The relationship between soft and hard quality management practices, innovation and organizational performance in higher education

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Abstract

Purpose – This study aims to empirically investigate the effects of both soft and hard quality management (QM) on innovation and organizational performance. It also examines the mediating role of hard QM, administrative innovation and technical innovation on the relationship between soft QM and organizational performance in higher education (HE).

Design/methodology/approach – The approach of this study is quantitative. The data used to test the hypotheses were obtained through online questionnaire sent to the academic staff of public universities in Naples (Italy). The hypothesized relationships are tested with data collected from 356 respondents by using the partial least squares structural equation modeling technique (PLS-SEM).

Findings – The results show that quality practices improve innovation and organizational performance, while innovation positively impacts organizational performance. The findings also indicate that soft QM affects organizational performance directly and indirectly through hard QM. Hard QM and innovation show a partial sequential mediating effect on soft QM-performance relationship

Practical implications – In order to implement quality management properly in HE, directors need to recognize the different roles that soft and hard QM can have on innovation and organizational performance. It is important that higher education institutions (HEIs) allocate resources to establish both types of QM practices to achieve the effectiveness of the whole QM system.

Originality/value – Despite the existence of numerous studies on the relationship between QM, innovation and organizational performance in manufacturing and services, studies conducted in higher education are still few. This is one of the earliest studies that adopt the multidimensional approach of QM in HE which could help directors understand the interdependencies and different roles of soft and hard quality practices.

Keywords Soft QM, Hard QM, Innovation, Organizational performance, Higher education

Paper type Research paper

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1. Introduction

Higher education institutions (HEIs) face various challenges coming out of global competition, rapid education technological changes and in increasing pressure on cost control and financing (Laurett and Mendes, 2019). These organizations have to meet their stakeholders' expectations while increasing their efficiency (Dumond and Johnson, 2013), driving them to adopt several strategies (TQM, knowledge management and innovation) already successfully used in other fields (Chen *et al.*, 2009), such as an effective implementation of quality management practices (Iqbal *et al.*, 2018). Innovation is also vital to universities because it can help in revising programs, improving the institutions' problem-solving ability and enhancing applied research (Al-Husseini and Elbeltagi, 2016).

The relationship between quality management (QM) practices, organizational performance and innovation have been studied in manufacturing firms (Sahoo, 2019, Zeng *et al.*, 2015; Feng *et al.*, 2006); however, only a few studies focus on these relationships in service companies (Mehta *et al.*, 2014; Segarra-Ciprés *et al.*, 2017), and even fewer are addressing them in higher education (HE) (Tarí and Dick, 2016).

In general, previous literature that considered QM as a single factor (Sadikoglu and Zehir, 2010; Prajogo and Sohal, 2003) has got mixed results on the relationship between QM and innovation (Martínez-Costa and Martínez-Lorente, 2008; Hoang *et al.*, 2006); on the other hand, some recent studies in manufacturing firms (Kim *et al.*, 2012; Zeng *et al.*, 2015, 2017) and high-tech companies (Escrig-Tena *et al.*, 2018; Hung *et al.*, 2010) have adopted a multidimensional approach to QM, distinguishing between soft and hard practices. Several authors highlighted the need to extend the multidimensional approach to other sectors to better understand its effects (Zeng *et al.*, 2015; Ershadi *et al.*, 2019).

Researchers have highlighted the importance of studying QM as a multidimensional practice, indicating that its successful implementation relies on a balanced mix of soft and hard QM factors as both dimensions are needed for successful QM implementation (Gadenne and Sharma, 2009; Zeng *et al.*, 2017).

Based on the above discussion, this study adopts a multidimensional view of quality to understand the impact of soft and hard QM on innovation and organizational performance in HEIs and to investigate if they should pursue QM and innovation simultaneously, or not.

Several contributions emerge from this study. First, it contributes to understanding the dichotomous view of QM, and its impact on innovation types and organizational performance. Then, we propose an integrated framework of quality and innovation practices to predict organizational performance from QM practices. Finally, the focus on HE will help HEIs management to choose the right QM practices to implement according to their objectives.

The paper is structured as follows. In the next section, we provide a literature review of QM practices and their relationship with organizational performance and innovation; in Section 3 we develop our research model and the related hypotheses. Then we describe the research methodology, followed by the data analysis. The final section discusses the main findings and implications stemming from this research as well as limitations and suggestions for future research.

2. Theoretical background

2.1 Quality management practices

Several studies consider QM as a managerial approach that, if correctly used, can enable continuous performance improvement (Ebrahimi and Sadeghi, 2013; Nair, 2006).

QM principles have been applied in the industrial sector for several decades; however, its application in service companies and, more specifically, in HEIs has recently emerged as a new concept framed in new realities that began to recognize HEIs as profitable organizations (Antunes *et al.*, 2018).

Quality management scales developed for HEIs are mostly been adapted from those constructs that were initially developed to study these topics in the manufacturing and other

services sector (Liao *et al.*, 2010), as some scholars stated that the type of activities carried out in manufacturing sector are somewhat similar to those carried out in the education sector, making TQM also applicable to HEIs (Owlia and Aspinwall, 1997)

In addition, several researchers argued that for successfully implementing QM in HE, the first step should be to adopt a relevant TQM framework that meets its missions and objectives (Venkatraman, 2007; Burli *et al.*, 2012). This framework should be built upon a set of core values and practices which provide the foundation of linking and integrating the key performance requirements within the quality framework (Venkatraman, 2007). As a result, several empirical studies have explored the quality practices that constitute QM construct in HEIs, leading to the generation of a wide range of different QM dimensions due to the various approaches, models and perspectives adopted by those studies (Psomas and Antony, 2017). Therefore, to determine the common practices in HE, we extensively review the different studies that have been implemented exclusively in HE.

In Table 1, we present some of the key empirical studies in the QM literature applied to higher education, highlighting the most commonly examined practices.

