institutions to improve their quality standards to better education for students (CNA-Chile, 2019) as, previously, many quality improvements were historically motivated by factors external to the legitimacy of the institutions rather than the installation of a quality culture.

The Importance of EMIS for QM, its use, and Differential Access by Managers.

The EMIS integration in quality management mechanisms allows information management to maintain organization quality standards (Garg & Shukla, 2017). EMIS must be efficient and fit for their purpose, have an appropriate articulation with the quality system, and show good relevant data collection and analysis (Tavares et al., 2015). In this sense, it is essential to assess managers' EMIS perceptions, for example, to support self-evaluation, accreditation, or QA. EMIS are accepted in varying degrees by academics and managers, depending on many factors that include quality culture, cultural and organizational resistance, individual experience, information, critical success factors, stakeholders, post-implementation follow-up, support, positions, etc. (González-Bravo et al., 2021; Thompson et al., 2018). This complexity associated with the heterogeneous valuation and use of information systems in organizations was noted ten years ago by Santa and Pun (2010), who stated that "organizations must work in all the dimensions […], to maximize the probability of achieving team success and avoid the conflicts

between different technological frames, as different actors have different expectations from the technological implementation such Enterprise Information Systems" (p. 1028).

In higher education, the role of EMIS depends on user's – i.e., manager's – position and access to data. Khairi and Tawarish (2018) state that operational-level managers require descriptive information, operational/middle-level managers require diagnostic information, senior middle-level managers predictive information, and top-level managers prescriptive information to make strategic decisions. Danaiata et al. (2018) distinguish four levels of access to organizational data related to the managers' positions: a) top management. The Rector, who accesses the data and uses it from a strategic thinking perspective; b) Middle management. For example, Deans, Vice Deans, who use them for tactical decision making and thinking using processed data, c) Operational management, Department directors. They take operational decisions, automate daily tasks by processing and controlling available data, and d) Operational Level, system users responsible for quality input. The specific requirements of each one depending on specific internal or external demands (such as accreditation or quality management) are: transparency, teaching and learning, reporting to the government (Chaurasia et al., 2018). While higher education managers permanently require data to inform strategic decisions (Alexander et al., 2019), middle management positions (below Dean level) must deal with tactical planning decisions (Rezvani, 2017; Shawyun, 2021), and positions like program directors, have an extensive EMIS use (Universidad de Concepción - Dirección de Docencia, 2019), due to their concern about daily students' needs (Opazo et al., 2019). However, despite these differences, an optimal EMIS use implies a collaborative effort involving the entire organization (Alexander et al., 2019; Shawyun, 2021).

For the reasons mentioned above, UNESCO proposes that each level (academics, leaders, institutional and support managers) is a key actor in the successful adoption and

maintenance of EMIS implementation programs. Therefore, a well-planned EMIS implementation policy and master plan must define and dynamically update each level's requirements (Miao et al., 2022): a clear understanding of the nature of the organization and its structure, but above all, the particular characteristics of the different managerial positions and their specific responsibilities and expectancies. Once this well-planned implementation is successful, it can improve the management efficiency of a HEI, or a broader education system, by supporting timely decision-making by managers (Miao et al., 2022).

Technology Acceptance

For this doctoral research, technology acceptance will follow the definition and conceptualization of Dillon and Morris (1996) as the demonstrable willingness within a user group to employ information technology for the tasks it is designed to support. The most usual ways to operationalize acceptance include use behavior, self-reported use, attitude, and behavioral intention (Garone et al., 2019).

Across the last four decades (Khechine et al., 2020), both behavioral theories and those that consider socio-cognitive and social learning factors have addressed the problem of acquiring and incorporating new technologies (González-Bravo & Valdivia-Peralta, 2015). Prominent examples of theories explaining the adoption of new technologies are the Theory of Reasoned Action (Ajzen & Fishbein, 1980), Theory of Planned Behavior (Ajzen, 1991), and the Technology Acceptance Model (Davis, 1989; Davis et al., 1989).

The Technology Acceptance Model and the UTAUT.

The latter, the TAM model (Technology Acceptance Model), constitutes a substantive approach to research in new technologies and has already been used in research on management in higher education (Al-Nuaimi & Al-Emran, 2021;

Ammenwerth, 2019; Dwivedi et al., 2020). This model, developed by Davis (1989), is focused on two primary constructs: perceived usefulness and perceived ease of use. These are hypothesized as central determinants of users' acceptance of ICT and allow to elucidate the factors that influence the success of information systems. Perceived usefulness is the extent to which a person believes that using a particular technology will improve their job performance, while perceived ease of use is defined as the degree to which a person believes that technology use does not require much effort.

TAM model relies significantly on the theory of reasoned behavior (Davis et al, 1989) to understand the intention as a mediator between action and attitudes. In 2000, Venkatesh and Davis added control, intrinsic motivation, and emotion as new dimensions in the later denominated model TAM2 (Venkatesh & Davis, 2000), and Venkatesh and Bala (2008), proposed the TAM3 model, which shows a nomological network of determinants of IT adoption by individuals to understand how various interventions can influence the known determinants of IT adoption and use. The model combines determinants of TAM2 and, in turn, the perceived ease to use determinants to provide information about how ICT adoption and use could be improved (Yañez-Luna & Arias-Oliva, 2018).

Venkatesh et al. (2003) developed the Unified Theory of Acceptance and Use of Technology (UTAUT) synthesizing previous technology acceptance models, thus aimed to assess the success probability of new technologies and their acceptance factors (Ammenwerth, 2019; Dwivedi et al., 2017). The model regards technology use as predicted by behavioral intention (BI) and facilitating conditions (FC). Behavioral Intention to use technology is predicted by PE (Performance Expectancy), EE (Effort Expectancy), and SI (Social Influence). BI and FC predict actual usage. Gender, age, experience, and voluntariness of use moderate the relationships between the

aforementioned variables (Venkatesh et al, 2003). The empirical results show that UTAUT explains approximately 70% of the variance in the behavioral intention to use a new system.

Today, the UTAUT is a predictive and integrative approach used in many countries and research settings (AlAwadhi & Morris, 2008; Khechine et al., 2016). Previous research has used the UTAUT model in HE to assess the acceptance of management platforms or specific computer program(s) to track and store records and related metadata (Mukred et al., 2019). For example, Phahlane and Kekwaletswe (2014) applied UTAUT to management information systems. In Brazil, the acceptance and use of the SINGU academic management system were evaluated by da Silva and Watanabe (2017).

Summary and conclusion

To summarize the literature overview outlined above, HEIs are required to implement EMIS and conduct QM and accreditation processes. Although the research in original UTAUT model has accumulated evidence and empirical applications in the field of HE management information systems, and QM is a HE main issue worldwide, there is a gap in the literature regarding specific research linking EMIS acceptance to QM perceptions in HE. Understanding this relationship is important as knowing manager profiles may allow more effective implementation of the EMIS, allowing institutions to strengthen QM.

Therefore, in this doctoral dissertation, I address the following research question:

What is the relationship between the use of EMIS in higher education and quality management?

This overarching research question is addressed by the following three studies.

Study 1

Article

Narrating in grey: An application to educational management information systems and accountability

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Abstract
This research presents an application of a mixed narrative review, including grey literature, to broaden knowledge about the value of educational management information systems (EMIS) for accountability in higher education institutions (HEIs). The review was focused in understanding the relationships among quality management (QM), EMIS use and accountability. Analyzing 39 documents produced between 1990 and 2018, we confirm the tight QM–EMIS use–accountability relationship. A weak link between QM and EMIS use was found, resulting in a low accountability level, nevertheless e-maturity successfully describes the link between QM and EMIS use and legitimizes the HEIs in the society. Finally, the value of mixed narrative reviews, including gray literature, is demonstrated in the fields of management information systems and higher education.

Keywords
educational management, information systems, accountability, higher education, grey literature, Chile

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Theoretical framework

Problem statement

In Chile, while the government has shown a growing interest to increase the Higher Education quality, the educational system as a whole still has a low level of accountability, thereby affecting the public confidence toward Higher Education Institutions (HEIs) (Dussaillant and Guzmán, 2014; Riquelme Silva et al., 2018; Rojas Ríos and López Stefoni, 2016; Fleet et al., 2014; López et al., 2015).

On the other hand, an extensive ICT use nationwide, mainly in urban areas (Stager Koller et al., 2017; Stäger Koller and Núñez Tissinetti, 2015), an increasing ICT use in Chilean higher education (Brun and Hinostroza, 2014; González Bravo and Valdivia Peralta, 2015) and a growing market of Higher Education ERPs in Latin-America (Cassidy, 2006; Abdellatif,

2014), are observed. The latter is probably due to these Educational Management Information Systems (EMIS) providing information in challenging environments for quality purposes, both within HEIs, and in governments and quality agencies (Haris et al., 2017).

The starting problem addressed in this research is the discrepancy between a growing EMIS use and a still low accountability level in Chilean HEIs. On the other hand, a growing number of scholars are recognizing the value of narrative reviews and 'grey literature', for generating new knowledge beyond

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peer-reviewed journals, incorporating practice and case reports, among many other sources (Bae, 2014; Paez, 2017; Paré et al., 2015; Rumrill and Fitzgerald, 2001)

Considering the cases using the already mentioned approach (Benzies et al., 2006), a mixed narrative review (NR) is carried out in order to demonstrate the value of narrative reviews, which include grey literature, in emerging higher education issues.

Narrative reviews

Narrative literature reviews or narrative reviews (NR) are focused to identify, analyze, assess and interpret the existing knowledge on a specific topic, depending on the final product to which it is aspired (Guirao Goris, 2015). They tend to focus on interpretation, following a path which could include multiple open-ended meanings (Ayala, 2018). In this sense, it is valuable when the researcher is interested in connecting many sources either for purposes of deepening understanding of a broad or complex issue (Thorne, 2018) or reinterpretation/interconnection pursuing theory building (Baumeister and Leary, 1997). It is possible to identify quantitative narrative reviews, qualitative narrative reviews, and mixed methods reviews, being the latter used when both quantitative and qualitative research are involved (Bae, 2014).

NR critics have argued that this is the simplest type of literature review, a subjective first approach (Rumrill and Fitzgerald, 2001), which does not seek generalization or cumulative knowledge, without systematic and comprehensive literature searching, detailed explanations and methods regarding the review process (Paré et al., 2015; Rumrill and Fitzgerald, 2001). It has even been pointed out that NR is less comprehensive, conducted by unidentified experts, without an explicit statement of methods and being in the last place of the hierarchy of scientific methods (Aguilera Eguía, 2014).

Answering these critics, several authors have exposed methods to improve the quality of a NR: detail databases and keywords used, dates and search strategy, how the terms used were combined, the number of sources found (Guirao Goris, 2015) or final report sections clearly identified (Ferrari, 2015; Rumrill and Fitzgerald, 2001). Even have been suggested guidelines for evaluating the quality of certain reviews in terms of rigor and relevance (Paré et al., 2015) or recommendations to improve the searching

and extracting process, or the final report (Vom Brocke et al., 2009; Bandara et al., 2011)

In a deeper view, some critics towards NR come from traditional quantitative perspectives, which underestimates the value of practice, reflection or social inquiry (Ng et al., 2015). The problem is that in fact, science moves on when it is capable of generating original and creative hypotheses from multiple directions, some of them germinal, and not necessarily coming from studies published in peer-reviewed journals: for example, a health-related clinical case, or a specific school-practice (Thorne, 2018). In fact, reflection could contribute to the development of educational practice at a high level, providing a critical awareness about the theories, applications of epistemological positions (Ng et al., 2015) or adding dimensions of insight/application perspectives, and providing critical analyses (Rumrill and Fitzgerald, 2001). In conclusion, some NR offer much deeper or "richer" information than a classical empirical analysis or meta-analysis (Rumrill and Fitzgerald, 2001)

Narrative reviews and grey literature

The NRs include in their scope a wide variety of sources, it thus becoming necessary to analyze the concept of grey literature and its value for scientific research.

According to the 'Luxembourg Definition', grey literature refers to print or electronic literature produced by government, academia, business and industry, and not controlled by commercial publishers. This can include materials such as unpublished studies, conference abstracts, conference proceedings, book chapters, government and agency reports, unpublished doctoral dissertations (Gokhale, 1998; Godin et al., 2015) or PowerPoint presentations, evaluation reports, standards/best practice documents, guidelines, working papers (Benzies et al., 2006).

The inclusion of grey literature has a heuristic value for NR, expanding the scope, adding contextual information (Benzies et al., 2006; Mahood et al., 2014; Adams et al., 2016; Paez, 2017) and in fact is recommended when the phenomenon is complex with multiple components (Benzies et al., 2006). Combining grey literature along with peer-reviewed sources may therefore provide a more balanced view of the evidence (Mahood et al., 2014), reducing the impact of publication bias (Adams et al., 2016; Gracia Leiva et al., 2019; Bellefontaine and Lee, 2014). It is because of this reason, that scholars are increasingly

recognizing the value of incorporating 'grey litera-ture' (Adams et al., 2017)

Quality management in higher education

Chile was the first Latin American country that initi-ated quality assurance practices in higher education as a state policy in 1990, through the Higher Education Council (Inga Ipanaque and Velásquez Silva, 2005). In their early years, the procedures were focused over a compulsory licensing of new private HEIs. In 2003, accreditation of institutions started, and in 2006 the National System of Quality Assurance was created by law (Lemaitre et al., 2011). Institutional accredita-tion remained in the hands of the newly founded CNA (National Accreditation Commission), being a require-ment for students who wished to access the Credit with State Guarantee (CAE) to pursue undergraduate studies in a HEI, and making accreditation an imperative for institutions to operate – survive – in the system (Fleet et al., 2014).Through the years, the concept of quality eventually changed from an abstract standard to an HEIs' response to a set of externally established bench-marks in terms of legitimacy and information about the purpose and outcomes. As a result, citizens can make informed decisions considering these factors in pro-grams or institutions (Kinser, 2014).

