Competing Models of Quality Management and Financial Performance Improvement

质量管理和财务绩效改进的竞争模型

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Abstract

Six competing models of quality management and financial performance improvement are hypothesized and statistically tested, using data from a survey of general managers of 288 four- and five-star hotels in Egypt and structural equation modelling. The comparative analysis of the conceptually and structurally different models suggests that financial performance can be improved when quality management is viewed holistically as a commonality of its interconnected practices (top management leadership; employee management; customer focus; supplier management; process management; quality data and reporting). Managers must therefore integrate stakeholders into design and implementation of effective quality management systems. This study: advances knowledge of the roles of alternative models of quality management in improving financial performance; deepens our understanding of the main features of a quality management system capable of enhancing organizational performance; and contributes to ongoing debates in quality and service management literature on factors that impact financial performance.

简叙

根据埃及288家四星级和五星级酒店的总经理调查数据以及结构方程模型，我们对六种质量管理和财务绩效改进的模型进行了假设和统计检验。对这些概念及结构不同的模型的比较分析结果表明，如果能从整体观角度以质量管理作为共同点链接各相关环节（高层管理领导;员工管理;**客**户关注;**供**应商管理;**流程管理**;质量数据和报告），绩效可以得到优化
。**因此**，**管理者必**须将所有利益相关者纳入有效质量管理体系的设计和实施。本研究：提高我们对质量管理各模型在改善财务绩效中作用的认知;**加深我**们对能够提高组织绩效的质量管理体系的主要特征的理解;**并有益于**质量和服务管理研究中关于影响财务业绩因素的持续辩论。

Keywords: financial performance, quality management, core practices, infrastructure practices, Egyptian hotels

关键词：财务业绩，质量管理，核心实践，基础设施实践，埃及酒店

Competing Models of Quality Management and Financial Performance Improvement

1. Introduction

The service sector is an important contributor to the growth of advanced and emerging economies (Bueno, Beauchamp Weber, Bomfim, & Kato, 2019; Euromonitor, 2018; Ghani & Kharas, 2010; Kitsios, & Kamariotou, 2019; Loungani, Mishra, Papageorgiou, & Wang, 2017; OECD 2008). Its future expansion depends largely on the ability of service firms to improve financial performance by effectively and efficiently utilizing scarce resources to address the challenges of changing competitive pressures, customer requirements and cost structures (Deloitte, 2018; Johnston, 1988). To improve financial performance, managers need to choose interventions that can optimize financial returns on organizational investments (Swanson, 1999). While extant literature provides some evidence-based guidance on performance improvement, this paper hypothesizes and statistically tests alternative models of quality management and financial performance improvement. It thereby contributes to research on factors that improve financial performance in the service sector. The specific rationales for this study are discussed below.

Firstly, numerous prior studies have examined how a range of factors impact financial performance in the service sector. These factors include: international expansion (Contractor, Kundu, & Hsu, 2003); customer perspective (Liang & Wang, 2008); interorganizational relationships (Gloede, et al., 2013); ownership (Gelübcke, 2013); franchising (Madanoglu, Lee, & Castrogiovanni, 2013); service innovation (Ryu & Lee, 2016); online rating (Ding, Guan, Fang, & Lee, 2017); human resource development (Chatterjee, 2017); corporate social responsibility (CSR) (Kim, Kim, & Qian, 2018); CSR and knowledge acquisition (Sinthupundaja, Chiadamrong, & Kohda, 2018); oil price changes (Katırcıoglu, Ozatac, & Taspınar, 2018). Although these studies have contributed to the debate on factors positively

or negatively impacting financial performance, our understanding of models that could improve financial performance in the service sector is still limited. This study answers past researchers' calls for more research in this area (Al & Tu, 2016; Brah, Wong, & Madhu Rao, 2000; Johnston, 1988).

Secondly, the importance of quality management in enhancing organizational performance has been recognized theoretically and empirically (see Section 2). Yet, despite the growing body of literature on relationships between quality management and organizational performance, a significant gap remains in our knowledge about effects of quality management on financial performance improvement. As noted by York and Miree (2004), theoretically quality management can improve financial performance by increasing revenues (e.g. through improved product quality and customer satisfaction) and reducing costs (e.g. through improved process and design efficiency). However, prior studies have produced mixed results regarding the impact of quality management on financial performance. While some findings show significant positive effects, others indicate significant negative effects and still others insignificant effects. These diverse findings call for further research on impacts of quality management on financial performance improvement (Chaudary, Zafar, & Salman, 2015; Kumar, Maiti, & Gunasekaran, 2018; Montes & Jover, 2004; O'Neill, Sohal, & Teng, 2016), to which the current study responds.