2.2 Soft and hard quality practices

Scholars have identified two main categories for TQM practices: soft or (infrastructure) and hard or (core) QM practices (Flynn *et al.*, 1995; Ho *et al.*, 2001; Rahman and Bullock, 2005;

Variable	Supporting references in HE field
Soft QM practices	
Top management support: Directors' long-term commitment to QM philosophy	Da Rosa *et al.* (2003); Calvo -Mora *et al.* (2005); Sakthivel (2007); Badri *et al.* (2006); Sahney *et al.* (2006);Venkatraman (2007); Bayraktar *et al.*,2008; Burli *et al.*,2012;Mehta *et al.*,2014 ; Sadeh and Garkaz (2015); Aminbeidokhti *et al.* (2016); Psomas and Antony (2017)
Strategic planning: The formulation and revision of the vision, mission, policies and objectives considering needs and expectations of different stakeholders	Da Rosa *et al.* (2003); Calvo-mora *et al.*, 2005; Sahney *et al.* (2006); Badri *et al.*,2006; Burli *et al.*,2012; Psomas and Antony (2017)
People management: Recognize staff performance on quality; encourage team working; provide training; involve staff in quality decision	Calvo-Mora *et al.* (2005); Venkatraman (2007); Burli *et al.* (2012); Mehta *et al.* (2014); Sadeh and Garkaz (2015); Aminbeidokhti *et al.* (2016); Psomas and Antony (2017)
Supplier management: Working closely and cooperatively with suppliers	Da Rosa *et al.* (2003); Calvo-Mora *et al.* (2005); Venkatraman (2007); Psomas and Antony (2017)
Student focus: Determining students' needs and expectations, and then meeting them	Badri *et al.*,2006; Bayraktar *et al.*,2008; Sayeda *et al.*,2010; Aminbeidokhti *et al.* (2016); Psomas and Antony (2017)
Hard QM practices	
Process management: It involves the administrative, educational and research process	Calvo-mora *et al.*, 2005; Badri *et al.* (2006); Venkatraman (2007); Bayraktar *et al.*,2008; Sayeda *et al.*,2010; Burli *et al.* (2012); Sadeh and Garkaz (2015); Psomas and Antony (2017)
Information and analysis: Collecting timely data on quality issues to be used by directors and staff for quality improvement	Badri *et al.*,2006;Mehta *et al.*,2014; Venkatraman (2007); Bayraktar *et al.* (2008);Sayeda *et al.*,2010; Aminbeidokhti *et al.* (2016); Psomas and Antony (2017)
Continuous improvement: The regular measurement, evaluation and improvement of administrative and academic processes as well as facilities	Sakthivel (2007);Sayeda *et al.*,2010; Mehta *et al.*,2014; Aminbeidokhti *et al.* (2016); Psomas and Antony (2017)
Program design: The regular review and update of academic programs considering stakeholders' needs and the technological advances	Bayraktar *et al.*,2008, 2013; Asif *et al.* (2013)

Table 1.
Soft and hard QM practices in the present study

Zeng *et al.*, 2015, 2017). Soft practices focus on the behavioral characteristic of QM dealing with the people, the social side and the culture of the organization; the hard practices, instead, focus on technical aspects exploiting scientific methods and statistical tools. This classification is supported by socio-technical systems (STS) theory by Manz and Stewart (1997) that sees organizations as made by two interacting subsystems: the social and the technical ones. STS supports identifying soft QM practices as those impacting on the social subsystem, and the hard QM practices as those impacting the technical one, and it supports the idea that optimizing them together is more beneficial than focusing on only one of them.

Based on the previous literature that classifies and distinguishes between soft and hard QM, we have divided the QM practices into soft and hard practices as shown in Table 1. According to some scholars (e,g. Calvo-mora *et al.*, 2005; Psomas and Antony, 2017), the key processes in HE are usually identified as the processes of administrative and services, teaching and research. So, we divided process management into these categories reflecting the distinct processes in HE field.

2.3 Innovation

Innovation is generally described as the development or application of new ideas, knowledge, methods and skills that can generate unique capabilities and leverage the organization's competitiveness (Kim *et al.*, 2012). A new idea could be a new product, process or service (technical innovation), or it could be a new market, organizational structure or administrative system (administrative or organizational innovation) (Damanpour *et al.*, 2009).

According to Antunes *et al.* (2018), innovation in HEIs can be understood as those procedures or methods of educational activity that differ from the established ones and that can increase the university efficiency level in the competitive environment. It is the capability of the institution to introduce new academic programs, curriculums, teaching methods and the like to be more competitive in a turbulent environment (Iqbal *et al.*, 2018).

Today, innovation in HE has become very important for providing the rising value of education to students and to the society at large. HEIs should be managed so that innovation is converted into a standard part of the institutions' culture, and it becomes embedded in its daily activities, as innovations are created by the interactions between the knowledge accumulated by the staff and the faculty members (Boroujerdi *et al.*, 2019).

Even if in innovation studies there are many types of innovation (product, process, service, organizational, open, radical and incremental innovations), we have chosen to focus on administrative and technical innovation according to their central role in several previous studies on impact of innovation (Prajogo and Sohal, 2004; Feng *et al.*, 2006), and they provide a general distinction between the organization's technological system (influencing the operating system) and the administrative one (influencing management system) (Damanpour *et al.*, 2009). Administrative innovations are introduced in the administrative core, and they pertain to organizational structure, administrative systems and human resources. They involve procedures, rules, roles and structures that are related to the communication and exchanges among employees, and they are more directly related to organizational management rather than directly to work activities (Damanpour *et al.*, 2009). In this research, we have adopted the definition proposed by Jaskyte (2011) in which administrative innovation refers to "the introduction and application of managerial practices related to structure, procedure, system, or process that are new to the whole organization."

On the other hand, technical innovation refers to the adoption of new ideas related to new products or services or processes. They are related to work activities, have a market focus and are client-driven (Damanpour *et al.*, 2009). Kim *et al.* (2012) divide technical innovation into product innovation and/or process innovation. Product innovations focus on introducing a new product or service, while process innovation focuses on introducing new production

processes or service operations. Technical innovation in this research is defined as "the adoption of new ideas pertaining to products (courses, research projects, curricula), or the introduction of new elements in the organization's operations (developing and using technology, continuous improvement of skills)" (Al-Hussini and Elbeltagi, 2016).

Technical innovation is a bottom-up approach where low-level staff commit relevant activities, whereas administrative innovation applies top-down approach where high-level managers are involved (Kim *et al.*, 2012).

2.4 Organizational performance

Effective execution of QM practices can lead to improvement in the performance of an organization. According to Uluskan *et al.* (2017), organizational performance generally refers to the outcome of the organization's operations or the achievement of the organization's goals.