Applied to higher education, a quality assurance (QA) view has been defined as "set of mechanisms and processes aimed at controlling, guaranteeing and promoting the quality of higher education institutions" (CNA-Chile, 2015: 4). Gradually, the QA concept has been replaced by quality manage-ment (QM), which emphasizes continuous develop-ment and improvement, rather than just responding to external certifications (Cabrera Lanzo, 2018; Lemai-tre et al., 2012). In HEIs, without quality information, it is impossible to manage quality (Beard and Hum-phrey, 2014; Mora et al., 2009) and to advance from QA to QM involves not only control over a deregu-lated system, but also to regain academic promotion of quality (Zapata and Torre, 2012a).

Managers and political authorities are rethinking higher education models, and adjust them to meet the environmental requirements. It must be guaranteed the existence of a sustainable and well-funded framework to support the HEIs' efforts. It is for this reason that in many countries, quality and continuous improvement, accountability and qualification frameworks in the higher education sector are at the forefront of national political agendas (Pucciarelli and Kaplan, 2016).

Accountability

Accountability is a very widespread concept and a term that has many meanings: from the efficient func-tioning of institutions and efficient learning in stu-dents, to the system's ability to stimulate the economy (Speziale, 2012). In the last three decades, this concept has been developed in the US and sub-sequently in the world, from the prevailing concept in the 1970s – design of government structures that ade-quately address the problem of autonomy versus the supervision of institutions – towards a vision that ori-ginated in the 1990s, focused on systemic results of HEIs (McLendon et al., 2006). Accountability and governance are necessary to preserve the pact between higher education and society; they are central issues for developing countries, and governments must be sure that HEIs are addressing the needs of society in terms of qualified graduates, and research to improve the quality of life of the citizens (Hendel and Lewis, 2005). There are multiple forces that pro-mote accountability, from the governments that pro-mote a scarce allocation of resources based on the results of the institutions (Kai, 2009), to the profes-sional authority that promotes monitoring and contin-ual improvement of processes and outcomes, for example through the use of management information systems (Shavelson, 2010).

Accountability, expressed through relevant public information and transparency, are key factors for citizenship when choosing a HEI and it also enhances the ability of citizen control over the state or the Higher Education market (United Nations Development Programme, 2006; Altbach, 2009). While Chile must build its achievements on the basis of an institutional framework in which the formal role of accountability is sufficiently valued, the country is not fully prepared for higher education quality systems based on trust and social capital (Dussaillant and Guzmán, 2014). This is due to an extremely deregulated educational market since 1981 (during the dictatorship of Augusto Pinochet), and it has taken twenty-five years to change to a more comprehensive regulation in a cultural context of an open market, an advanced use of technology, but where distrust in institutions persists.

Equity, quality and effectiveness and therefore accountability have been promoted as indicators of system success in Latin America (Castro et al., 2017), and the first way to provide quality informa-tion to achieve transparency, accountability and

success of an HEI, is to have adequate management information systems (Rivera et al., 2009; Altbach, 2009).

EMIS in higher education

HEIs are purchasing or developing information systems to manage academic, non-academic and administrative processes. This is largely because their use makes services cheaper, easier, faster and more accurate (Gunawardhana and Perera, 2015), and the implementation of cutting-edge technology helps streamline HEIs and transform their processes to achieve outstanding results (Dlamini, 2015). These EMISs must provide information to directors that allows them to make key decisions for the organization, in the right direction considering environment and internal processes (Bubel et al., 2015; Martins et al., 2019). This information facilitates management at different levels (Toro, 2012): inputs for governance, academic records, human resources, physical resources inventory, financial systems. Most of the efficient performance of a HEI depends on having updated retention and dropout data of students, academic progression and enrolment, graduates employability rates and salaries, courses satisfaction reports, curriculum plans validity and teaching loads, among many other indicators. This implies an effective management of a large amount of information, and providing it in user friendly way, which often involves the use of ERP systems for several processes (Bubel et al., 2015) and even the daily work of all members of the organization (Stensaker, 2018).

The strategical use of data mining plays an important role in the sustainable growth, success, and quality assurance of universities (Goyal and Vohra, 2012), and has become relevant to assess and improve HEI quality. Through implementing strategic planning and effective/efficient allocation of resources, HEIs can be more effective and have more opportunities to make right investments/improvements, which accelerate their sustainable growth, success, and reputation (Al-Sabaawi, 2015; Sart et al., 2015, November; Zahid and Khan, 2016).

The use of information is an intangible resource, which ends up being related to organizational culture or management styles, that allows a university to develop in a competitive environment (Bubel et al., 2015). As Weiss says, in the context of the results of her research about leadership and the use of new technologies in HEIs "organizational quality factors ... [are] ... defined and a correlation determined between an organization's organizational quality score and overall satisfaction with the CIO and IT department" (Weiss, 2010: 169).

However, as early as 1998, Abby Rubin (1998) indicated that in the case of developing countries, MISs have been implemented in the educational field, but that " ... implementation and use of accountability measures, however, has been varied, not always living up to the ideal of what could be expected in terms of making the connection with quality improvement" (Abby Rubin, 1998: 287). Today, this situation has not changed substantively (Rojas Ríos and López Stefoni, 2016), despite the fact that educational organizations seek certain objectives in a transcendent way, objectives that mobilize them in different areas, for example, in the ICT incorporation for educational management, expecting a quality certification (Harrison et al., 2014)

Higher education institutions face pressures from the government and society as a whole (Bernasconi, 2012, Fall; Pedraja-Rejas and Rodríguez-Ponce, 2015), to demonstrate quality and effectiveness, which translates into processes of self-assessment and quality assurance (Garnett and Ecclesfield, 2008). These external demands can revolve around the concept of public value: the ethos and values of any public organization, service provider or profession must be assessed according to their creation of value, understood as better outcomes, services and trust. This allows the building of trust from the environment towards these organizations, making them more adaptive and stimulating collaborative relationships with society to the benefit of their students and the entire educational system (Garnett and Ecclesfield, 2008).

To recognize the importance of educational management information systems is relevant, considering first, the changing and challenging historical breakpoint in HE in terms of quality and accountability, and secondly, the significance that this issue has for the countries to design Higher Education public policies which considers the broader environment where institutions are inserted (Opazo et al., 2019). In Chile, the value of provision of information, transparency and accountability is particularly notable, given the advanced ICT use but distrust toward institutions.

Aim

The aim of this study is to analyze the value of a narrative review which includes grey literature, to

understand the relationship between the use of EMIS in higher education and accountability.

Materials and methods

Design and data collection

We conducted a narrative literature review (Bae, 2014; Baumeister and Leary, 1997; Cronin et al., 2008; Ferrari, 2015; Green et al., 2006; Rumrill and Fitzgerald, 2001) mainly using:

1. Databases EBSCO, Proquest and Redalyc.org from 1990 to 2018. 1990 was the year that Chile returned to democracy and the Constitutional Act on Education was issued (Ley Orgánica Constitucional de Enseñanza – LOCE).
2. Normative documents issued by CNA-Chile and other Chilean government departments and educational organizations.

The selection of relevant publications until December, 2018, was made based in four themes, operationalized in four keywords or key themes (Bearman and Dawson, 2013): Quality management/quality assurance (QM/QA), Chilean Higher Education, ICT Use and Information Systems. Sources that explicitly established a connection between the mentioned terms were selected. An exclusion criterion for the selection of relevant literature was not including articles exclusively focused on new technologies serving the teaching/learning process.

This process allowed the selection of 39 publications. Additionally, they were classified into two main categories: empirical and non-empirical. This general classification was utilized to allow the inclusion of public documents and books, not published in peer-reviewed journals.

Among the publications reviewed, eight were empirical, which used samples ranging between 10 accredited (Lemaitre et al., 2012) and 57 HEIs (López et al., 2015).

Data analysis

A narrative review was conducted, where different sources were analyzed according to key themes. The steps were the following:

1) Each source was read following the six questions suggested by Porritt et al. (2014), to determine relevancy and then again to collect information relevant to the research problem (Porritt et al., 2014). These six questions were related with a) time period covered b) language (English and Spanish) c) population/sample, d) phenomena stated in the main aim, e) study design and f) outcome measured (p. 48).

2) After that preliminary stage, each component was analyzed thematically, organizing the information collected in three nodes that articulate the analysis, for the results of this study. The findings were summarized, articulating emerging conclusions from the sources in analytical themes (Thomas and Harden, 2008). This last stage was based on the judgements and insights of the reviewers, and is an inductive analysis to answer the research problem. The purpose is going "beyond the content of original studies" (p. 7), using descriptive themes to infer more abstract meanings (Thomas and Harden, 2008).

Results

The result of analysis shows that 13 of the 39 documents, explicitly established the relationship between QA/QM and use of new technologies for management. These results are exposed in Table 1.

As shown in Table 1, all of the mentioned documentary sources consider the context of national accountability as a framework where information or ICT are essential. These findings are synthesized below, and their importance is analyzed in detail in the light of literature, identifying two major analytical themes: a) Quality management and ICT Use, b) Quality Management, ICT Use and accountability.

Quality management and ICT Use

In 2003, González reported that there were no systematic data regarding the computer resources implementation in Chilean HEIs, although "it could be said that all universities have computer resources for teachers and students ... [and that] ... a significant number has Intranet and technology classrooms that include access to teleconferencing" (González, 2003: 23). While there is now broad recognition of the value of EMIS for education, this development started towards the end of the 1960s and was closely linked to technological developments of the 1990s in the computing area, but had not yet reached its current expression at the beginning of the present century. In

Table 1. Sources that explicitly establish the relationship between the use of new technologies for management, and quality assurance/management in Chilean Higher Education.

Source	Type	Sample
1. Aguayo et al. (2009)	Empirical	75 HEIs
2. Bernasconi (2012, Fall)	Non Empirical	Non-applicable
3. Cárdenas and García (2014)	Non Empirical	Non-applicable
4. Fukushi (2010)	Non Empirical	Non-applicable
5. González Bravo and Valdivia Peralta (2015)	Non Empirical	Non-applicable
6. Lemaitre et al. (2012)	Empirical	10 universities
7. López et al. (2015)	Empirical	58 universities
8. Mora et al. (2009)	Non Empirical	Non-applicable
9. Rivera et al. (2009)	Empirical	13 universities
10. Rojas Ríos and López Stefoni (2016)	Empirical	4 universities
11. Zapata and Fleet (2012)	Empirical	56 universities
12. Zapata and Torre (2012a)	Empirical	23 universities (Ibero-America)
13. Zapata and Torre (2012b)	Empirical	30 universities (Ibero-America)

fact, as indicated by Marterer (2008), in 2002 it was possible to identify only two empirical studies in large universities worldwide about effects of ERP systems in higher education (United States and England).

Today, on the other hand, there is awareness in Chilean universities, particularly those that belong to the "Council of Rectors" (i.e., universities created before 1981), that ICTs and "Business Intelligence Mechanisms" are a fundamental part of their work, and the ongoing growth and complexity of HEIs, and the society's needs and demands (Mora et al., 2009), have created new needs to be met from the management perspective (Fuentes Tapia and Valdivia Pinto, 2010; Mora et al., 2009; Busco et al., 2018), and that, complementary, information management is key in institutional accreditation (Fleet et al., 2014; Lemaitre et al., 2012).

As Lemaitre et al. (2012) pointed out, while improving the information management processes emerged as a response to external demands from accreditation processes, information had taken a leading role in quality management. This growing need has been answered from HEIs through incorporation of several technological tools, including ERPs (Enterprise Resource Planning) for academic management (Zapata and Torre, 2012a), being already a trend reported in other countries around the world.

Today, many Chilean universities utilize integrated ERPs for internal management (Zapata and Fleet, 2012): in most cases, these systems incorporate 'academic management modules' where managers can

follow up on the students' academic progress or to what extent professors and researchers are carrying out their professional activities. The institution's complexity and maturity, will influence what use it will make of that information following the classification of intelligences listed by Terenzini (1993): Technical/Analytical, Issues or contextual.

Regardless of these specific differences, there has been growing recognition of EMIS value in the last decade, so that authors such as Bernasconi (2012, Fall) affirm that "not only in Chile, but also in Latin America, tools such as planning, business intelligence, market surveys and performance indicators have been strongly incorporated" (p. 13). It is very important that HEIs incorporate good information management practices that allow them to use quantitative information in a context of strategies that provide them with both meaning and purpose. This notion is directly related to the concept of e-maturity applied to the educational field – degree of provision, administration, and use of technology to support learning in the curriculum (Underwood, 2009) –, as a broader perspective (Bagozzi, 2007; Harrison et al., 2014; Nistor, 2014) that gives long term meaning to ICT use, as a way to achieve its objectives transcendently (for example, social or systemic determinants, quality or external certification; Harrison et al., 2014).

Quality management, ICT use and accountability

In the area of public visibility, Zapata and Fleet (2012) carried out an analysis of the web pages of 56 Chilean universities, and found that the institutions

disseminate their information in a partial way, empha-
sizing aspects of academic offer rather than issues
related to accountability (for example, qualification,
financial aspects, etc.). In addition, they found that
public and traditional private HEIs disseminate more
information than new private universities. Something
similar occurs when comparing accredited universi-
ties versus those that are not, being the former those
that provide more information. The authors show how
the quality of information is largely explanatory of
institutional quality.