Thirdly, our literature review has revealed that existing knowledge on relationships between various quality management practices and performance is insufficient to recommend a theoretical model that could improve financial performance. Indeed, our analysis of prior findings demonstrating likely positive effects of quality management on organizational performance has identified six groups of similar results. Based on this process and existing theory, we hypothesize six alternative models of quality management that are likely to improve financial performance (see Figure 1). These models vary with regard to: the

conceptualization of quality management; the structural relationships among the various quality management practices; the likely direct and indirect impacts of quality management on financial performance (see Section 2). The individual relationships contained in the proposed models have been examined previously, but using varied indicators of quality management and performance and different methods of data analysis (mainly correlation and regression analysis). The models proposed here are new in terms of specifications (measurement models and structural models), as discussed in Section 3. While structural relations among the unobserved (latent) variables (factors) of Models 1 – 5 have occasionally been tested (albeit using different measurement models), the proposed structure of Model 6 (i.e. the direct and indirect relations among the latent variables) is new: it has emerged from our literature review and analysis of patterns in the results of prior studies reporting positive effects of quality management on organizational performance.

Fourthly, there is uncertainty about the effectiveness of the six hypothesized models for improving organizational performance in general, and for improving financial performance in service firms in particular. This is because no previous study has tested simultaneously the validity of the relations contained in the competing models using the same measures, the same sample data, and the same analytical methods. Furthermore, diverse model specifications have been used in prior studies for Models 1 – 5 while no previous study has tested Model 6. In addition, the effects of quality management may be contingent upon factors such as firm characteristics and industry type (Hendricks & Singhal, 2001; Jayaram, Ahire, & Dreyfus, 2010; Patyal & Koilakuntla, 2017).

In view of the rationales outlined above, this study attempts to identify an adequate model of quality management that can improve financial performance by statistically testing the validity of relations contained in the six hypothesized models, using the same sample data from a survey of 288 general managers of four- and five-star hotels in Egypt. The

conceptually and structurally different models are compared with a view to answering the following research questions:

(1) Does each of the six hypothesized models provide an adequate fit to the data?

(2) Which of the six competing models provides the best account of the data?

(3) Is the model that provides the best account of the data theoretically consistent?

We apply structural equation modelling to analyze the data. Very few prior studies have tested the validity of similar models using structural equation modelling that combines factor analysis and linear regression to simultaneously analyze all variables in a model, and to test complex dependence relationships between the study's latent multidimensional constructs (Byrne, 2010). To our knowledge, this is the first study that reports results of simultaneously testing the structurally different models using the same measures and sample data.

This quantitative study contributes to the limited research on factors that improve financial performance. It addresses an important gap in the knowledge about the impacts of quality management on financial performance improvement. Specifically, the current study: synthesizes the existing body of knowledge about the effects of quality management on financial performance; proposes new measurement models and alternative structural models; tests these models using the same sample data. This increases comparability of study results and enables examination of the alternative models' relative abilities to explain the data.

This study thus advances knowledge of the roles of alternative models of quality management in improving financial performance, deepens our understanding of the main features of a quality management system capable of enhancing organizational performance, and contributes to ongoing debates in quality and service management literature on factors that impact financial performance.

The results of this study provide guidance for managerial interventions aimed at improving financial performance. Specifically, the results indicate a need for managers to:

differentiate between the alternative models; integrate a range of stakeholders into design and implementation of effective quality management systems; interconnect quality management practices into a system that can improve financial performance. This suggests that managers need to operate with a strategic and flexible approach, especially if using established quality management frameworks (e.g. ISO 9000 Quality Management System, EFQM Excellence Model, MBNQA criteria) as practical guides for designing and implementing effective systems.

The rest of the paper is organized as follows. In the next section, literature on quality management and organizational performance is reviewed; the six competing models of quality management and financial performance improvement are hypothesized, and their theoretical and empirical underpinnings are discussed. We then describe the research methodology, present the results of testing the six competing models, and discuss the findings in relation to research questions and results of prior studies. The concluding section discusses the study's theoretical contribution, implications for practice, limitations, and directions for future research.