Organizational performance can be measured from different perspectives such as organizational performance results (Claver *et al.*, 2003), financial and non-financial performance (Pinho, 2008), innovation performance (Hung *et al.*, 2010; Prajogo and Sohal, 2003) and quality performance (Prajogo and Sohal, 2004; Zu, 2009). As highlighted in these studies, there are no standard measures for organizational performance, and researchers used the measures which are compatible with their business environment.

Accordingly, and by reviewing the literature exclusively related to HE, we have found that most studies on HEIs measure the organizational performance from the results perspective (Badri *et al.*, 2006; Burli *et al.*, 2012; Calvo-mora *et al.*, 2005; Psomas and Antony, 2017).

On the other hand, measuring the effects of quality on performance can be determined objectively by examining changes in published financial results, for example, in the five years following the introduction of quality management (Easton and Jarrell, 1998), or in a subjective way, by measuring respondents' perceptions. Such subjective measurements are widely accepted in organizational research (Powell, 1995) due to the difficulty of identifying and obtaining an objective measurement for organizations of different sizes and sectors (Saraph *et al.*, 1989). Some organizations are unwilling to reveal such information voluntarily to outsiders (Claver *et al.*,2003). Moreover, the economic and financial results are sometimes difficult to measure, analyze and relate to QM factors because, in some cases, the effects of those results are seen only in the long run (Hung *et al.*, 2010).

According to the above, this study adopted the perceptual measures of organizational performance by asking respondents to indicate the extent of their satisfaction with their departments' performance along each of the following four dimensions: student results, faculty/staff results, institute results and society results.

3. Research hypotheses and conceptual framework

Previous studies (Flynn *et al.*, 1995; Kaynak, 2003; Rahman and Bullock, 2005; Zeng *et al.*, 2015) have modeled the QM-performance relationships with a sequence soft QM-hard QM-performance, finding that soft QM facilitates the implementation of hard QM. They contend that sound soft QM system can help develop both teamwork and autonomy, increasing the chances of successfully implementing QM techniques and tools.

Despite the non-existence of empirical studies that examine specifically soft-hard QM relationships in HE, some provide support to the research hypothesis. For instance, Calvo-Mora *et al.* (2005) found that certain factors such as leadership and policy and strategy (soft QM) have a direct impact on process management (hard QM). Ali *et al.* (2010) examined the impact of HR-TQM factors or soft factors related to successful TQM implementation, and they concluded that team working, customer focus and leadership are critical factors in implementing successful TQM and producing performance excellence in HE. Therefore, the following hypothesis is suggested:

H1. Soft quality practices have a positive impact on hard quality practices.

According to several scholars (Feng *et al.*, 2006; Prajogo and Sohal, 2004), soft practices such as leadership and people management are related to product innovation. Zeng *et al.* (2015) argued that soft QM enables open communication and supports developing creative ideas, which is essential for creating the right climate for developing innovation. In the same vein, Jackson *et al.* (2016) suggest that management support for quality and communication of QM philosophy could foster innovation by establishing shared vision and challenging targets that inspire employees to improve performance, encourage training and promote recognition of employees' suggestions and creative performance.

Other studies have shown that hard QM practices can have a positive impact on innovation (Kim *et al.*, 2012; Perdomo-Ortiz *et al.*, 2006), as they help in developing new routines to implement best practices as a learning base and support innovative activities (Kim *et al.*, 2012). In addition, creating a culture of basing decision-making on timely information and benchmarking provides the opportunity to enhance innovation (Sadikoglu and Zehir, 2010).

Although the studies conducted on QM-innovation relationship in HE are still few, compared to other studies in manufacturing and other service industries, in general, they support the positive influence that quality management practices can have on innovation. For instance, Antunes *et al.* (2018) contended that TQM practices are a powerful tool for enhancing innovation in HEIs which will lead to providing better services, not only for internal customers but also for the society as a whole. Similarly, Aminbeidokhli *et al.* (2016) found that QM practices such as teamwork, leadership and communication have an indirect impact on organizational innovation through organizational learning. In addition, Liao *et al.* (2010) suggest that HEIs should realize the relationship between QM and innovation which will help them to adjust their courses to meet the needs of various customers and markets in contrast to the traditional closed systems. Therefore, the following hypotheses are suggested:

H2. Soft quality practices have a positive impact on (H2a) administrative innovation and (H2b) technical innovation.

H3. Hard quality practices have a positive impact on (H3a) administrative innovation and (H3b) technical innovation

Regarding the relationship between innovation and organizational performance, Cheng *et al.* (2010) and Walker (2004) consider innovation as a critical enabler to obtain a dominant position and to achieve higher profits in the current rapidly changing business environment. Moreover, several empirical studies have confirmed the positive relationship between innovation and organizational performance (e.g. Gunday *et al.*, 2011; Khan and Naeem, 2018). Other studies further suggested that organizational performance is influenced by both administrative and technical innovation (Kim *et al.*, 2012; Jaskyte, 2011).

In HE, several studies found that innovation is needed to continuously improve their performance (Chen and Chen, 2012; Jaskyte, 2004). For instance, Jaskyte (2004) and Obendhain and Johnson (2004) argued that universities have to rely on product and process innovation so as to raise educational performance. Similarly, Chen and Chen (2012) argued that innovation can enable universities to achieve competitive advantage and increase their chance of being alive in the future. Iqbal *et al.* (2018), found that innovation is significantly instrumental to improving performance in universities as it can lead to increased research productivity, student satisfaction, curriculum development and responsiveness to the environmental challenges. According to the above discussion, the following hypothesis is proposed:

H4. Innovation (H4a: administrative innovation; H4b: technical innovation) has a positive impact on organizational performance.

Several scholars (Flynn *et al.*, 1995; Kaynak, 2003; Powell, 1995) documented the positive relationship between QM practices and performance. For instance, García-Bernal and Ramírez-Alesón (2015) found that the implementation of TQM improves the operational performance of organizations, which ultimately affects the other dimensions of performance such as financial performance, customer satisfaction and other stakeholders' performance.

Moreover, some studies found a direct impact of soft QM practices on organizational performance (Flynn *et al.*,1995; Rahman and Bullock, 2005), as they help to create an organizational climate that supports the application of hard QM practices. At the same time, other studies (Fotopoulos and Psomas, 2009; Kaynak, 2003) found that effective implementation of hard QM practices, as in timely collecting and disseminating important quality data and information throughout the organization, directly enhances an organization's ability to consistently provide products and services of satisfactory quality to its customers.