As an additional component, in Chile as in the
whole world, since the 1990s the Institutional Anal-
ysis Offices (IAOs) have given a strong boost to the
incorporation of EMIS. In Chile, they received an
important boost with the quality assurance policies
promoted by the state in the 2000s, following with
some delay, the trends originated in United States,
and followed by Europe and Asia (Opazo et al.,
2019). It is important to mention that they are an
important point of contact between universities and
their environment, in two senses: IAOs provide offi-
cial information to external bodies that require it,
and provide the organization with information about
the environment in which it operates (Rivera et al.,
2009). Rivera et al. (2009) carried out a study in
which they found that among 61 Chilean universi-
ties, 48 have a division in charge of information
processing, support for decision-making and inform-
ing the environment (for example, state agencies).
To the extent that authors recognize that the work
of these units is based on collection, analysis and
systematization of information, it is a problem not
always to have online and updated managing data.
Something similar happened until 2011, with
national information systems: in that year the higher
education public information started to be dissemi-
nated through websites such as Mifuturo.cl (Ferreyra
et al., 2017), an initiative that provides information
about degrees, enrollment values, length of careers,
graduation rate, employability, among others (Espi-
noza and González, 2013). This is a clear example in
Chile of how governments can use information and
communication technologies to improve their sys-
tems, contributing to social development (Qureshi,
2009).

In any case, the problem regarding the significant
and strategic use of information remains, and this is
worrying as far this information finally feeds back
institution quality in a process of continuous improve-
ment. In the same line, it describes how the

investment on technology should be guided by a proj-
ect to lead the process along. In simpler words, HEIs
should know what they are using technology for.
Fukushi (2010) raises questions that organize socio-
cognitive frames and place the organization regarding
its technological reality. According to the author, the
few Chilean HEIs using EMISs systematically do so
motivated by the 'know-what' or 'know-how', but
very few reach the higher stages, where they must ask
about systemic understanding of growth or the
"motivated creativity or ethics" (Fukushi, 2010: 14)
with a strong social component in terms of social
welfare. This is fully connected with theories like
technological frames (Orlikowski and Gash, 1994)
and with concepts expressed by Bagozzi (2007), in
the sense that often ICT adoption models do not
respond clearly to the question about the final purpose
of the technology incorporation (Bagozzi, 2007: 245)
which could even be social welfare in general
(Bagozzi, 2007: 251)

This is also consistent with the findings of Aguayo
et al. (2009), who reported that quality of strategic
plans, management of material resources and infor-
mation systems were among the most noticeable
weaknesses of Chilean HEIs. Likewise, they indicate
that a key factor that hinders optimal management
control in the HEIs is the absence of an integrated
management system (67%). That is consistent with
managers' interest in planning, developing informa-
tion systems for such purpose (Cáceres, 2007), and
with Solar et al. (2013), about the value of e-
maturity in the field of strategic planning, delivery
of information required by stakeholders and by law,
among many other areas.

In short, although there is a greater recognition
about the value of EMISs in Chilean HEIs, three types
of problems are observed:

1) An insufficient number of universities have
   implemented adequate systems of institutional
   information management, with the subsequent
   low ICT use for management (Espinoza and
   González, 2013; Rojas Ríos and López Ste-
   foni, 2016). For example, López et al. (2015)
   conducted a study with 48 accredited
   institutions until 2011, and found that when
   reviewing the results for accreditation, one of
   the difficulties experienced by HEIs is the
   limitation of information systems for
   decision-making, mainly in the planning
   area (López et al., 2015; Cáceres, 2007). It is

interesting that the mentioned article by López et al. (2015), mainly aimed at evaluating the effects of accreditation in Chilean universities, ends up analyzing how these effects are connected with the society as a whole: as a way to balance the deregulated privatization of higher education.

2) Inside the Chilean academic environment, although there is recognition about the value of such systems for accountability and their connection with quality management (Zapata and Fleet, 2012), there is observed a wide and variable spectrum of incorporation of ERPs to their processes (Espinoza and González, 2013; Rojas Ríos and López Stefoni, 2016). The assessment about the real impact of its benefits (Abugabah and Sanzogni, 2010; Chaushi et al., 2018) would be variable.

This situation is due in part to the current paucity of national literature that explores this field and the diverse degrees of e-maturity among institutions. In those institutions that are just beginning a systematic incorporation of EMIS, it is sought to develop integrated systems of information to take decisions based on evidence. In more mature HEIs, a better management of indicators is carried out, which translates into concrete actions, for example, improvement of academic indicators (Lemaitre et al., 2012), being this consistent with the three tiers of institutional research mentioned by Terenzini (1993).

3) Complementing the aforementioned, long-term planning problems persist for many Chilean HEIs, and the ability of these long-term plans to guide an ICT use policy for management (Cáceres, 2007). In this line, Zapata and Torre (2012a) mention a study of 23 universities in seven countries showing greater progress in developing QA systems: Mexico, Costa Rica, Colombia, Chile, Argentina, Portugal and Spain. The authors reported that one positive result of QA processes, was the incorporation of more information for internal control processes and decision making (Zapata and Torre, 2012b), which implies the use of better information systems. The impact of this gradual transformation and valuation seems to be greater in Costa Rica, Colombia and Chile, and slightly less in Mexico, Portugal and Spain.(Zapata and Torre, 2012a). Even

though these systems serve primarily the institutional and academic management, it is the governing authorities who perceive more clearly their benefits. Academic and professional associations, conversely, question their validity, reliability and usefulness (Zapata and Torre, 2012b).

Discussion

The results of this narrative review including grey literature are consistent with previous research about the value of EMISs in higher education and allow obtaining meaningful findings related with the Chilean Higher Education System.

In the first place, EMIS facilitate the implementation of quality managing mechanisms, and to achieve accountability. In the second place, the relationship between Quality Management and accountability in Chilean HEIs, is mediated by EMIS use. In Chile, as in the rest of the world (Speziale, 2012; Shavelson, 2010), there is recognition about the usefulness of ICT and ERP systems, for educational quality management and particularly for accountability outcomes. This has been stimulated by government regulations that demand transparency in institutional outcomes, and by the institutional and programs accreditation processes. These processes not only demand to demonstrate results and organizational health, but the self-evaluation process itself is developed thanks to EMIS that provide adequate information, which must be used at different levels of the organization, being clear the final purpose for which they are being used (e-maturity).

Notwithstanding the foregoing, the aforementioned processes have happened partially and gradually in Latin American countries, HEIs have been incorporating ERPs in the development of their processes, and managers have gradually valued such implementation. This positive perception is becoming increasingly consolidated due to the usefulness of this information –derived from accountability, and has also allowed an improving of their internal processes and academic outcomes, making them public, increasing their years of accreditation and thus gaining legitimacy in a highly distrustful society.

In the case of Chile, the differences among institutions regarding the above (Espinoza and González, 2013; López et al., 2015; Dooner et al., 2016), confirm that the country has not completely changed from a culture of quality assurance to quality

management (CINDA, 2019), to the extent that the mechanisms described are probably still implemented in many institutions as a way of responding to external standards, rather than a deep understanding of the benefits of incorporating a quality culture, relating to the findings of Fukushi (2010), Aguayo et al. (2009) and López et al. (2015). This is most likely amplified by the fact that the increasing legitimation among managers is not equally developed among many academics, a phenomenon that has been found in other countries and described in the literature (Cardoso et al., 2013; Larrauri et al., 2012; Watty, 2006).

The technology evolution is a historical event inextricably influenced by current political and historical facts, where the participation of citizens and institutions plays a key role and the value of transparency for democracy is based on the right of citizens to judge public bodies (United Nations Development Programme, 2006; Qureshi, 2009). In this way, the ability of HEIs to achieve higher levels of e-maturity will allow them to build legitimacy in societies where distrust occupies an important place. In the words of Terziyan et al. (2015) the ability to generate trust towards higher education institutions is based on data and well-designed and significant performance indicators, which allows decisions involving all stakeholders in a system of accountability.

As Zapata and Torre (2012a: 276) say regarding the Chilean higher education system, "the HEIs' quality assurance systems should strengthen their links with information systems and indicators or dashboards promoted by government agencies, which help to make macro decisions regarding university functioning, while allowing a process to be carried out of accountability that makes sense at a social level, outside the strictly university and political sphere".

Regarding the methodology used in the present study, expanding literature reviews to include grey literature, though difficult, is increasingly important in the fields of information science and organizational management, . The quality of a science domain can be increased by considering these sources and can bridge the research-practice gap (Adams et al., 2017), providing a balanced view of the evidence and a sense of context to answer a research aim, mainly when there is paucity of available evidence in commercial publications (Paez, 2017), as happened in the application of EMIS to accountability. In these areas, grey literature provides current, up-to-date information, allowing a big picture about what is happening with a body of literature (Bellefontaine and Lee, 2014).

Often, those who work in university institutional management do not publish their findings or practical experiences in peer-reviewed journals, but rather in congresses, seminars, or congresses or systematize their experience into guidelines from government agencies. Mixed narrative reviews that consider grey literature provide a mechanism to integrate these experiences in an efficient way, contributing to the higher education system as a whole. This is particularly evident in the case of world higher education, in the segment of people grouped in the so-called third space: "a collegial space where university professional staff and academic staff work collaboratively on complex and multifaceted projects" (Veles and Carter, 2016: 520). These professionals, with different degrees of experience in publications and academic research, are in a historical period of recognition and evolution, and several projects are being generated in United States, Australia, England, aimed at recognizing and enhancing their contribution to higher education (Whitchurch, 2009; Whitchurch, 2015; Veles and Carter, 2016; Berman and Pitman, 2010). Thus, mixed narrative reviews constitute an efficient methodology that recovers the contributions of this third space, for example, in the use of new technologies for management.

Finally, in a complementary sense, the findings of this study open the possibility of future pure quantitative studies exploring the relationship between the variables mentioned, in particular, regarding the perceptions that managers will have about the use of new technologies and quality management processes.

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Study 2

PERCEPTIONS ABOUT ACCREDITATION AND QUALITY MANAGEMENT IN HIGHER EDUCATION.
DEVELOPMENT OF A SPANISH-LANGUAGE QUESTIONNAIRE WITH A SAMPLE OF ACADEMICS FROM A PRIVATE UNIVERSITY

Luis González-Bravo[1], Dorin Stanciu[2], Nicolae Nistor[3], Bernardo Castro[4], Gonzalo Puentes[5], Maruzzella Valdivia[6][7][8]

ABSTRACT

Quality improvement policies occupy a central place in higher education and represent important requirements for educational institutions in a globalized economy, and quality-related processes legitimacy is enhanced by the participation of academic community. Therefore, the purpose of this study is to develop and validate a Spanish-language scale intended to assess perceptions about the accreditation process and the quality management in Higher Education Institutions. Based on prior findings, and using a one-time, cross-sectional design, 339 academics across four Chilean major academic cities were surveyed. Using structural equation modeling, two solutions with adequate fit indices were found: a four-factor solution comprised of Institutional relevance of accreditation, Objectivity of accreditation evaluation, Internal Quality Unit relevance for accreditation, Value of accreditation to educational system, as main constructs, and a six-factors solution, which included two additional constructs, i.e., Continuous Quality Management value and Students' participation value.

The questionnaire developed in our research allows higher education institutions to objectively assess and quantify the benefits of quality management and accreditation. Its results are particularly pertinent for countries with Spanish as an official language, taking into account the importance of internationalization of higher education.

Key concepts: Accreditation; Higher Education; Quality Management; Scale Development; Faculty Perceptions; Latin America; Structural Equation Modeling

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PERCEPCIONES ACERCA DE LA ACREDITACIÓN Y LA GESTIÓN DE LA CALIDAD EN LA EDUCACIÓN SUPERIOR. DESARROLLO DE UN CUESTIONARIO EN CASTELLANO CON UNA MUESTRA DE ACADÉMICOS DE UNA UNIVERSIDAD PRIVADA

RESUMEN

Las políticas de mejoramiento de la calidad ocupan un lugar central en la educación superior y representan requisitos importantes para las instituciones educativas en una economía globalizada, en tanto que la legitimidad de los procesos relacionados con la calidad se ve reforzada por la participación de la comunidad académica. En consecuencia, el propósito de este estudio es desarrollar y validar una escala en castellano destinada a evaluar las percepciones sobre el proceso de acreditación y la gestión de la calidad en las Instituciones de Educación Superior. En base a hallazgos anteriores, y utilizando un diseño transversal en un solo momento en el tiempo, se encuestaron 339 académicos en cuatro ciudades académicas importantes de Chile. Utilizando el modelado de ecuaciones estructurales, se encontraron dos soluciones con índices de ajuste adecuados: una solución de cuatro factores que incluye Relevancia institucional de la Acreditación, Objetividad de la evaluación de acreditación, Relevancia de la Unidad de Calidad Interna para la acreditación, Valor de la acreditación para el sistema educativo, como principales constructos, y una solución de seis factores, que incluyó dos constructos adicionales: el Valor de la gestión continua de la Calidad y el Valor de la participación de los Estudiantes. El cuestionario desarrollado en nuestra investigación, permite a las instituciones de educación superior evaluar y cuantificar objetivamente los beneficios de la gestión de la calidad y la acreditación. Sus resultados son particularmente pertinentes para países con el castellano como lengua oficial considerando la importancia de la internacionalización de la educación superior.