2. Models of Quality Management and Financial Performance

The International Organization for Standardization defines quality management as 'coordinated activities to direct and control an organization with regard to quality' (ISO, 2015). As a process, quality management comprises interrelated practices that may result in improved product/service quality, where quality is a 'degree to which a set of inherent characteristics of an object fulfils requirements' (ISO, 2015).

While the number and type of practices that represent the quality management construct have been debated in literature, several scholars have also considered the applicability of quality management practices to service industries, given the manufacturing

origins of quality management and distinctive features of services (intangibility, heterogeneity, perishability, inseparability of production and consumption). For example, Sureshchandar, Rajendran, & Anantharaman (2001) proposed a conceptual model of total quality service that includes practices derived from quality management literature as well as two service-specific practices: service culture and servicescape. Overall, there is a widespread agreement among scholars and practitioners that the theoretical foundations and methods of quality management—rooted in the works of Crosby (1979), Deming (1982), Juran (1988), and Shewhart (1931)—can be applied in both manufacturing and service sectors (Bouranta, Psomas, Suárez-Barraza, & Jaca, 2019; Brah, et al., 2000; Douglas & Fredendall, 2004; Nair & Choudhary, 2016; Prajogo, 2005; Psomas & Jaca, 2016; Nasim, 2018). It is not surprising therefore, that six groups of practices have commonly been used in studies examining relationships between quality management and organizational performance, in both manufacturing and service contexts. They include: top management leadership; employee management; customer focus; supplier management; quality data and reporting; and process management (Aquilani, Silvestri, Ruggieri, & Gatti, 2017; Ebrahimi & Sadeghi, 2013; Nair, 2006).

Our analysis of prior findings on the effects of quality management on organizational performance has identified six groups of similar results. Based on this process and existing theory, we hypothesize six alternative models of quality management and financial performance improvement. The models vary in the conceptualization of quality management, and in structural relationships among the quality management practices and their likely direct and indirect impacts on financial performance (see Figure 1 and discussion below).

---Insert Figure 1 about here---

2.1 Model 1 - Direct Effect of Multidimensional Quality Management on Financial Performance

Several researchers have been influenced by Crosby's (1979), Deming's (1982, 1986) and Juran's (1986) quality management philosophy and by quality management frameworks such as the ISO 9000 Quality Management System, the European Foundation for Quality Management (EFQM) Excellence Model, and the Malcolm Baldrige National Quality Award (MBNQA). They therefore view quality management holistically as a management system underpinned by common quality management principles, in which all interconnected quality management practices are explicable only by reference to the whole system (Tamimi, 1998). In this approach, the impact of quality management on organizational performance is tested using a multidimensional second-order construct, comprising a superordinate factor (quality management) manifested by first-order dimensions representing groups of quality management practices (see Figure 1, Model 1). Since multidimensional quality management is viewed as a commonality of its dimensions (Williams, Vandenberg, & Edwards, 2009), all quality management practices contained within Model 1 are required to generate a positive impact on financial performance.

Results of empirical studies that have adopted this conceptualization of quality management are consistent, showing a direct positive effect of multidimensional quality management on organizational performance. For example, using the MBNQA criteria, Prajogo (2005) found a direct positive effect of quality management on performance of 194 Australian manufacturing and service firms. Several researchers obtained similar results using the EFQM Excellence Model criteria. These studies examined 446 Spanish manufacturing and service firms (Bou-Llusar, Escrig-Tena, Roca-Puig, & Beltrán-Martín, 2009), 173 Spanish hotels (Benavides-Chicón & Ortega, 2014) and 210 Pakistan textile mills

(Shafiq, Lasrado, & Hafeez, 2019). Further evidence of the positive effect of multidimensional quality management on organizational performance was provided by scholars examining the effects of total quality management (TQM). Examples include: a study of Turkish manufacturing and service firms by Sadikoglu & Zehir (2010); a study of Iranian pharmaceutical distribution companies by Mehralian, Nazari, Nooriparto, & Rasekh (2017); a study of Vietnamese construction firms by Panuwatwanich & Nguyen (2017); and a study of Turkish and Northern Cypriot manufacturing and service firms by Sila (2018).

Based on this evidence, we hypothesize Model 1 showing a direct positive effect of multidimensional quality management on financial performance (see Figure 1).