In HE, several studies found a positive relationship between QM practices and performance (Badri *et al.*, 2006; Calvo-mora *et al.*, 2005; Psomas and Antony, 2017; Sayeda *et al.*, 2010). For instance, Sayeda *et al.* (2010) found that the TQM dimensions significantly influence all the HEI's measures of performance having a significant bearing on institutional effectiveness. Psomas and Antony (2017) also found that TQM is significantly related to performance results proposing that HEIs can establish a robust TQM model that can help them approach business excellence, apply for competitive quality awards and derive significant benefits. Hence, the following hypotheses are proposed:

H5. Soft quality practices have a positive impact on organizational performance

H6. Hard quality practices have a positive impact on organizational performance.

While some studies link the soft QM practices directly to performance (Rahman and Bullock, 2005), other empirical findings suggest that soft QM practices could indirectly affect performance through hard QM practices. For instance, Ho *et al.* (2001) found that hard QM practices fully mediate the effect of soft practices on quality performance. Similarly, in Kaynak's (2003) TQM model, the soft QM practices were hypothesized to indirectly affect firm performance through the hard QM practices. Recently, Khan and Naeem (2018) studied the relationship between soft and hard quality management practices, service innovation and organizational performance using a sample from telecommunication operators in Pakistan, and they concluded that soft quality practices enhance the direct impact of hard quality practices on organizational performance. Therefore, the following hypothesis is proposed:

H7. The relationship between soft QM practices and organizational performance is mediated by hard QM practices.

On the other hand, some studies have modeled the relationship between QM and innovation in the sequence from soft QM-hard QM-innovation (Kim *et al.*, 2012; Zeng *et al.*, 2015; Escrig-Tena *et al.*, 2018; Khan and Naeem, 2018). These authors suggest that hard practices are needed to let soft practices impact on innovation. Kim *et al.* (2012) concluded that process management can improve innovation when supported by a set of soft and hard QM practices. Zeng *et al.* (2015) reach a similar conclusion on determining that soft QM practices affect innovation indirectly through hard QM practices.

Moreover, some studies found that the relationship between QM practices and organizational performance is indirect, mediated through innovation (Antunes *et al.*, 2017; Khan and Naeem, 2018). For instance, Khan and Naeem (2018) proposed that innovation

enhances the direct impact of soft/hard quality practices on organizational performance. Therefore, the following hypotheses can be proposed.

H8. The relationship between soft QM practices and organizational performance is mediated by innovation (H8a: administrative innovation; H8b: technical innovation).

H9. The relationship between soft QM practices and performance is mediated sequentially by hard QM practices and innovation (H9a: administrative innovation; H9b: technical innovation).

All the hypothesized relationships are modeled in as depicted in Figure 1.

4. Research methodology

The data were collected using a questionnaire designed using scales previously adopted in the relevant literature, and we used the translation and back-translation procedures (Saunders *et al.*, 2009) to produce the Italian versions.

All variables were measured using a seven-point Likert scale. Quality management practices were measured using 41 items previously developed for the HE (Bayraktar *et al.*, 2008; Calvo-mora *et al.*, 2005; Psomas and Antony, 2017; Sadeh and Garkaz, 2015), and we divided the QM practices into two higher-order constructs – soft QM and hard QM – as presented in Table 1. Innovation was measured using 10 items reflecting the acceptance of new ideas related to technical and administrative Innovation. Technical innovation is considered a higher-order construct consisting of product and process innovation, and it has been measured using the scale developed by Al-Husseini and Elbeltagi (2016) for the HE field.

Administrative innovation items were adapted from several studies (Walker, 2006; Wang and Ahmed, 2004). Organizational performance was measured using 14 items for four basic first-order constructs (student results, people results, institute results and society results) according to previous literature in HE (Calvo-mora *et al.*, 2005; Psomas and Antony, 2017).

The scales validity was discussed with a panel of experts (both faculty and staff involved in quality management activities in their department) to assess the clarity of questions and to examine their appropriateness to the specific context of Italian public universities. *The final items in the survey are reported in* Appendix. The studied population consists of all the academic staff (professors and lecturers) of public universities located in Naples (Italy). The questionnaire was sent using an online survey platform (http://www.limesurvey.org) in the period from May 2018 until August 2018, collecting a total of 356 useable questionnaires. There are 150 missing values in the data set, which account for less than 1% of the total

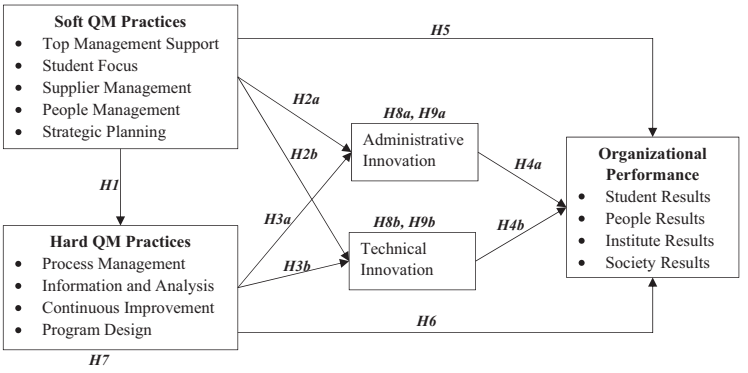

Figure 1.
The research model

number of values. We performed the MCAR test (Little and Rubin, 2002) and sound that these values were missing completely at random, so we have do not have any hidden systematic pattern and, among the various options (Hair *et al.*, 2014), we have used the substitution with the variable mean as the imputation method. The characteristics of the sample are set out in Table 2.

5. Data analysis

To test our model, we adopt a structural equation model with the variance-based PLS-SEM approach, an approach widely applied in many social science disciplines such as organizational management (Sosik *et al.*, 2009), international management (Ritchter *et al.*, 2015) and quality management area (Calvo-mora *et al.*, 2005; Abu Salim *et al.*, 2019).