Conceptos Clave: Acreditación; Educación Superior; Gestión de la Calidad; Desarrollo de Escalas; Percepciones de Académicos; América Latina; Modelos de Ecuaciones Estructurales

Introduction

The need to clarify the effects of quality systems on educational institutions, in terms of empirical evidence of perceptions and attitudes about accreditation is increasingly relevant (Cardoso, Rosa, & Santos, 2013; Cardoso, Rosa, & Stensaker, 2015). The study of opinions and attitudes of academics regarding quality assurance/management in university education has gradually gained recognition as a field of research in itself (Larrauri, Espinosa, Rosario Muñoz, & Lechosa, 2012), and has experienced significant development during recent decades in countries like the United Kingdom, US (Larrauri et al., 2012), Portugal (Cardoso, 2009; Cardoso et al., 2013; Cardoso et al., 2015; Cardoso, Rosa, & Videira, 2018) and Chile (IPSOS, 2010b; Lemaitre, Maturana, Zenteno, & Alvarado, 2012; Zapata & Torre, 2012).

A distinction must be made between quality assurance and quality management in higher education. Although difficult, since there is not such a clear separation in the literature (Manatos, Sarrico, & Rosa, 2017), it is possible to assert that quality assurance consists of the existence of mechanisms, procedures and processes to ensure that a desired quality standard is achieved. To guarantee this quality and its improvement, quality assurance must be a cyclical process and must consider at least a measurement of educational quality, a judgment based on standards and an improvement based on priorities and plans. (Dolmans, Wolfhagen, & Scherpbier, 2003). There are external quality assurance systems -for example, government or private agencies- and internal ones, which the institution itself creates and manages (Cabrera Lanzo, 2018). Quality assurance implies a strong component of accountability, testing against standards, and ultimately, control (CNA-Chile, 2015: 4).

This notion is being replaced by the concept of quality management (QM), which emphasizes continuous development and improvement, rather than just responding to external certifications. It has a strong component of cultural change, where the different members of the organization are committed to continuous improvement processes (González-Bravo, Nistor, & Castro Ramírez, 2019).

Despite the importance of HEI professionals' participation in these quality assurance or quality management processes, relevant quantitative Spanish-language instruments, with adequate psychometric properties, are not reported in the literature. The perception that academics, managers and the university community have about quality and self-assessment are relevant for the sustainability of institutions and the need to achieve and promote adequate quality improvements. According to the World Bank, improving quality levels of higher education in Latin America, as well as having the appropriate instruments are of international interest when facing internationalization processes in a globalized economy (Ferreyra, Avitabile, & Paz, 2017).

The purpose of this study is to develop and validate a Spanish-language scale intended to assess the perceptions about the accreditation process and the quality management in Higher Education Institutions. The theoretical framework of this paper addresses the following points: a) benefits of accreditation as a self-assessment process, b) value of accreditation to Latin-American educational systems, c) peer-review roles and state guidelines, d) value of the internal quality unit, e) student participation, and f) continuous quality management. Consequently, based on a thorough literature review, four existing questionnaires, utilized in previous studies with similar interests, were selected and translated into Spanish by bilingual experts. After exploratory and confirmatory factor analysis, a final questionnaire was proposed.

Theoretical Framework

The literature regarding perceptions of quality and accreditation in HEIs is currently led by three major approaches, according to the functional roles of the population of interest within the educational centers. The first approach includes studies that compare perceptions between different institutional levels. In this regard, the most relevant research was conducted by Putnam (2000), which included presidents, full-time faculty members, chief administrative officers, and governing board members, and by Vieira (2002), which included students and faculty. The second approach consists of studies focusing

on assessing the students' perceptions (Cardoso, 2009; Volkwein, Lattuca, Harper, & Domingo, 2007). Finally, the third perspective stems from studies that focused on evaluating the perceptions of managers and academics about these issues (Cardoso et al., 2013; Cardoso et al., 2015; Cardoso et al., 2018; Gregorutti & Bon, 2012; Newton, 2002; Trullen & Rodríguez, 2013).

The main findings about these processes on HEIs are presented below, organized into main topics that the literature review regarding perceptions about accreditation and quality management, has indicated as relevant (Busco, Dooner, & d'Alencon, 2018; Cardoso et al., 2013; Cardoso et al., 2015; IPSOS, 2010b; Kleijnen, Dolmans, Willems, & van Hout, 2011; Lemaitre, Maturana, Zenteno, & Alvarado, 2011; Scharager, 2017; Zapata & Torre, 2012).

Benefits of Accreditation as a Self-Assessment Process

Generally, faculty support quality and accreditation processes, as long as these do not interfere in their daily activities (Laughton, 2003), and appreciate that these processes can serve the quality of teaching and learning (Cardoso et al., 2013; Huusko & Ursin, 2010; Kleijnen et al., 2011). In 2006, the New England Association of Schools and Colleges (NEASC) conducted research on educational institutions at different levels. For HEIs, a sample of college and university presidents selected from a blend of 16 public and 14 independent institutions was surveyed. The main findings included that 97% of respondents agreed that accreditation "fulfilled the function of 'promoting quality' at their institution" (which is accomplished through the continuous improvement of different processes); 100% believed that accreditation "fulfilled the function of providing public assurance of the quality of education" at their institution; the 97% of respondents agreed that "participation in accreditation was useful to faculty and staff at their institution" (NEASC, 2006, p. 20).

The direct benefits of accreditation, indicated by academic personnel, included faculty recruitment, infrastructure improvement, curricular redesign and other aspects, as pointed out by De Vincenzi (2013) who conducted document analysis and semi-structured interviews in three universities in Argentina, spanning the period

of 2000-2005. De Vincenzi (2013) found that organizational changes produced by accreditation were due to different political or contextual factors, such as perceptions about educational quality or state regulations. Regarding institutional evaluation, even though respondents valued the validity of the evaluation, they also reported that they only did it systematically when the State demanded it. In addition, although there had been changes in teaching, research and extension to the community, these have often been the results of external pressures and requirements rather than outcomes of a natural internal development process.

The findings reported above are consistent with those identified in Salas Durazo's (2013) qualitative study, and in Zapata and Torre's (2012) and Busco et al.'s (2018) mixed qualitative-quantitative research. Based on the in-depth interviews of four career coordinators and one common curricular specialist, Salas Durazo (2013) found that the introduction of accreditation in Mexico City transformed teaching and administrative practice, especially in the field of planning and management tools, e.g., planning, development and evaluation of the courses. This positively influenced the related decision-making process and led to an improvement in teaching and in the administrative practice of HEIs (Salas Durazo, 2013).

Busco et al. (2018), in a case study at Universidad de Chile, reported significant effects of accreditation in three main areas: organizational learning, cultural shift, and university and stakeholders. At managerial levels, the authors identified positive effects in "data gathering and information access, planning of curricula and teaching, professors' career development, and relationships with the international environment" (Busco et al., 2018, p. 445). Despite the aforementioned, self-assessment produced internal tensions on a cultural level, associated with extra work and lack of recognition of functions. Along the same lines of empirical evidence, a new style of decision-making that incorporates the results of self-evaluation in the field of teaching is reported in a quantitative-qualitative study developed by Zapata and Torre (2012) who reported that a greater value to teaching is added.

In Chile, the main effects of accreditation are observed in institutional management, e.g., diagnostic capacity, 90.3%; and information management, 85.9% (IPSOS, 2010a, 2010b). In IPSOS' seminal study for Chile, 93.8% of the respondents considered that accreditation contributed to improvement of quality of institutional management, while other areas benefited were observed such as undergraduate teaching (87.5%), program offerings (76.6%), teaching processes (76.1%), graduate follow-up (74.1%) and research (51.6%). To a lesser extent, postgraduate programs (42.8%) and community linkage were observed in certain specific areas: definition of public policies (82.7%) and formalization of the link with the community (81.6%) (IPSOS, 2010a, 2010b).

Newton (2002) revealed that professors do not passively accept the particular changes or demands of quality assurance policies or systems, and that policy implementation is perceived as complex and uneven. Faculty members are not inert recipients of management objectives; instead, academic staff, together with all actors involved, are 'makers' and 'shapers' of such policy. Even though accountability can be considered as "proving, in the most efficient manner, responsibility for the performance of certain results" (Kai, 2009, p. 40), academics in key management positions have mixed feelings about this accountability, i.e., they wish to retain their academic freedom and 'autonomy', but they do not oppose the idea of being evaluated by external agents, as long as overall quality improves (Ngwenya, 2003).This is consistent with the findings of Cardoso et al. (2013) and Watty (2006), who reported that quality assurance on many occasions is perceived as an excessive control that will affect their academic development, in such a way that academics sometimes adopt instrumental behaviors to circumvent the process.

In general, academics value accreditation as a moderately positive process, while managers evaluate it as very positive (Cardoso et al., 2013; Stensaker, Langfeldt, Harvey, Huisman, & Westerheijden, 2011). To this end, Larrauri et al. (2012) reviewed 22 studies about quality management perceptions among academics and managers from nine countries, four of these having Spanish as official language, i.e., Argentina, Chile, Mexico, and Spain. They found that opinions

differ depending on their position in HEIs: instructors in managerial positions are more willing to accept the rules imposed by quality assurance systems and more optimistic about the consequences of quality assurance programs within HEIs, than the non-managerial academic staff.

Value of Accreditation to the Latin-American Educational System

In South America, most findings show recognition among academics about positive effects of the quality assurance system, in terms of the value of higher education accountability (Vásquez, 2015). Zapata and Torre (2012) reported the results of a study with 16 universities from non-Anglo-Saxon countries showing greater progress in developing their QA systems: Mexico, Costa Rica, Colombia, Chile, Argentina, Portugal and Spain. They found that some of the positive effects of QA processes included change in the institutional QA framework, assessment of information for decision-making and a better relationship between the State and institutions.

One of the major goals of IPSOS (2010a, 2010b) was to provide the National Accreditation Commission of Chile (CNA) with information about the effects of institutional accreditation on HEIs. Its major findings included that participants pointed out the value of accreditation and CNA for the Chilean higher education system and as an opportunity for self-knowledge and learning for institutions.

Currently there is consensus in Latin America that quality assurance processes have had a real and significant impact on higher education institutions, contributing to the development of self-regulation instruments. Thus, its importance for universities today is fundamental and has a direct impact on the improvement of education in the different institutions (Lemaitre, 2019).

In 2019, CNA-Chile asked 711 institutional authorities and peer reviewers about their perceptions regarding the progress and challenges in these issues, in the context of improving the accreditation law. Among the multiple findings, they detected that mandatory integral accreditation for institutions was mentioned in

the first place within the changes that will have a positive effect on institutions, and that the law will stimulate institutions to certainly improve their quality standards to better education for students (CNA-Chile, 2019).

In Latin America, Rresistance to change and to implementation of cultural changes in universities, has also been reported as an obstacle to the setting of a self-evaluation and accreditation process in Ecuador (Ayala Bolaños, 2018). Meanwhile, in Argentina, although there is recognition among university authorities that quality policies have contributed to the improvement of management, institutional transparency, and the incorporation of an evaluation culture, they express concern regarding an excessive bureaucratization of activities and reports, the risk of forced institutional homogenization or the lack of consistency in external evaluation reports (De Vincenzi, 2018).

Roles of Peer Reviewers and State Guidelines

The effectiveness of supervision, control or external support in accreditation processes is based on a broad participation of academics. At the same time, the standards that will be applied in the evaluation of the institution, although developed independently, must be based on consolidated national policies and applied independently of specific political interests or of third parties. The aforementioned elements allow HEIs to combine autonomy with responsibility and openness to the international environment (Lemaitre & Anderson, 2010).

Less desirable aspects included criticism towards inconsistencies in the application of criteria, use of indicators, accuracy in decisions of accreditation, conflicts of interest, training and behavior of peer reviewers (Zapata & Torre, 2012), weak participation mechanisms, links between HE government policies and results of accreditation processes (Proyecto Alpha, 2011), and an absence of a deeper reflection in academics (Cardoso et al., 2013; Gregorutti & Bon, 2012; Laughton, 2003; Lewis, 2016; Loukkola & Zhang, 2010; Stensaker et al., 2011).

Although today the use of evaluation criteria and rubrics by peer reviewers is valued, inasmuch as it guarantees uniformity and

transparency in peer judgments, there has been an overvaluation of formal aspects (De Vincenzi, 2018), displacing more substantial academic aspects to the background. Being able to develop a more substantial view would imply that they could not only act as auditors in management and accreditation processes, but also in those processes where they could speak as peers who express expert opinions that recognize the diversity of educational institutions and projects (Bernasconi, Fernández, Irarrázaval, Scharager, & Villalón, 2020).

Role of the Internal Quality Unit

The departments in charge of quality processes in Chilean universities have a diversity of organizational forms and characteristics. For example, Venables and Van Gastel (2014) performed an analysis of three Chilean universities and pointed out that this diversity is due to the fact that these units carry out a work of "translation" and "generation of meaning" of the environmental regulations; these units are positively evaluated by academics and higher authorities, and are seen more as a unit of support rather than control (Venables & Van Gastel, 2014). The units that have emphasized accountability, rather than the internal management of a culture of quality, tend to focus more on control, generating reactive systems to demands and compliance with external requirements (Scharager, 2017). Most of these units depend hierarchically on the top management level of the university or in close administrative proximity, and frequently they are part of an academic vice-chancellorship. In universities with less consolidated collegiate bodies, these units centralize more power, although in general they are well evaluated (Scharager, 2017). In fact, they have significant experience in different areas of higher education (Dooner, Armanet, Busco, d'Alencon, & Salomone, 2016; Lemaitre et al., 2012; Scharager, 2017; Scharager & Rodríguez Anaiz, 2019), and have become highly relevant for the accreditation and accountability of HEIs, being experts in different areas and transferring good practices, triggering reflection and institutional learning (Scharager, 2017; Venables & Van Gastel, 2014). In the words of Campo Herrera (2018), they go slightly beyond their official role, providing "support and technical advice to Schools and Programs in areas related to self-assessment and curricular assessment processes, as well as teacher updating, skill assessment,

virtual support for learning and its methodology, accreditation, among others" (p. 143).