2.2 Model 2 – Direct Effects of Quality Management Practices on Financial Performance

In contrast to Model 1, other scholars influenced by specific quality improvement programs, view quality management as a set of practices critical to improving organizational performance (Saraph, Benson, & Schroeder, 1989). In this approach, the impact of quality management on organizational performance is tested using a first-order construct containing various factors representing groups of quality management practices. Results of studies that have adopted this conceptualization of quality management are varied and provide a basis for hypothesizing five further models (see Figure 1, Models 2 – 6). In this section we discuss Model 2, while Sections 2.3 – 2.6 consider Models 3 – 6 respectively.

The relationships contained in Model 2 represent a view that all quality management practices need to be deployed to positively impact organizational performance (Hackman & Wageman, 1995). Nair (2006) reviewed early studies in this area (published between 1995 and 2004) and provided empirical evidence for the likely existence of a significant positive direct relationship between quality management practices and financial performance. Results

of later studies on manufacturing and service small and medium sized enterprises (SMEs) by Appiah Fening, Pesakovic, & Amaria (2008) and by Gadenne & Sharma (2009) also indicated that all quality management practices are associated with organizational performance. Two separate studies published in 2011 reported similar findings, indicating that all TQM practices have a direct positive significant impact on organizational performance of Malaysian manufacturing and service firms (Idris, 2011) and Iranian manufacturing firms (Valmohammadi, 2011). Furthermore, Phan, Abdallah, & Matsui (2011) reported results of two surveys of 27 Japanese manufacturing companies (carried out in 1993-1994 and in 2003-2004) indicating significant associations between quality management practices and competitive performance, with no significant differences between the two samples. Additionally, Wokabi (2016) found that quality management practices have positive significant impacts on financial performance of 42 Kenyan commercial banks. Ahmad, Iteng, & Rahim (2017) reported similar results in the Malaysian automotive industry while Androwis, Sweis, Tarhini, Moarefi, & Hosseini Amiri (2018) observed similar relationships in construction chemicals companies in Jordan.

Given this evidence, we hypothesize Model 2 showing direct positive effects of quality management practices on financial performance (see Figure 1).

2.3 Model 3 - Direct Effects of Infrastructure Quality Management Practices on Financial Performance

Within studies that conceptualize quality management as a first-order construct (see Section 2.2), several scholars have been influenced by work of Wilkinson (1992), Flynn, Schroeder, & Sakakibara (1995), and Zu (2009). They therefore identify two types of quality management practices: core and infrastructure practices. Core quality management practices refer to hard, technical elements of quality management, such as process management and

quality data and reporting. Infrastructure quality management practices refer to soft, behavioral elements that create an environment conducive to the effective use of core quality management practices. Infrastructure practices include top management leadership, employee management, customer focus, and supplier management. Results of studies on the impacts of infrastructure (soft) and core (hard) practices on organizational performance are varied, and provide evidence for hypothesizing three models (see Figure 1, Models 3 – 5). In this section we discuss Model 3, while Sections 2.4 and 2.5 consider Models 4 and 5 respectively.

The relationships in Model 3 represent a view that only infrastructure practices can directly improve organizational performance, but core ones cannot. This is supported by the results of early studies (e.g. Dow, Samson, & Ford, 1999; Powell, 1995; Samson & Terziovski, 1999), which show that while infrastructure practices have direct positive significant impacts on organizational performance, core practices have direct insignificant or negative effects. Later, in the context of 140 Malaysian service firms, Sit, Ooi, Lin, & Yee-Loong (2009) found that infrastructure practices have positive impacts on customer satisfaction, but one of the core practices (process management) has a negative impact. Similar findings were reported by Jaafreh & Al-abedallat (2012), using a sample of 600 employees of 22 commercial banks in Jordan. Furthermore, in a study of 400 employees from nine energy sector parastatals in Kenya, Njenga (2016) found that infrastructure practices have direct positive effects on organizational performance while core practices have insignificant effects. Finally, in a recent survey of 197 Jordanian pharmaceutical firms, Albuhisi & Abdallah (2018) found that infrastructure practices positively impact financial performance.

Based on this evidence, we hypothesize Model 3 showing direct positive effects of infrastructure quality management practices on financial performance (see Figure 1).