There are several key arguments for selecting the PLS-SEM approach, instead of the traditional covariance-based one (Hair *et al.*, 2019). The goal of this study is to explain the key target construct, organizational performance, as requested by the PLS-SEM, and a prediction-oriented approach (Henseler *et al.*, 2009; Becker *et al.*, 2012). Moreover, Hair *et al.* (2019) recommend the use of PLS-SEM for complex models containing many constructs, indicator variables and structural paths as in this study.

The PLS path modeling approach is computed in two stages to warrant that the constructs' measures are valid and reliable before attempting to draw any conclusions regarding relationships among constructs (Hair *et al.*, 2019): (1) the assessment of the reliability and validity of the measurement (outer) model, and (2) the assessment of the structural (inner) model.

5.1 Measurement model

The assessment of the measurement model for reflective indicators in PLS is based on indicator reliability, construct reliability, convergent validity and discriminant validity (Hair *et al.*, 2016).

To evaluate indicator reliability, we consider loadings above the 0.6 threshold (Henseler *et al.*, 2009). Only one item, AI3, has a lower value, so we deleted it from the model. In addition, Cronbach's α and composite reliability (CR) values were above 0.7, which supports the internal consistency for all constructs (Hair *et al.*, 2016). At the same time, the average variance extracted (AVE) values for all constructs were above 0.50, which confirmed the convergent validity as well (Hair *et al.*, 2016) (see Table 3).

Discriminant validity was assessed with two criteria. First, an indicator's outer loading should be larger than its cross loadings on other constructs (Hair *et al.*, 2016). To secure the

Variable		*N*	%
Academic position	Professor	113	31.7
	Assistant professor	127	35.7
	Senior lecturer	36	10.1
	Lecturer	80	22.5
Type of study	Health sciences	73	20.5
	Humanities	34	9.6
	Social and legal sciences	81	22.8
	Scientific	168	47.2
Role in managing the department	Directors	43	12.1
	Non-directors	313	87.9
Role in quality management activities	Yes	106	29.8
	No	250	70.2

Table 2. Demographic details of the respondents

Construct	Items	Loading	CR*	Alpha	AVE
Top management support (TMS)	TMS1	0.937	0.902	0.836	0.757
	TMS2	0.747			
	TMS3	0.913			
Student focus (SF)	SF1	0.866	0.925	0.892	0.756
	SF2	0.872			
	SF3	0.835			
	SF4	0.903			
Supplier management (SM)	SM1	0.662	0.803	0.633	0.578
	SM2	0.823			
	SM3	0.785			
People management (PEM)	PEM1b	0.744	0.948	0.935	0.722
	PEM1c	0.756			
	PEM2	0.88			
	PEM3	0.916			
	PEM4	0.912			
	PEM5	0.863			
	PEM6	0.858			
Strategic planning (SP)	SP1	0.876	0.965	0.956	0.820
	SP2	0.926			
	SP3	0.901			
	SP4	0.899			
	SP5	0.922			
	SP6	0.909			
Educational process (EP)	EP1	0.941	0.942	0.876	0.890
	EP2	0.945			
Research process (RP)	RP1	0.929	0.930	0.849	0.869
	RP2	0.935			
Administrative process (AP)	AP1	0.865	0.891	0.815	0.732
	AP2	0.896			
	AP3	0.802			
Information and analysis (IA)	IA2	0.943	0.938	0.867	0.882
	IA3	0.936			
Continuous improvement (CI)	CI1	0.894	0.909	0.850	0.769
	CI2	0.893			
	CI3	0.843			
Program design (PD)	PD1	0.885	0.934	0.905	0.779
	PD2	0.854			
	PD3	0.902			
	PD4	0.889			
Administrative innovation (AI)	AI1	0.868	0.913	0.858	0.778
	AI2	0.878			
	AI4	0.859			
Process innovation (PRCI)	PRCI1	0.854	0.905	0.843	0.761
	PRCI2	0.900			
	PRCI3	0.862			
Product innovation (PRDI)	PRDI1	0.873	0.928	0.883	0.811
	PRDI2	0.922			
	PRDI3	0.906			

Table 3.
Validity and reliability evidence

(*continued*)

Construct	Items	Loading	CR*	Alpha	AVE
Student results (STR)	STR1	0.843	0.918	0.866	0.789
	STR2	0.924			
	STR3	0.895			
People results (PER)	PER1	0.873	0.923	0.888	0.750
	PER2	0.770			
	PER3	0.913			
	PER4	0.901			
Society results (SOR)	SOR1	0.888	0.934	0.905	0.779
	SOR2	0.909			
	SOR3	0.921			
	SOR4	0.808			
Institute results (IR)	IR1	0.853	0.904	0.840	0.758
	IR2	0.881			
	IR3	0.877			

Note(s): *Values were computed after deleting indicators with low loadings

Table 3.

model's discriminant validity, two items had to be deleted (IA1 and PEM1a) because of their low loadings and higher cross loadings. Second, the AVE square root for all variables should be greater than its correlation with any other variables (Fornell and Larcker, 1981). As shown in Table 4, discriminant validity is confirmed according to that criterion .

Then we tested for the common method bias (CMB) using the variance inflation factor (VIF) (Kock, 2015). According to Kock and Lynn (2012), the VIF should be lower than 5 in reflective SEM models. In our model, the highest VIF is 4.3, so we can assume that there is no CMB. Hence, the constructs from our model are statistically distinct and can be used to test the structural model (see Table 5).

5.2 The structural model

The structural model is estimated with the coefficient of determination (R^2), the algebraic sign, magnitude and significance of the path coefficients and the predictive relevance Q^2 (Table 6). The model has an appropriate predictive power as the four dependent constructs have an R^2 exceeding 0.6.

These findings are also supported by the Q^2 value of the predictive relevance. After the blindfolding, we obtained a Q^2 higher than 0, indicating that the structural model has a satisfactory predictive relevance for the dependent variables.

Consistent with Roldán and Sánchez-Franco (2012), we used bootstrapping (5,000 resamples) to generate standard errors, and the t-statistics and the confidence interval (CI) to test the statistical significance of the path coefficients. If a CI for an estimated path coefficient w does not include zero, the hypothesis that w equals zero is rejected. Moreover, this approach is percentile-based and distribution-free (Chin, 2010).

According to the results for t-values and the percentile bootstrap of 95% confidence interval, eight of nine hypotheses that represent the direct effects were supported as shown in Table 6.

5.3 Mediation analysis

An assessment is made of the total and direct effect of the soft QM practices construct on organizational performance (Figure 2a) and the indirect effects via the mediators (Figure 2b).