Student Participation

Student participation in processes of accreditation and quality management is a well-valued and widespread practice (Lemaitre, 2019), but its true impact in the teaching-learning process is yet to be determined. Cardoso's (2009) research into two Portuguese HEIs found that while students evaluate the assessment of the institution positively, "appear in a position of maximum distance in relation to evaluation, both in socio-cognitive terms, and in terms of their 'practical' experience in the process" (p. 7). Part of this is because the students' educational experience has changed with more emerging demands (Volkwein et al., 2007).

The future of quality management should incorporate a greater participation of students with full interaction and learning among all levels (Westerheijden, Stensaker, Rosa, & Corbett, 2014), which is not happening today due to structures of hierarchical and bureaucratic management and government (Cardoso et al., 2015; Martínez Iñiguez, Tobón Tobón, & Romero Sandoval, 2017).

Recently in Chile and Colombia, research exploring student perceptions about quality has been published, where starting from accreditation standards, an acceptable, but absolutely satisfactory, perception about the quality of the educational service offered has been found (Vera-Millalén, 2018; Viloria-Escobar, Bertel-Narváez, & Daza-Corredor, 2015). To explicitly consider the students' increasing demands has been reported as a key factor that promotes the culture of quality at the Institution, but raises some open questions. In the words of Lemaitre (2019) "How to activate and engage ordinary students in quality culture activities?" (p. 138).

Continuous Quality Management

The HE sector has been progressively implementing high quality management systems over the last two decades, with a substantial deliberation within academic institutions about the essence of

such systems in higher education, and in an aggressive business environment which pushes HEIs to more complex, stable and permanent development (In'airat & Kassem, 2014; Kauko, 2014; Trakman, 2008). The similarities and differences in quality concepts and organizational values were studied in the Netherlands by Kleijnen et al. (2011), who found that although these concepts and values were similar, effective departments had a more structured quality management commitment, closely linked to the daily work and its continuous improvement. That commitment with continuous improvement usually involves teamwork, and the first stage is gaining additional knowledge followed by a change of attitude, changing the relationship of each person and team with the surrounding environment (Taskov & Mitreva, 2015).

In Latin America, quality processes and mechanisms described above are often implemented in many institutions, as a way of responding to external standards, rather than following a deep and full understanding of the culture of quality. The case of Chile is no exception, insofar as many of the improvements in quality were historically motivated by factors external to the legitimacy of the institutions, rather than the installation of a culture of quality (CIPER-CHILE, 2012; Pedraja-Rejas & Rodríguez-Ponce, 2015; Proyecto Alpha, 2011).

Quality management (QM) implies an improvement in quality as a whole (Dzimińska, Fijałkowska, & Sułkowski, 2018), which includes the existence of internal and external evaluation processes, self-evaluation processes, progressive improvement, continuous monitoring of processes, resource management and the incorporation of remedial measures (Pulido-Roccatagliata & Espinoza-Díaz, 2018). It also encompasses policies, concepts, approaches, ideas, systems and processes designed to guarantee the systematic maintenance and improvement of quality within an institution, having a more comprehensive character and deep connection with meaningful decision-making (Pratasavitskaya & Stensaker, 2010).

Existing Specific Measurement Instruments

We have reviewed the several English-language questionnaires to assess perceptions toward quality management and accreditation that have been developed over the past 40 years (Kleijnen et al., 2011; Larrauri et al., 2012). The Higher Education Survey, used by the New England Association of Schools & Colleges (NEASC, 2006), has 25 items that assess perceived impact of accreditation processes inside an institution. The original survey questions were developed in conjunction with researchers outside NEASC, validating the robustness and validity of the questions, and then proceeding to a pretest before its final application (NEASC, 2006). Another example in the United States is the research developed by Schroeder (2008), who adapted the Quality Management Questionnaire of Grandzol and Gershon (1998).

In the Netherlands, Kleijnen et al. (2011), used a Quality Management Scale (QMA) to assess several aspects related to quality design and quality assurance (inspection, evaluation and improvement activities, involvement of faculty in quality management, and communication). In South Africa, Ngwenya (2003) proposed a survey oriented to exploring quality assurance in South African Higher Education and its implementation at the University of Durban-Westville (UDW). Besides biographical data, the questionnaire consists of 11 closed items and two open questions. The questionnaire includes reviews of concepts and definitions of quality, the importance of institutional self-evaluation and external audits, the relationship between quality and academic development, relationships between national and institutional quality policy, the implementation of quality assurance mechanisms in UDW, personal quality and team development, management familiarity with relevant legislation and policies, the evaluation of academic programs by students and other issues considered important by respondents.

To summarize, we identified and analyzed the most relevant studies, with the overarching purpose of developing and validating a Spanish-language scale which assesses perceptions about the accreditation process and quality management in Higher Education

Institutions. Our literature review led to the identification of six core areas present in the quality & accreditation perceptions: benefits of accreditation, value of accreditation to the Latin-American educational system, peer-reviewers' roles and state guidelines, value of the internal quality unit, student participation and continuous quality management. Therefore, our main research question was whether or not the same main factors that transpired from our literary review can be isolated in our research. Consequently, the corresponding working hypothesis was that we would find all these factors in the structure of our model.

Methodology

Research Design

A one-time, cross-sectional research design was utilized in order to identify relevant association between the variables of interest (main scale constructs corresponding to hypothesized subscales) and their contribution to the perception regarding the accreditation process.

Participants

The research targeted a private University's personnel without managerial positions, from four Chilean cities (Concepción, Puerto Montt, Santiago and Valdivia), which made up a population of 4,679 individuals. For the current study, a purposive, convenience research sample, totaling 339 persons, was drawn from this larger population. The mean age of our sample was $M = 40.98$ years, standard deviation $SD = 11.50$. 198 (58.41%) participants were females, with mean age $M = 40.03$ years, $SD = 11.34$; 134 (39.53%) were males, with mean age $M = 42.40$ years, $SD = 11.63$; and 7 (2.06%), refused to declare their gender and age. 161 (47.49%) participants were tenured faculty members, with mean age $M = 41.55$ years, $SD = 13.19$; 168 (49.45%) were part-time faculty, with mean age $M = 40.57$years, $SD = 9.57$, and 10 (2.95%) participants did not declare their employment status, mean age $M = 33.67$ years, $SD = 5.51$.

The purposive sampling including academics from several University campuses, without management positions, is pertinent

when considering the antecedents previously presented in the theoretical framework regarding the comparison with managers' perceptions (Cardoso et al., 2013; Stensaker et al., 2011), and potential geographic differences. A purposive, convenience research sample, as a complementary sequential stage of a measure validation, has been previously reported by Milne, Creedy, and West (2016) and Fernandez, Omar, and Husain (2013) with positive results, and even in the study of Carpio et al. (1999) considering Chilean and Canadian samples.

Data Collection Procedure

Faculty academic personnel were sent invitations by their corresponding University Program Directors, for each city. The invitations informed participants about the objectives of the study, confidentiality of data processing, and contact data of researchers. In addition, participants were informed that their participation was voluntary, *i.e.*, did not imply any financial or other type of reward, considering an *Informed Consent* in order to accept to participate in the research. Finally, paper printed questionnaires were sent via regular mail to participants in the four Chilean cities with the aid of Program secretaries in each campus.

Data Analysis

The collected data was subject to a preprocessing procedure consisting of cleaning and preparation (e.g., coding, reversing inverted/negatively formulated items, missing cases and outlier analyses) for specific data analyses. After preprocessing, an exploratory factor analysis (EFA) and a consequent confirmatory factor analysis (CFA) led to the final models.

Factor analysis, both exploratory and confirmatory, is regularly used in the social sciences for the creation or validation of instruments, insofar as they allow researchers to determine which theoretical constructs underlie a given set of data and the extent to which these constructs represent the original variables (Henson & Roberts, 2016). On one hand, exploratory factor analysis (EFA) explores the data and provides guidance from the factor number through to identifying

correlations among observable variables (Carpenter, 2018). The confirmatory factor analysis, on the other hand, allows the researchers to test the hypotheses about the relationship between indicators and latent dimensions, detected through the EFA (Batista-Foguet, Coenders, & Alonso, 2004; Carpenter, 2018).

The aforementioned applies to Likert-type scale items, to operationalize unobserved constructs (Li, 2016). Because data from surveys are often on an ordinal level, and sometimes slightly non-normally distributed, it is suggested to use estimators that are robust against nonnormality, such as maximum-likelihood (ML). This was the main estimation method used for this research, for both the EFA and the CFA (Babyak & Green, 2010; Knekta, Runyon, & Eddy, 2019; Li, 2016).

Particularly in the EFA case, previous studies have reported that EFA conducted on Likert scales' items, could produce an overinflated number of factors (Alexis Dinno, 2009; Glorfeld, 1995). In addition, specific research concerning the differences in factor solutions between interval and ordinal data, suggest that polychoric correlations may provide a more accurate reproduction of the observed data (Holgado-Tello, Chacón-Moscoso, Barbero-García, & Vila-Abad, 2008). For this reason, the polychoric correlations alternative was additionally employed in the factor analysis provided by R's *psych* package (Revelle, 2018).

Data Preprocessing and Preparation

The collected data was processed using IBM™ SPSS (IBM, 2016) version 24, and IBM AMOS™ (Arbuckle, 2014). Almost all computations were replicated using the R Statistical Computing Software (R Core Team, 2017). Missing data was verified for patterns of missingness and for participants' lack of engagement and that no cases of missing data were identified. However, the multivariate outlier's analysis using the Mahalanobis distance identified 29 cases of outliers that were excluded from the records used in developing the models. A further inspection of these outliers revealed that they were the results of unengaged responding, *i.e.*, respondents whose

patterns of responses were straight-lined and/or otherwise aberrant, and, as such, potentially indicative for disengaging from honest and thoughtful responding. Consequently, these respondents were not considered further in the analyses.

Scale Development

Initial measures.

Four existing questionnaires, utilized in previous studies with similar interests, were considered as sources for the questionnaire developed in our research, and the list of items whose content was adapted to Chilean culture and quality assurance system were extracted from them. Four academics who have participated in leading accreditation processes agreed upon the conceptual and content relevance and the phrasing of items, and a final 38 item (question) inventory was built.

Higher Education Survey (NEASC, 2006). This scale included 25 items measured on a 5-point Likert Scale. NEASC (2006) applied it originally to 21 respondents representing higher education public institutions and 14 respondents from higher education independent institutions, but no reliability scores were reported.

Quality assurance in South African Higher Education (QAS). Implemented at the University of Durban-Westville (Ngwenya, 2003), the questionnaire consisted of 11 closed items (Likert: Five Points, from *Strongly agree* to *Strongly disagree*). Originally applied to 24 managers, no factor structure or reliability score were reported.

Quality Management Questionnaire (QMC). The scale is a 62-item, six-point Likert scale, ranging from *strongly disagree* to *strongly agree* (Grandzol & Gershon, 1998). It was applied originally to 275 suppliers of the US armed forces (Grandzol & Gershon, 1998; Schroeder, 2008). The reported reliability scores were 0.87 for customer focus, 0.84 for cooperation, 0.82 for process management, 0.81 for learning, 0.75 for continuous improvement, 0.74 for employee fulfillment, and 0.73 for leadership.

The Quality Management Activities Scale (QMA). This scale consisted of 16-items on a five-point Likert scale, from *fully disagree* to *fully agree*, and was separated into three subscales. The reliability scores (Cronbach's alpha) reported in the original study for each subscale were 0.89 for the PDCA cycle, 0.84 for the external evaluation and communication subscale, and 0.73 for the internal evaluation and communication, while the reported reliability score for the entire scale was 0.93. This scale was originally applied to 266 respondents in the Netherland's Higher Education System (Kleijnen et al., 2011).

The instrument employed.
A composite of 38-item, 5 point Likert scale, ranging from *strongly disagree* to *strongly agree* was built by incorporating a) 23 items (items 1 to 23) taken from the Higher Education Survey (NEASC, 2006), b) 10 items (24 to 33) from the Quality Assurance in South African Higher Education scale (Ngwenya, 2003), c) four items (34 to 37) from the Quality Management Questionnaire (Grandzol & Gershon, 1998; Schroeder, 2008) and, lastly, d) a single item (item 38) from the Quality Management Activities Scale (Kleijnen et al., 2011).

This 38-item scale was translated into Spanish using a stepwise protocol developed by the research team and based on previous research (Arnau, Martinez, Niño de Guzmán, Herth, & Yoshiyuki Konishi, 2010; Collazo, 2005; Ruiz, Berrocal, López, & Rivas, 2002):

a) A first integral translation from English to Spanish based on the original sources was performed by a university professor of English who had no affiliation with the research team (Version S1).

b) This first version was revised in terms of content by all authors, and, consequently, was sent to the University Ethics Committee (Version S2).

c) The version already approved by University Ethics Committee (Version S2E), was translated back into English language by a translator to analyze its concordance with the original version.

d) Finally, it was compared to the Spanish version and approved by two independent bilingual academics.

Results

Model Development

Exploratory factor analysis.