2.4 Model 4 - Indirect Effects of Infrastructure Quality Management Practices through Core Quality Management Practices on Financial Performance

Unlike supporters of Models 2 and 3, some researchers argue that, while both core and infrastructure practices are needed to improve organizational performance, core practices mediate the effects of infrastructure practices. Prior empirical results support this view. For example, using a sample of 226 U.S. manufacturing plants, Zu (2009) noted that core practices completely mediate the relationship between infrastructure practices and quality performance. Arauz, Matsuo, & Suzuki (2009) obtained similar findings in their survey of 317 Japanese manufacturing companies. Results of studies in the context of 116 Spanish manufacturing and service firms (Calvo-Mora, Ruiz-Moreno, Picón-Berjoyo, & Cauzo-Bottala, 2014) and 283 high performing manufacturing plants in eight developed countries (Zeng, Phan, & Matsui, 2015) also indicate the likely existence of the mediating effect of core quality management practices. Similar findings were reported by Psomas, Vouzas, & Kafetzopoulos (2014) in a study of 90 Greek food companies. Patyal & Koilakuntla (2017) also found the indirect effect of infrastructure practices on organizational performance through core practices in 262 manufacturing firms in India.

We therefore hypothesize Model 4 showing positive indirect effects of infrastructure quality management practices through core quality management practices on financial performance (see Figure 1).

2.5 Model 5 - Direct and Indirect Effects of Infrastructure Quality Management Practices on Financial Performance

In contrast to advocates of Models 3 and 4, other researchers suggest that organizational performance can be explained by combined effects of both direct and indirect (through core practices) influences of infrastructure quality management practices (see Figure 1, Model 5).

Early evidence indicating such relationships was provided by Ho, Duffy, & Shih (2001), who examined 25 Hong Kong electronic companies. Rahman & Bullock (2005) provided further empirical evidence for the likely co-existence of direct and indirect effects of top management leadership, employee management, customer focus, and supplier management on productivity in a study of 962 Australian and New Zealand manufacturing companies. More recently, Abdullah & Tarí (2012) surveyed 255 electrical and electronic companies in Malaysia and also found that infrastructure practices have direct and indirect positive impacts on organizational performance. Similar results were reported by Ahmad, Rasi, Zakuan, & Hisyamudin (2015) in a study of Malaysian automotive firms, and by Khan & Naeem (2016) in the context of telecommunication industry in Pakistan.

Given this evidence, we hypothesize Model 5 showing positive direct and indirect (through core practices) effects of infrastructure quality management practices on financial performance (see Figure 1).

2.6. Model 6 - Complex Interdependent Direct and Indirect Effects of Quality Management Practices on Financial Performance

Contrary to supporters of the previously discussed models, several scholars view quality management as a complex interdependent set of first-order quality management practices, with direct and indirect (through other quality management practices) impacts on organizational performance. Regarding the direct effects contained in such complex models, considerable empirical evidence indicates that all quality management practices may have direct positive impacts on financial performance, as previously discussed in Section 2.2. Such direct effects are therefore included in Model 6 (see Figure 1). However, there is less agreement in the literature on the indirect effects of quality management practices (through other quality management practices) on organizational performance. Nevertheless, based on

existing theory and our analysis of patterns in results of prior studies reporting positive effects of quality management on organizational performance, we propose the following indirect relationships for Model 6.

One, top management leadership has an indirect positive effect on financial performance through all other quality management practices. This is consistent with quality management literature, which suggests that effective quality management systems require top management leadership to drive quality excellence and quality management implementation (Deming, 1982; Dubey et al., 2018). Furthermore, several empirical studies have indicated positive effects of top management leadership on other quality management practices, such as employee management (Lakhal, Pasin, & Limam, 2006), customer focus (Tarí, Molina, & Castejon, 2007), supplier management (Laosirihongthong, Teh, & Adebanjo, 2013), quality data and reporting (Xiong, He, Deng, Zhang, & Zhang, 2017), and process management (Sila & Ebrahimpour, 2005).