To test mediation, we used the bootstrapping method (5,000 iterations - Preacher and Hayes, 2008) to calculate CI (95%) in order to test if the mediation exists. The results show that hard practices partially mediate the relationship between soft practices and

Table 4.
Discriminant validity of constructs

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1. TMS	*0.87*																	
2. SF	0.63	*0.87*																
3. SM	0.54	0.49	*0.76*															
4. PEM	0.70	0.74	0.53	*0.85*														
5. SP	0.77	0.69	0.55	0.83	*0.91*													
6. CI	0.66	0.77	0.51	0.79	0.75	*0.88*												
7. PD	0.66	0.81	0.45	0.74	0.72	0.83	*0.88*											
8. EP	0.62	0.70	0.47	0.69	0.68	0.71	0.78	*0.94*										
9. RP	0.59	0.66	0.46	0.70	0.67	0.67	0.70	0.74	*0.93*									
10. AP	0.48	0.62	0.45	0.59	0.58	0.69	0.67	0.63	0.58	*0.86*								
11. IA	0.55	0.63	0.38	0.67	0.66	0.64	0.60	0.55	0.52	0.55	*0.94*							
12. AI	0.61	0.67	0.51	0.80	0.74	0.74	0.69	0.64	0.67	0.61	0.56	*0.88*						
13. PRCI	0.58	0.62	0.47	0.75	0.70	0.70	0.63	0.56	0.60	0.56	0.53	0.82	*0.87*					
14. PRDI	0.64	0.76	0.45	0.77	0.77	0.82	0.82	0.72	0.67	0.70	0.67	0.72	0.72	*0.90*				
15. STR	0.52	0.60	0.44	0.63	0.61	0.59	0.59	0.61	0.55	0.53	0.43	0.59	0.53	0.58	*0.89*			
16. PER	0.65	0.72	0.48	0.77	0.74	0.73	0.73	0.69	0.70	0.64	0.57	0.72	0.66	0.76	0.74	*0.87*		
17. SOR	0.71	0.73	0.50	0.73	0.76	0.74	0.69	0.64	0.61	0.60	0.62	0.73	0.65	0.75	0.61	0.74	*0.88*	
18. IR	0.63	0.66	0.45	0.70	0.68	0.72	0.67	0.63	0.64	0.58	0.58	0.67	0.61	0.73	0.69	0.79	0.73	*0.87*

Note(s): Italic numbers represent the square root of AVEs

Endogenous constructs	R^2	Q^2
Hard QM practices	0.777	0.426
Administrative innovation (AI)	0.666	0.492
Technical innovation (TI)	0.778	0.488
Organizational performance	0.779	0.439

Hypothesis and relation		Direct effect	*t*-value (bootstrap)	Percentile 95% CI	Support
H1	Soft QM → Hard QM	0.882***	63.027	[0.858; 0.904]	Yes
H2a	Soft QM → Administrative innovation	0.555***	8.005	[0.440; 0.668]	Yes
H2b	Soft QM → Technical innovation	0.426***	7.157	[0.329;0.523]	Yes
H3a	Hard QM → Administrative innovation	0.285***	4.035	[0.169;0.400]	Yes
H3b	Hard QM → Technical innovation	0.484***	8.084	[0.386;0.582]	Yes
H4a	AI → Organizational performance	0.134**	2.496	[0.050; 0.224]	Yes
H4b	TI → Organizational performance	0.091^{ns}	1.319	[-0.024;0.202]	No
H5	Soft QM → Organizational performance	0.420***	7.246	[0.323;0.514]	Yes
H6	Hard QM → Organizational performance	0.288***	4.906	[0.193;0.383]	Yes

Note(s): ***$p < 0.001$; **$p < 0.01$; ns: not significant

Table 5. Effect on endogenous constructs

Total effect of soft QM → perf		Direct effect of soft QM → Perf		Indirect effects of soft QM on performance				
						Percentile bootstrap 95% confidence interval		
Coefficient	*t*-value	Coefficient	*t*-value		Point estimate	Lower	Upper	Mediation
0.86***	59.131	0.42***	7.246	Total indirect effect	0.440	0.3322	0.5478	Yes
				H7: via hard practices	0.254	0.1517	0.3569	Yes
				H8a: via AI	0.074	0.0134	0.1354	Yes
				H8b: via technical	0.039	−0.0205	0.0981	No
				H9a: via (hard + AI)	0.035	0.0013	0.0677	Yes
				H9b: via (hard + technical)	0.039	−0.0201	0.0979	No

Table 6. Tests of mediating effects

performance (H7). The results also show that administrative innovation partially mediates the relationship between soft practices and performance (H8a). However, the results did not provide support for the mediating effect of technical innovation which leads to the rejection of H8b.

Finally, for the joint mediating effect of hard practices and innovation, the results show that soft practices are positively associated with higher hard practices and higher administrative innovation which, in turn, relate to higher levels of performance (H9a). However, the results did not provide support for the indirect effect of hard and technical innovation on the soft and performance relationship. Therefore, H9b is rejected.

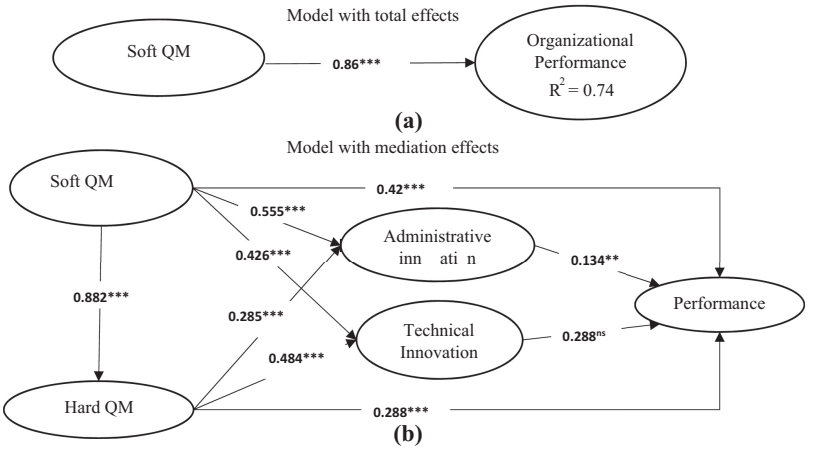

Figure 2.
a,b The structural model

6. Discussion and implications

6.1 Discussion of findings

In this section, we discuss the main findings. Firstly, our study found that soft practices are positively related to hard practices. This is in line with the findings of Kaynak,(2003), Rahman and Bullock (2005) and Zu, (2009), although in a field different from education. In the latter field, and using the EFQM model, Calvo-mora *et al.* (2005) confirm that certain factors (such as leadership and people management) have a direct influence on process management which is considered a hard practice. These findings substantiate the STS theory which suggests that organizations must effectively implement soft and hard practices to get the most out of QM.