Both the parallel factor analysis conducted using an SPSS syntax developed by Fabrigar and Wegener (2012), and replication of this parallel analysis using the online parallel analysis engine developed by Patil, Surendra, Sanjay, and Donavan (2007), indicated a 4-factor solution. However, another parallel analysis conducted in R (R Core Team, 2017) using Dinno's (2012) *paran* package and replicating the same analysis with the R's *psych* package (Revelle, 2018), indicated a 7 to 10 factor solution. Another EFA using Maximum Likelihood (ML) indicated a substantially different 10-factor solution based on eigenvalues greater than 1.0.

Alternative polychoric correlations in the factor analysis provided by the R's *psych* package (Revelle, 2018) were employed and suggested 4 components and 6 common factors (see Figure 1 and Table 1 for the graphical solution and, respectively, for the EFA results).
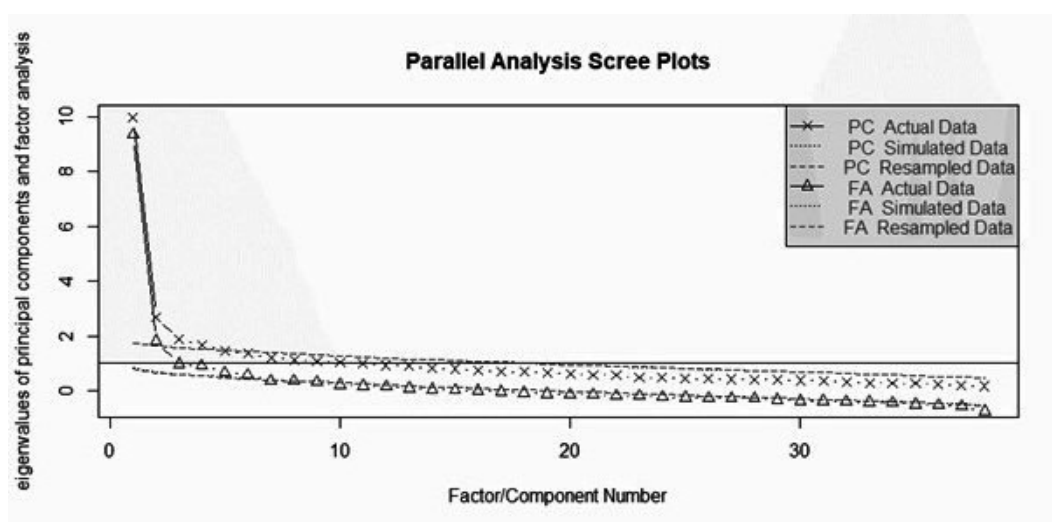

Figure 1: Parallel analysis using the polychoric correlations (Revelle, 2018) indicating 4 components, and, respectively, 6 common factors

Table 1.

Pattern matrix generated by EFA

Item	Factor			
	A	B	C	D
it2_HES2	0.855			
it5_HES5	0.78			
it4_HES4	0.779			
it1_HES1	0.738			
it3_HES3	0.62			
it10_HES10		0.862		
it18_HES18		0.611		
it9_HES9		0.578		
it19_HES19		0.426		
it29_QAS6			0.758	
it28_QAS5			0.688	
it31_QAS8			0.671	
it21_HES21				0.91
it22_HES22				0.637

The inspection of variance explained, the extracted communalities, and the pattern matrix of EFA using Maximum Likelihood as the common factor analysis, with both Promax and Direct Oblimin rotations, revealed that the cumulative contribution of the extracted factors to the cumulative variance had a rather uniform rate of descent.

Problematic items were removed following an iterative process that considered the severity and overlapping of problems that they pose for a clean solution. The first criterion that we considered was to keep the explained variance to the maximum possible, by first eliminating the items that did not load on any factors during EFA using ML with Promax rotation, without constraining or forcing a smaller number of items than those automatically selected by the algorithm based on eigenvalues.

A four-factor solution resulted from the iterative EFA, during which 24 items were eliminated based on the above-mentioned criteria. This solution explained 55.49% of the variance in data. The

sampling adequacy was meritorious, as measured with the Kaiser-Meyer-Olkin test of .86 (Kaiser, 1970, 1974).

Confirmatory factor analysis.

Based on the results from the EFA presented above, a 4-factor model was built and tested with IBM SPSS AMOS ver. 24. Factor A (Institutional relevance of accreditation) included loadings from scales assessing facets of positive effects of accreditation on the university. Factor B (Objectivity of accreditation evaluation) included loadings from items that assess clarity, quality and completeness of functions and support from the national accreditation commission and peer reviewers. Factor C (Internal Quality Unit relevance for accreditation) is associated with items that assess value and functions of the internal quality unit, within the organization. Finally, Factor D (Value of accreditation to educational system), expands the scope outside the university, towards the educational system as a whole, evaluating the value of accreditation for the system mentioned.

The model had good to very good indices of fit, *e.g.*, *NFI* = .947, *PCLOSE* = .684, *RMR* = .023, *RMSEA* = .045, *SRMR* = .036. Fit indices are presented in more detail in Table 4.

Nevertheless, the model had slight discriminatory and convergent validity risks associated with factor B, whose maximum shared variance was slightly higher than the average variance extracted (.55 vs. .46).

Because the initial analyses regarding the suggested number of factors indicated between four and six factors, we conducted a series of separate EFA's on the excluded items and identified two factors which could be included in the initial four-factor model. Consequently, these two alternative models were considered for further confirmatory factor analysis using IBM SPSS AMOS ™ ver. 25. These two additional factors (E & F) are related to "Continuous Quality Management value" and to "Student participation value", respectively.

The 6-factor model also had good fit indices, *e.g.*, *NFI* = .931, *PCLOSE* = .899, *RMR* = .027, *RMSEA* = .041, *SRMR* = .037.

However, the discriminant and validity issue grew and affected also factors A (a maximum shared variance of .76 vs. an average variance extracted of .60) and E (maximum shared variance of .76 vs. an average shared variance of .45), along with B's validity concerns, inherited from the 4-factor model. The indices for reliability and validity are presented in detail in Table 2.

Table 2.
Indices of reliability and discriminant and convergent validity

Model	Factor	*alpha*	CR	AVE	MSV	SQRT(AVE)	Inter-factor correlations					
							A	B	C	D	E	F
A	4F	0.88	0.88	0.59	0.55	0.77	-					
	6F		0.88	0.60	0.76*	0.77*	-					
B	4F	0.69	0.71	0.46	0.55*	0.68*	0.74	-				
	6F		0.71	0.46	0.63*	0.68*	0.74	-				
C	4F	0.75	0.76	0.51	0.15	0.71	0.39	0.34	-			
	6F		0.76	0.51	0.25	0.71	0.39	0.34	-			
D	4F	0.77	0.78	0.64	0.45	0.80	0.67	0.60	0.38	-		
	6F		0.78	0.64	0.52	0.80	0.67	0.60	0.38	-		
E	6F	0.71	0.71	0.45	0.76*	0.67*	0.87	0.79	0.50	0.72	-	
F	6F	0.88	0.89	0.79	0.14	0.89	0.17	0.17	0.38	0.17	0.32	-

Note: *Alpha* is Cronbach's alpha; *CR* is composite reliability; *AVE* is average variance extracted; *MSV* is maximum shared variance; *ASV* is average shared variance. The starred indices suggest possible risks of discriminant or, respectively, convergent validity.

Both the 4-factor and the 6-factor models are depicted in Figures 2 and, respectively, 3. The item loadings for the four and six-factor models are presented in Table 3. The fit indices of 4-factor and six-factor solutions are showed in Table 4. The items' coding preserve the acronyms from original sources, *i.e.*, HES (NEASC, 2006), QAS (Ngwenya, 2003), QMA (Kleijnen et al., 2011) and QMQ (Schroeder, 2008).
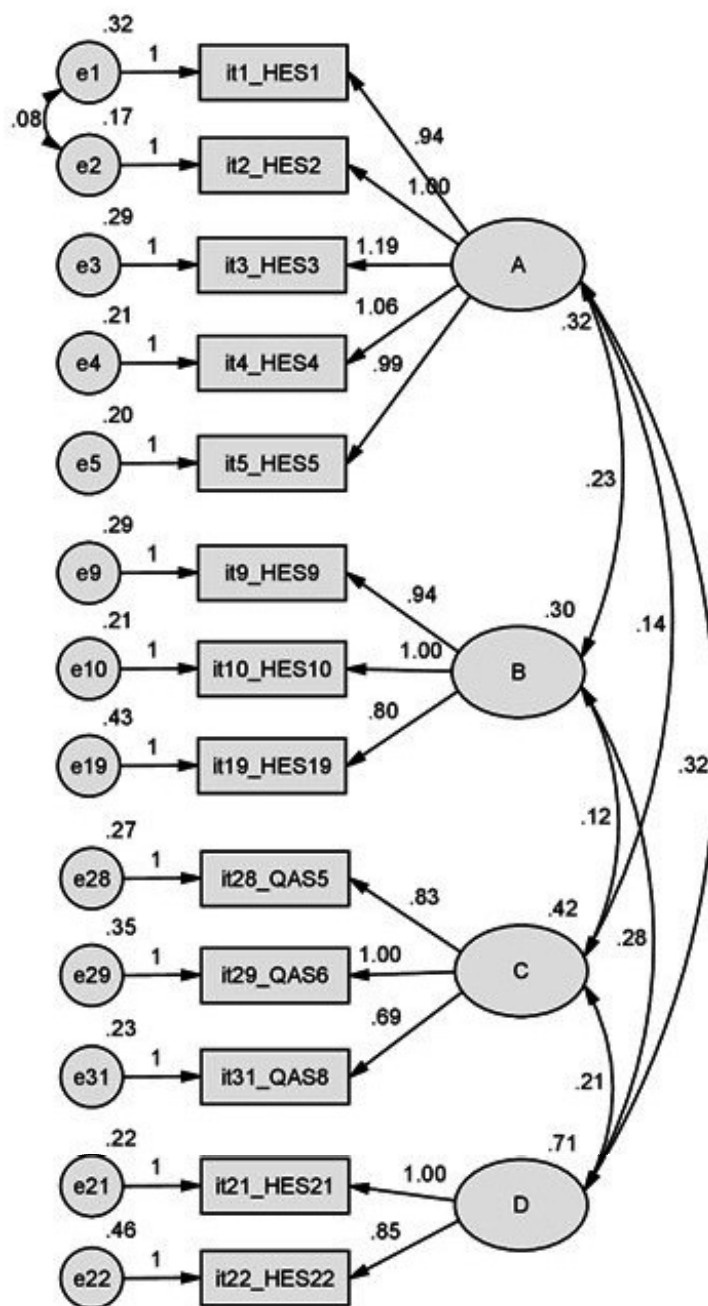
Figure 2.
The four-factor model. The factors are A) Institutional relevance of accreditation, B) Objectivity of accreditation evaluation, C) Internal Quality Unit relevance for accreditation, and D) Value of accreditation to educational system
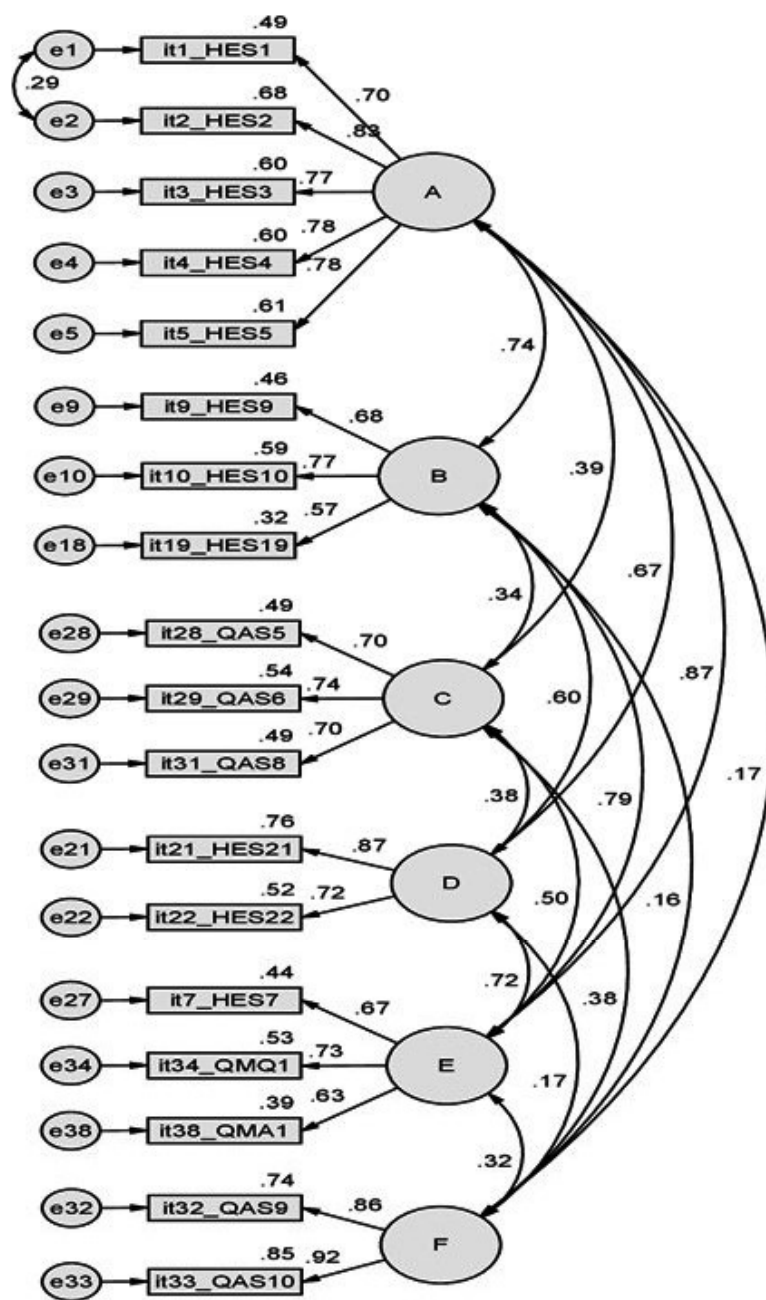
Figure 3.
The six-factor model. In addition to factors A through D, factors E, Continuous Quality Management Value, and F, Student Participation Value, respectively, were added to the four-factor model