Secondly, our results confirmed that hard and soft practices have a significant impact on innovation. This result is consistent with the results of Hoang *et al.* (2006), Kim *et al.*(2012), Zeng *et al.* (2015), Escrig-Tena *et al.*(2018) and Khan and Naeem, (2018) which adopt the multidimensional approach of QM in studying innovation. It is also interesting to note that the impact of soft QM on administrative innovation is stronger than the hard QM one, while hard QM has slightly higher impact on technical innovation. These results can be associated with the nature of QM and innovation types, as soft QM and administrative innovation are linked to the social aspects of the organization, while hard QM and technical innovation are linked more to the technological ones. Our findings are also consistent with Jaskyte (2011) who found that factors that are favorable to administrative innovation may differ from those related to the technical one. In HE, this result differs from the findings of Aminbeidokhti *et al.* (2016), who concluded that TQM has no positive and significant effect on innovation. One reason for this may be attributed to the way of studying QM as they used an integrated approach, considering QM as single factor without investigating the different relationships between QM dimensions and innovation.

Thirdly, our research confirms the positive effect of soft and hard practices on performance, which is in line with studies conducted by Flynn *et al.*(1995), Kaynak (2003),and Rahman and Bullock (2005). The results also show that soft QM indirectly influences performance through hard QM which is consistent with several studies that modeled the relationships between quality management and performance from soft to hard and then to performance (e.g. Ho *et al.*, 2001; Kaynak, 2003; Zeng *et al.*, 2015).

Fourthly, and at the general level, our study found that innovation is positively related to performance, which is in line with the findings of Chen and Chen (2012) and Jaskyte (2004), indicating that innovation can enable universities to improve their educational performance.

However, we found no significant effect of technical innovation on performance, and this result is compatible with Lin and Chen(2007) and Gunday *et al.* (2011) who found that only administrative innovation plays a key role in improving the organization's performance.

Finally, our study supports the sequential mediating effect of hard practices and innovation in the relationship between soft practices and performance. When we considered the model with the total effect (Figure 2a), our results indicate that the greater the level of soft practices, the higher the performance; however, the importance of the direct effect (Figure 2a) of the soft dimension decreases considerably when we analyze the full model (Figure 2b). Nevertheless, the percentage of explained variance of performance increases ($\Delta R^2 = 4\%$) after introducing hard QM and innovation into the model.

This result provides support for the notion that quality must be attained first as a sequential precedent to other organizational outcomes (such as innovation and performance in the current study) (Ferdows and De Meyer, 1990). This result also is in line with Zeng *et al.* (2015) who argued that the improvement in quality would lead to the achievement of other competitive priorities in a cumulative manner. He also argued that quality and innovation are not a matter of trade-offs, but they coexist in a cumulative model, with quality as a foundation.

6.2 Theoretical implications

This research contributes to the debate in the literature regarding QM-innovation-performance relationships by providing information about the different impact of soft and hard QM practices on innovation and performance, applying it to new setting (HE sector), which allows for more generalizability to the findings proved previously in the manufacturing sector.

The multidimensional view of QM is proven to be important and useful as there are different paths going through either soft or hard practices, respectively, leading to different influences on innovation types and performance.

Although recent studies have looked at the different effects of soft and hard on innovation, they concentrated more on studying the technical innovation by focusing more on product and process innovation, causing a limited understanding to the contribution of QM to innovation. By breaking down innovation into administrative and technical and demonstrating different paths leading to each type, this study provides more detailed approach for the organizations which could help them to efficiently allocate their resources according to a particular innovation type.

6.3 Managerial implications

Overall, this study contributes to a better understanding on the potential effects soft and hard QM practices can have in improving innovation and, as a consequence, in increasing the HEIS' organizational performance; hence, it may serve as a guideline for the HEI's administrators.

Based on the results of this research, some suggestions are made for directors and senior managers of academic departments.

The empirical findings indicate that soft QM practices have a significant impact on hard practices, administrative, technical and organizational performance. This means that directors should give importance to different soft practices related to staff commitment and training, share quality vision among staff, focus on students' and stakeholders' needs and encourage mutual supplier relationships to have an effective QM implementation, better innovation and improved organizational performance.

The high significant impact of soft quality on hard quality practices highlights the interdependency of QM practices and the importance of a systematic approach for managing

them. Therefore, and for the proper implementation of any quality improvement initiative, directors must first set the foundations for quality by focusing on the soft practices. They should have the leadership and commitment by creating and disseminating the values of QM philosophy, setting goals and objectives that are consistent with this philosophy and setting a well-defined policy and strategy, implemented and communicated to all levels of the institution. They should encourage the participation of the entire staff members in the improvement activities and recognize their effort. In this way, the appropriate management of the soft practices will have a positive impact on the hard practices which, in turn, will strengthen, support and promote the development and improvement of the teaching, research and administrative activities.

The significant positive impact of soft and hard practices on innovation means that directors should focus on exploiting the synergies between them. They should be aware of the different roles that soft and hard practices can have on innovation. Soft QM should be developed as a way to create the necessary infrastructure, allowing the staff to take the initiative to handle new ideas, which, in turn, will help in creating the atmosphere for implementing other more technical practices such as process management and measurement, which will help to generate new ideas for administrative and technical innovations. It is also important to note that since the direct impact of soft practices on administrative innovation is stronger than hard practices, directors should focus more on the social aspects of QM (e.g. people management, strategic planning) when they introduce administrative innovation such as new recruitment systems or new organizational structure.