Table 3.
Item loadings for the two models

		Weight	
Factor	Item	4-factor	6-factor
A	it1_HES1	0.685	0.699
	it2_HES2	0.809	0.825
	it3_HES3	0.781	0.772
	it4_HES4	0.794	0.777
	it5_HES5	0.777	0.781
B	it9_HES9	0.689	0.678
	it10_HES10	0.766	0.769
	it19_HES19	0.556	0.566
C	it28_QAS5	0.718	0.702
	it29_QAS6	0.741	0.738
	it31_QAS8	0.679	0.699
D	it21_HES21	0.872	0.873
	it22_HES22	0.725	0.724
E	it7_HES7		0.665
	it34_QMQ1		0.726
	it38_QMA1		0.626
F	it32_QAS9		0.861
	it33_QAS10		0.920

Table 4.
Fit indices of 4-factor and 6-factor solutions

Model	*CMIN*	*RMR*	*GFI*	*NFI*	*RFI*	*CFI*	*RMSEA*	*PCLOSE*	*Standardized RMR*
4F Model	1.620	.023	.957	.947	.928	.979	.045	.684	.0364
6F Model	1.514	.027	.941	.931	.912	.975	.041	.899	.0374

Note. CMIN: ratio of the chi-square statistic over degrees of freedom, *RMR*: root mean square residual, *GFI*: Goodness of Fit Index, *NFI*: Normed Fit Index, *RFI*: relative fit index, *CFI*: comparative fit index, *RMSEA*, root mean square error of approximation, *PCLOSE*: *p* value for testing the null hypothesis that *RMSEA* is less than .05, *RMR*: root mean square residual.

The Chi-square tests performed for models and its pathways, indicated that both final 4-factor and 6-factor models are invariant across gender and job type. It is necessary to mention that item 18 (it18_HES18), initially considered in both models, was later excluded to obtain configural invariance across job type (tenured vs. part-time).

Discussion and Conclusions

The present research aimed to build a scale regarding faculty perceptions with respect to accreditation and quality management processes in Latin-American HEIs that have recently been through an accreditation process following the structure that combines self-evaluation, external peer evaluation and use of performance indicators (Ganga Contreras, 2016). Thus, our research achieved its main objective, *i.e.,* the construction of a feasible multidimensional measurement instrument, and has responded positively to its research question, finding factors present in previous instruments or in our literary review.

We used structural equation modeling and identified two models, with appropriate fit indices, that could underpin the phenomenon addressed. The first one, a 4-factor structure, includes factors A, *Institutional relevance of accreditation*, B, *Objectivity of accreditation evaluation*, C, *Internal Quality Unit relevance for accreditation*, and D, *Value of accreditation to educational system*, whereas the second, 6-factor model, includes factors E, *Continuous quality management value*, and F, *Student participation value*.

From a more descriptive or idiographic perspective, the results parallel the characteristics of the accreditation process and the level of increasing evolution of quality assurance systems as a whole (Zapata & Torre, 2012). In our research, greater factor loadings were found in items which assess institutional relevance of accreditation. This is consistent with the consensus that exists in Latin America about the value of accreditation for institutions (Lemaitre, 2019), which is also regularly verified in Chile (CNA-Chile, 2019) and complementary, this is not surprising, since self-assessment itself is an opportunity to generate virtuous quality cycles inside the institution, with a wide participation of several actors.

The other three factors found – and their meanings – are related to previous literature. The value of objectivity of the accreditation evaluation is clearly present as a factor in the adjusted scale, related with the experience of peer review committee, and the training to

prepare for an accreditation visit. In Chile, in the study made by IPSOS (2010a, 2010b) for the CNA, the participants pointed out the value of accreditation for the Chilean higher education system, as an opportunity for self-knowledge and learning for institutions. The importance of quality assurance as a whole can also be seen in Zapata and Torre's (2012) study, conducted in several Latin-American countries, and in those studies that have found in Chile a critical position about inconsistencies in the application of criteria, use of indicators, rigor in decisions about accreditation, conflicts of interest, training and practices of peer reviewers, among others, which is consistent with recent assertions of Bernasconi et al. (2020) regarding the Chilean context, and De Vincenzi (2018) or Aguilera (2017), in relation to Argentina.

With respect to the factor *Value of accreditation to educational system*, as noted by IPSOS (2010a, 2010b) and Dooner et al. (2016), among others, the main positive effects of accreditation are observed in institutional management improvement, undergraduate teaching program offers, teaching processes, graduate follow-up and research. The relationship that must exist between the HEI quality assurance systems and those of the environment should be understood by integrating the approaches of Toro (2012) and Mizikaci (2006): a HEI as a dynamic system with multiple interactions within itself and the environment, where accountability and quality assurance function as a linking element.

Regarding the Internal Quality Unit relevance for accreditation, the quality assurance unit and its functions performed within the university fulfill a central role in the perception of accreditation and quality inside the institution (Campo Herrera, 2018; Scharager, 2017; Scharager & Rodríguez Anaiz, 2019; Venables & Van Gastel, 2014). This is due to, on one hand, to the role it plays leading accreditation processes of programs and the institution, and, on the other hand, to the fact that the quality processes are still a way of responding to external standards, rather than a full incorporation of quality culture in each HEI level (CIPER-CHILE, 2012; De Vincenzi, 2013; González-Bravo et al., 2019; Pedraja-Rejas & Rodríguez-Ponce, 2015; Proyecto Alpha, 2011). It follows that it is important to replicate this

study or apply this measure to other institutions, with other forms of participation of academics (Scharager, 2017), evaluating whether the same factorial structure is observed. This is consistent with a weak correlation observed between the value of the internal quality unit and other factors. A potential influencing factor for our finding may be that, while its official function is the promotion of quality, its creation concentrated central responsibilities associated with the quality in the organization, leaving a lesser sense of ownership in academics (Cardoso et al., 2018).

The second solution, with an underlying six-factor structure, contains two additional factors, *i.e., Continuous Quality Management value* and *Students' participation value*. Particularly for Chile, where the scale was validated, although the incorporation of the *quality* dimension in internal processes in HEIs is recognized as essential to achieve sustained and adequate quality standards and sustainability for the organization (Cárdenas & García, 2014), it has undergone a slow process and its results are yet to be definite. More specifically, Chile has not yet fully moved on from an accountability focused QA culture, into a culture of QM understood as a permanent process. Many institutions implement mechanisms of quality assurance as a response to external standards, rather than a quality culture implementation (González-Bravo et al., 2019). Additionally, this drawback can be associated with a political component, inasmuch as public controversy has raised questions of the legitimacy of organizations and their activity, resulting in shut-down HEIs, corruption allegations, etc. Paradoxically, however, unless HEIs install QM mechanisms in their internal processes, no systemic and consistent improvement can be expected.

With respect to factor F, *students' participation value*, this is a widespread practice in Chilean universities, largely stimulated by accreditation processes (Salazar, 2008). However, it is necessary to widen the scope of these evaluations, since there are differences among institutions in various areas related to it: performance evaluation policy, impact on the academic program, feedback to academics, etc. (Salazar, 2008). The fact that there is a weak correlation between this factor and the others in the questionnaire may be due to what

was reported by Cardoso et al. (2018), regarding the cognitive and experiential distance in the students, towards the actions of quality in the University. As was mentioned in the theoretical framework, in the words of Lemaitre (2019), it remains a pending task how to meaningfully involve students in quality activities.

The Chilean higher education system has experienced a significant maturation in recent years and the quality assurance system has had a significant impact, ensuring an orderly growth and better guarantees for users. Nowadays in Chile, in the media and in major institutional stakeholders, the importance of HEI and program accreditation has been increasingly recognized, both to operationalize the standards which guide the strategic development of the country, and to eliminate suboptimal practices in educational management. Due to the diversity that exists within educational institutions and differing degrees of knowledge that different members of HEIs have regarding accreditation and quality management, we suggest that further scientific studies apply the measure developed in this article among other groups (for example, managers or students), or to several public universities. These results could be analyzed also from previous research that report differences in perceptions associated with different positions inside an organization or personal characteristics. That is the case of planning, learning value, knowledge about organization resources, importance of accreditation for the country, among others (Grubisic & Kovacevic, 2010; Kleijnen, 2012; Kruempel, 1990).

The instrument developed in this research presents adequate psychometric properties and factor structure, is conceptually and theoretically coherent with the state of the art in the field of quality management in Latin America, which are better than those developed previously in Latin America in prior research (Busco et al., 2018; Gregorutti & Bon, 2012; IPSOS, 2010a, 2010b; Lemaitre et al., 2012; Zapata & Torre, 2012) and in many ways, even with respect to others developed in the world, which even often do not report adequate antecedents such as internal consistency (NEASC, 2006; Putnam, 2000). In terms of the thoroughness and completeness of the background information delivered, it is comparable to that

reported by Kleijnen et al. (2011), and is therefore a contribution to international knowledge about perceptions of HEI members regarding quality management and accreditation.

Our study's limitations include: 1) Non-random sampling (the participating academic staff agreed to participate based on an invitation made by their units' directors). Nevertheless, the researchers did not select intentionally, or 'handpick' the participants, and their participation was neither coerced nor rewarded in any way. 2) The exploratory and confirmatory factor analyses performed during this research are entirely replicable and their results outperform those of the original measures on which the questionnaire was based. 3) The original measures were developed in research carried out outside Latin America, which can raise doubts as to the meaning of the constructs in different languages. The aspect pertaining to adaption from English to Spanish was controlled by using translators and academics with accreditation experience, which made the necessary modifications before the application. 4) The study was conducted in a private Chilean University, and it is necessary to replicate these findings including other types of higher education settings (e.g. technical, public or traditional universities), considering the differences between public and private institutions reported by literature (Muñoz, 2016). 5) A vast majority of the previous research, identified during our literature review, derives from doctoral studies. From our perspective, rather than being a weakness, it is a reiteration of the need for more studies regarding the perceptions about accreditation and quality, as an emerging field within research in the quality of higher education (Cardoso et al., 2013). Lafont (2014) offers a complementary view in this regard, from the field of education. Doctoral students choose the topics of their theses considering the circumstances that motivated them to enroll, as well as their trajectory as beginning researchers and the social use that they want to give to their thesis, when it is finished. This makes it possible to explain why theses regarding perceptions about quality (and its specific value), must also be analyzed from researchers who investigate emerging requirements in their countries of origin: this is the case of Scharager (2017), Ngwenya (2003) or Cardoso (2009).

There is a growing commitment to accountability and an increasing expectation of installing a culture of quality within institutions. Therefore, the availability of a Spanish-language measure that can feasibly assess the perceptions about accreditation/quality management, has a direct impact on the development of the area. For example, the state of development of an institution could be evaluated over long periods of time, or through comparing different countries or types of institution (public versus private).

Finally, despite the limitations of this research that were discussed above, the development and dissemination of this instrument has the potential to bring a concrete and timely contribution to higher education in Latin-American countries and for the body of knowledge pertaining to educational research and management.

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Appendix 1: Table 5. Questionnaire items (in English and Spanish)

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.	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.
6.	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.*
7.	The standards set by the CNA are realistic / Los estándares establecidos por la CNA son realistas.
8.	The evaluators' recommendations were valid and exhaustive / Las recomendaciones de los evaluadores fueron válidas y exhaustivas.
9.	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.
10.	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.
11.	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.
12.	One of the central functions of the (Quality Unit) at (mention the institution) should be staff development to improve the quality of teaching and learning / Una de las funciones centrales de la (Unidad de Calidad) de (mencionar la institución) debe ser la capacitación en temas académicos para el personal, para mejorar la calidad de la enseñanza y el aprendizaje.
13.	The (Quality Unit) at (mention the institution) should design programmes for university–wide curriculum development / La (Unidad de Calidad) de (mencionar la institución) debe participar del diseño de los programas para el desarrollo curricular de toda la universidad.
14.	The (Quality Unit) in (mention the institution) must participate in the design of the trainings for the academics to improve the quality of teaching and learning / La (Unidad de Calidad) en la (mencionar la institución) debe participar en el diseño de las capacitaciones a los académicos para mejorar la calidad de la enseñanza y el aprendizaje.

15.	Students should evaluate the content of all modules for which they are registered / Los estudiantes deben evaluar el contenido de todas las asignaturas inscritas.*
16.	Students should evaluate the presentation of all modules for which they are registered / Los estudiantes deben evaluar la presentación y forma de todas las asignaturas inscritas.*
17.	The organization and management model of the (mention the institution) encourages the evaluation and continuous improvement of all its services and processes / La organización y el modelo de gestión de la (mencionar la institución) fomenta la evaluación y mejora continua de todos sus servicios y procesos.*
18.	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.*

Note for the table: * Designates items kept only in model 2 (6F).