In general, it is important to note that innovation and improved organizational performance can be achieved by the implementation of a framework which is based on QM practices and has its foundation on soft elements (such as management support, strategic planning and people management). Therefore, directors should focus on both quality practices and innovation as per the sequence of relationships in the proposed model to ascertain organizational framework, which is in line with the modern view (Zeng *et al.*, 2015; Khan and Naeem, 2018), suggesting that both quality and innovation can coexist side by side in a joint improvement model.

7. Limitations and future research

The limitations of the present study provide directions for future research as follows. First, we have collected these data just from faculty of the five universities in the City of Naples, so in future researches, it would be helpful to adopt a broader perspective, surveying faculty from other cities and other countries as well as different contexts can lead to different organizations. It is also suggested to test the studied model among other stakeholders (such as employees and students) and compare their results. Future studies can also examine the potential effects of contingency factors (such as environmental uncertainty, organizational culture and organization's strategy) on the proposed framework. These factors can be studied as moderators which could generate more interesting results complementing ours.

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Appendix 1.
Questionnaire Items

No	Statement
	Soft quality management practices
	Top management support
TMS1	Directors actively participate in quality improvements efforts and support the improvement process
TMS2	Directors encourage student's and staff's involvement in the improvement actions
TMS3	Directors empower faculty members and staff to manage and solve quality problems
	Strategic planning
SP1	The department's policies and strategies are in line with its mission, vision and values
SP2	The department's policies and strategies are clearly formulated and documented
SP3	There is a formal process of reviewing and updating policies and strategies
SP4	Policies and strategies are communicated at all levels of the department
SP5	The formulation and revision of policies and strategies include the needs and expectations of the stakeholders
SP6	Goals are set out in writing and in a clear and quantifiable manner
	Supplier management
SM1	The suppliers of the institution are not many
SM2	The institution has close and long-lasting relationships with the suppliers
SM3	The evaluation and selection of suppliers is mostly based on quality issues rather than cost
	People management
PEM1a	The academic performance of faculty members is appraised regularly
PEM1b	The pedagogical performance of faculty members is appraised regularly
PEM1c	The performance of employees is appraised regularly
PEM2	Teaching staff and employees participate in meetings, the agenda of which is related to quality improvement planning
PEM3	Teaching staff and employees feel that they are motivated to improve their performance
PEM4	There are suitable channels for sharing and communicating "better practice," knowledge and experiences
PEM5	Our department has cross-functional teams and supports teamwork
PEM6	Special training for job-related skills is provided to faculty members and staff
	Student focus
SF1	Students' opinions and suggestions for quality improvement are determined and analyzed carefully
SF2	The teaching staff are in close contact with the students and have close relationships with them
SF3	We provide a variety of extracurricular activities for students
SF4	Students are encouraged to submit complaints and proposals for quality improvement
	Hard quality management practices
	Process management
	Educational
EP1	The teaching activity envisages the students' needs and expectations
EP2	The teaching activity envisages the needs and expectations of the companies, community or the society in general
	Research
RP1	The research activity envisages the students' needs and expectations
RP2	The research activity envisages the needs and expectations of the companies, community or the society as a whole

(*continued*)

No	Statement
Administrative	
AP1	Our institution has modern facilities (e.g. laboratories, library, computers, Internet, video players) to enhance the effectiveness of education
AP2	Facilities (e.g. classrooms, laboratories, computers, heating systems and air conditioners) are maintained in good condition according to periodic maintenance plans
AP3	Our department collects statistical data (e.g. error rates on student records, course attendances, employee turnover rates) and evaluates them to control and improve the processes
Information and analysis	
IA1	Quality data are taken into consideration by the teaching staff and employees during their daily tasks
IA2	Quality data (e.g. errors, nonconformities) and the performance indexes of the institution are recorded and analyzed
IA3	Our department benchmarks the academic and administrative processes with other departments
Continuous improvement	
CI1	The areas in the department and the procedures that need improvement are determined
CI2	The institution keeps track of the changes/demands of industry and proactively responds accordingly (e.g. revision of courses and syllabus to address the emerging and recent trends and technology)
CI3	Efforts are being taken by the department to update the library, laboratory facilities and courses following the recent updates/advances in science and technology
Program design	
PD1	Students' requirements are thoroughly considered in the design of curriculum
PD2	The experienced academicians' suggestions are thoroughly considered in the design of curriculum
PD3	Curriculum and academic programs are evaluated and updated every year
PD4	University facilities (e.g. laboratories and hardware) and resources (e.g. finance and human resources) are considered in the development and improvement of the curriculum and programs
Innovation	
Administrative innovation	
AI1	Our department implemented new or improved existing structures such as project team or departmental structures, within or in-between existing structures
AI2	Our department staff members can try new ways of doing things while still respecting the university`s procedures
AI3	When the university changes the administrative procedures, our staff is slow to adapt
AI4	We encourage the staff to work together (cooperation in teams or best practices sharing) when needed to be more effective in handling new administrative issues
Product innovation	
PRDI1	Our institution constantly emphasizes development and doing research project
PRDI2	Our institution often develops new teaching materials and methodologies
PRDI3	Our institution often develops new programs/services for members of staff and students
Process innovation	
PRCI1	Our institution often develops new technology (Internet, databases, etc.) to improve the educational processes
PRCI2	Our institution incorporates new techniques/inputs in producing programs/services
PRCI3	Our institution is trying to bring in new equipment (i.e. computers) to facilitate educational operations and work procedures

(*continued*)

No	Statement
Organizational performance	
Student results	
STR1	There is a significant decrease in student dropout rate over the past three years
STR2	There is an improvement in graduation rate over the past three years
STR3	There is a significant increase in number of high merit students opting to our institute
People results	
PER1	There is a significant increase in faculty and staff members satisfaction over the past three years
PER2	The number of students for each teacher in the last three years has become easier to manage
PER3	The scientific performance of the teaching and research staff has significantly improved over the last three years
PER4	The overall performance of teaching and research staff has significantly improved over the last three years
Institute results	
IR1	Number of research papers published by students and faculty members have increased over the past three years
IR2	There is a significant increase in preference given by high-ranked students and parents over the past three years
IR3	The number of research projects obtained from public institutions has increased over the past three years
Society results	
SOR1	There is an active involvement of the department in social events
SOR2	The department's reputation and image have increased in the civil society over the past three years
SOR3	There is a significant increase in support of cultural or sport activities
SOR4	The department is actively involved in the protection and preservation of the environment (rational processing of solid and liquid waste, recycling etc.)

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