Study 3

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

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).
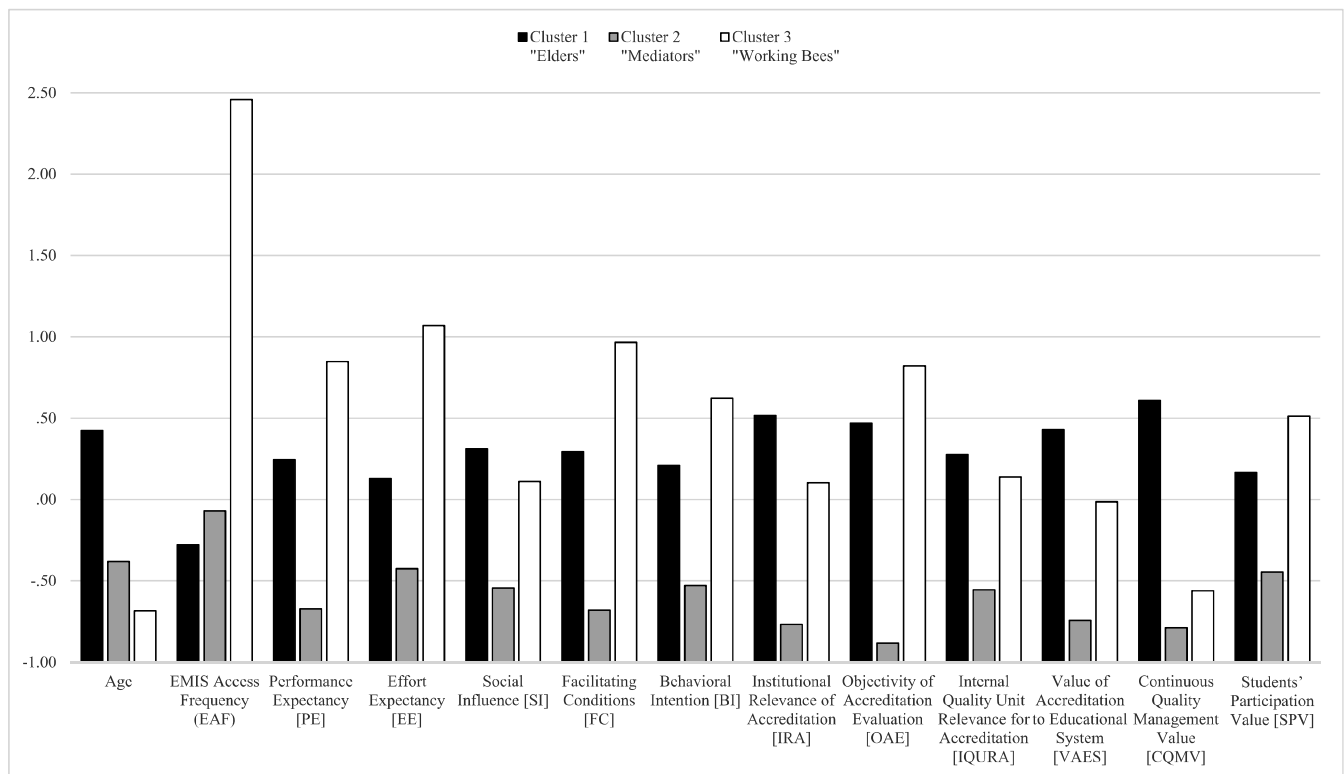
Fig. 1. Z-Scores of the clusters on age, EMIS access frequency, QMAS, and UTAUT scales.

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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General Discussion

This doctoral research started from the existent gap linking EMIS acceptance to QM perceptions in HE. Understanding this relationship is essential because knowing manager profiles may allow for more effective implementation of the EMIS, allowing institutions to strengthen QM. The gap described above was faced by posing the following research question: What is the relationship between the use of EMIS in higher education and quality management? This RQ was answered by developing three studies that were published in scientific journals. Their principal findings are reviewed below.

In Study 1, the main findings were: 1) EMISs facilitate the implementation of quality management mechanisms, to achieve accountability, 2) The relationship between Quality management and accountability in Chilean HEIs, is mediated by EMIS use, but with differences among institutions. Although both variables have a solid conceptual and operational link, this relationship does not behave homogeneously in Chile among institutions. This asymmetry affects systemic global accountability and trust.

In Study 2, using structural equation modeling, a Spanish-language scale intended to assess perceptions about the accreditation process and the quality management in Higher Education Institutions was developed and validated, and two models were identified with appropriate fit indices. The first one, a 4-factor structure, includes factors A, Institutional relevance of accreditation, B, Objectivity of accreditation evaluation, C, Internal Quality Unit relevance for accreditation, and D, Value of accreditation to the educational system. The second, 6-factor model, includes factors E, Continuous quality management value, and F, Student participation value. Greater factor loadings in items that assess the institutional relevance of accreditation are consistent with the consensus in Latin America about the value of accreditation for

institutions (Lemaitre, 2019). Alternatively, other factors found – and their meanings – are related to previous literature.

Finally, in Study 3 through a cluster analysis, three distinct manager types were identified: "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).

These three studies, in fact, correspond to three stages of research, which progressively allow approach this dissertation's overall results and implications in terms of higher education research, higher education practice, and methodology. The first investigation results expose the gap between the increasing EMIS availability and the concrete practice of quality management within institutions. Although the EMISs are legitimized and are increasingly valued by HEIs, their link with the development of quality management inside HEIs must be strengthened in cultural and operational terms.

This happens for many reasons, including the existing diversity between the institutions and intra-institution planning problems. Clarifying both issues a little more is relevant, given their implications in higher education research and practice. Despite the pressures of the environment and (in the Chilean case) the latest adjustments in the legislation (Law 21,091), a wide variety of institutions persist. At one extreme are those, younger (40 years old or less), private, which maintain the focus on undergraduate teaching activities, with low investment in research and community engagement, low complexity, generally with high fees, and often with only a few years of accreditation. On the other extreme, traditional universities of 40 years or more of existence, public or

non-profit private administration, that conduct research, artistic creation, and a strong community engagement; are highly complex, generally with lower fees and many years of accreditation. There is a broad spectrum between both extremes, which has been narrowed in some way thanks to emerging state regulations promoting accountability and quality management across the system (Barroilhet et al., 2022).

Those older or more complex institutions have already gone through several accreditation cycles or must sustain the accreditation of excellence over time and therefore are more aware of the need to incorporate EMIS to manage or face these growing challenges. Nevertheless, they contain many manager profiles with the practical responsibility of installing quality policies. Indeed, as Bendermacher, oude Egbrink, Wolfhagen and Dolmans (2017) has pointed out, the installation of a quality policy materializes through specific measures taken by the University's senior management but is complemented by cultural changes (psychological and sociological) in the members of the HEI.

Furthermore, these managers must also be able to assess and efficiently use the EMIS to monitor the planning commitments that will support the continuous improvement cycles. Consequently, there is a double challenge for managers: to promote the installation of quality management and, once the value of EMIS for said installation is understood, to use those information systems effectively.

This set of elements poses challenges for research in higher education, to the extent that future studies must be able to investigate in depth the different factors mentioned up here, at least 1) the different types of institutions, with their different degrees of installation of cultures of quality management and idiosyncrasies and 2) the different profiles of managers, with their different perceptions about quality

management and use of the EMIS. It cannot be taken for granted that the country has the conditions to leap from QA to fully installed quality management. This analysis aligns with Fardella et al.'s (2020) assertions regarding the principal value of specific organizational features for successfully implementing new technologies in higher education.

In terms of higher education practice, these elements make it possible to distinguish elements critical for effective quality management to respond to the emerging demands of society, legal bodies, and students and their families. Additionally, they force universities to take charge of their level of development and e-maturity before compulsively embarking on attempts to meet planning and continuous improvement commitments established or audited by external bodies. This honest self-assessment exercise is the spirit that animates quality management in higher education. Finally, in methodological terms, it forces future research to use mixed-methodologies and gray literature to rescue the particular aspects described in previous paragraphs and to take charge of the diversity between the institutions and within them in study samples.

Regarding Study 2, its conclusions complement what has already been highlighted. First, it is essential to have brief instruments in Spanish that assess the installation of quality management within institutions from the perception of the different actors. Until this dissertation, the available instruments were in some of the following circumstances: a) were in English, b) did not have the appropriate psychometric background, c) had been applied in generic terms to the system as a whole by government entities, or d) were applied only for purposes of compliance with accreditation regulations. Having the QMAS scale allows comparative research to be carried out among institutions, Spanish-speaking countries, or positions to continue

generating disciplinary knowledge in the area of quality of higher education. The above consequences in terms of higher education practice are pretty straightforward. Having appropriate instruments in Spanish provides a concrete tool for institutions to move forward on the path of continuous improvement: not only focusing on accountability but also monitoring the different and dissimilar levels of development within the institution.

Strictly in methodological terms for future research, in the case that the factorial structure found in the validation could exhibit differences when the instrument is applied in other institutions rather than a problem, it would be an opportunity to analyze the reasons for the said discrepancy. Furthermore, given the diversity of the existing universities in the terms mentioned in the discussion relating to Study 1, it would be expected to find such differences, which will up be a stimulus to search for the best strategies and paths to improve the measures, or implement quality management while respecting institutional diversity. Furthermore, having this instrument in Spanish promotes the possibility of comparing the level of implementation of these quality policies for different Spanish-speaking countries and associating these variables with others of interest to researchers or administrators: this is the case, for example, of the use of EMIS for quality management, or the different levels of development among countries in the installation of quality policies. In brief, given the growing demand for public policies to promote such quality management throughout Latin America and Spanish countries, the availability of this measure has become highly relevant.

Regarding Study 3, the implications of the results for higher education research must do with how "managers" are conceived. A mistake is often made in conceiving managers (administrators or "key managers") as a homogeneous sample of quality managers supported by EMIS (Alzafari & Kratzer, 2019). Alternatively, in other research, they have been presented divided into layers (strategic, tactical, operational)

without understanding how significant those differences can be (Danaiata et al., 2018). The results of Study 3 have shown that these differences are very significant and that their proper understanding will gradually emerge from developments in other areas, such as the case of communities of practice.

The implications for higher education practice derive directly from the abovementioned research. Customized training programs that consider individual needs and staff plans are highly recommended because HEIs have developed plans to buy more EMIS licenses and implement training, and the already mentioned factors must be considered before making such investments. Higher Education Institutions make significant EMIS investments to support quality management practices, which can reach millions of dollars (Abdellatif, 2014; Nanayakkara, 2017): it is reasonable to expect that such investments effectively allow institutions to achieve their strategic objectives and permanently improve their quality.

It is essential to point out that international organizations such as UNESCO (UNESCO, 2021) or the World Bank (Chowdhary, 2022) endorse the importance of EMIS for the educational development of countries. Moreover, human resources, which include the professionals responsible for installing educational platforms, are essential: their level of training determines productivity. In this sense, it is essential to have trained managers to lead the implementation of said digital technologies (Costan et al., 2021).

Due to insufficient infrastructure and resources, this training becomes difficult in developing economies, such as Chile (Costan et al., 2021). For this reason, a strategic alliance with the productive sector or with the EMIS vendors for the design of personalized training becomes essential. For example, the University of Concepción (in

Chile) has designed with the company Monday -which sells its planning software- the training for its key users (Universidad de Concepción, 2022). Furthermore, personalized training for managers, where individual requirements are identified, also becomes a way to make these scarce resources efficiently.

Analyzing the results of this doctoral thesis as a whole, it is possible to state some managerial consequences and consequences for future research in the following.

In terms of managerial consequences, the studies compiled in this doctoral thesis clearly shows how the development of quality management within institutions cannot be analyzed separately from the acceptance and use that managers make of the platforms. Moreover, acceptance and use (and, therefore, the necessary training) could not be planned or budgeted in generic terms. It then becomes an obligation for the HEIs to take charge of said complexity in their managers' characteristics, to advance in more meaningful and better use of their EMIS, and quality management.

In terms of future research, a multiplicity of possible fields is considered for the future. One particularly interesting for this author would be the comparison among countries in the relationships between the variables considered in this research, considering the different national QA systems in each of them, for example, Germany, Portugal, and other Latin countries such as Colombia. In the case of Germany, given the cultural and developmental differences with Latin America, but with national quality systems and a high level of technology acceptance and use (Damian et al., 2015; Nistor et al., 2013). In the case of Portugal, it is absorbing from the investigations of Cardoso, Rosa and others about the perceptions about quality management (Cardoso et al., 2019). Finally, in the case of Colombia, there is a good level of development in the QA system from the state, with the growing use of new technologies and participation of

institutions in the definition of these quality criteria (Cifuentes et al., 2014), but with

vast cultural differences with Chile and Germany.

Conclusion

Approaching the general conclusions of this dissertation, it was conceived to face a real problem that emerged from a need of the national and international context, whose resolution can be addressed by integrating central concepts of the acceptance of new technologies and quality management.

Today, it is necessary that higher education managers use EMIS provided by their institutions to improve the quality of their work, take charge of accountability and social expectations about quality management and to gradually promote the installation of quality management in their units and institutions.

Achieving these goals is essential for HEIs to improve their work quality and answer society's requirements.

This is a global trend, which finally influences other central areas of tertiary education (for example, internationalization, community engagement) and society, for example, through people's trust toward institutions. The Chilean higher education system has experienced significant maturation recently, and the QA system has had a significant impact, ensuring orderly growth and better guarantees for users. Increasingly, in the communications media and the different powers of the State, the importance of HEIs and program accreditation is recognized to operationalize standards that guide the country's strategic development and eliminate suboptimal practices in educational management.

Finally, yet importantly, institutions make significant investments in technological systems for educational management. Information systems must be used effectively and capitalized for the HEIs that acquire them to move toward a meaningful investment. All this confirms the relevance of investigating factors influencing higher education managers' acceptance of new management technologies. Due to these factors,

it is possible to affirm that the EMIS, regardless of how advanced the technologies used are, do not replace adequate quality management but instead supports it when they are understood in the complexity of their articulation with the organization.

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