Two, employee management has an indirect positive impact on financial performance through customer focus and process management. Indeed, literature suggests that effective customer focus depends on motivated and trained people who can respond to customer requirements, which may in turn increase profits (Flynn et al., 1995; Kaynak & Hartley, 2008). Also, when employees are trained in using quality tools and statistical methods, variations can be reduced and improvement areas can be identified, which in turn may enhance organizational performance (Chen, 2013; Flynn & Saladin, 2001). Several empirical studies support these relationships. For example, Zehir & Sadikoglu (2012) found a positive indirect impact of employee management on organizational performance through customer focus and process management in the context of 486 manufacturing and service firms in Turkey. Furthermore, Basu, Bhola, Ghosh, & Dan (2018) reported a positive relationship between employee management and process management in a study of 469 Indian IT enabled

service SMEs. A similar finding was also noted by Al-Refaie, Ghnaimat, & Ko (2011) in 130 service and manufacturing firms in Jordan.

Three, supplier management has an indirect positive impact on financial performance through process management. This is theoretically plausible because high quality inputs may reduce the level of process variance, leading to reducing rework and waste and thus to improving profitability (Flynn et al., 1995; Tarí et al., 2007). Results of prior empirical studies also support this relationship. For example, in the context of U.S. manufacturing and service firms, Kaynak (2003) and Kaynak & Hartley (2008) found that process management mediates the impact of supplier management on quality performance. A similar finding was reported by Laosirihongthong et al. (2013) in a study of 115 automotive firms in five ASEAN countries and by Bakotić & Rogošić (2017) in the context of 359 large Croatian firms.

Four, process management has an indirect positive impact on financial performance through the practice of quality data and reporting. This is theoretically possible because process management uses statistical techniques that generate information on the performance of organizational processes. If this information is carefully managed, it may help firms identify areas for improvement, achieve the desired quality levels and increase profitability (Deming, 1982; Chen, 2013). Such an indirect significant impact of process management on organizational performance, through the practice of quality data and reporting, was found by Fotopoulos & Psomas (2010) in a study of 370 Greek manufacturing and service firms.

Five, the practice of quality data and reporting has an indirect positive impact on financial performance through employee management, customer focus and supplier management. Such relationships are probable because quality management theory emphasizes building quality into the product/service through effective employee management, customer focus and supplier management. This requires using data and information to analyze quality performance and identify possible improvements (Deming,

1982; Sadikoglu & Zehir, 2010). Among empirical studies that support these relationships, Sila & Ebrahimpour (2005) found a significant positive impact of quality data and reporting on organizational performance through employee management and customer focus, using data from 220 U.S. manufacturing companies. Similar findings were reported by Xiong et al. (2017), who surveyed 204 quality managers of large public hospitals. Furthermore, a significant positive relationship between quality data and reporting and supplier management was found in a study of 214 U.S. manufacturing and service firms (Kaynak, 2003) and in a study of 486 manufacturing and service firms in Turkey (Zehir & Sadikoglu, 2012).

Given the above evidence, we hypothesize Model 6 showing complex interdependent positive direct and indirect effects of quality management practices on financial performance (see Figure 1).

3. Methods

Data was obtained from a self-administered survey of general managers of the entire population of 384 four- and five-star hotels in Egypt. The luxury hotel industry was chosen because quality management is important in improving hotel performance (Alonso-Almeida, Rodríguez-Antón, & Rubio-Andrada, 2012) and the industry is characterized by increased globalization and standardization (Yu, Byun, & Lee, 2014). Egypt was chosen because 80% of Egyptian four- and five-star hotels are operated by international chains with global strategies and management policies (Egyptian Ministry of Tourism, 2015) and with similar strategic characteristics that may influence their financial performance, in accordance with Porter's (1980) strategic group theory.

The data collection process (15 July – 10 October 2010) involved three stages and generated 300 responses: 15 responses in stage one, 20 in stage two, and 265 in stage three (see Figure 2). In the first stage of the data collection process, hotel general managers within

the entire population of 384 were approached by email. This generated 15 responses. In the second stage of the data collection process, the remaining 369 hotel managers were sent the questionnaire by first class post with a stamped-return envelope. A further 20 responses were obtained in this stage. In the third stage, the questionnaires were personally delivered to and later collected from the remaining 349 hotel managers, either directly or via a secretary. The third stage generated 265 responses. The total of 300 responses obtained during the three stages of the data collection process contained 12 responses with missing values. Following Tabachnick & Fidell's (2007) recommendations, these were excluded from analysis because they represented less than 5% of the data. We used an independent sample t-test to check for significant differences between early and late respondents (Groves, 2006). Our results show no significant difference between both groups of respondents at 95% confidence level.

---Insert Figure 2 about here---

Among the 288 usable responses, there were 124 responses from general managers of five-star hotels and 164 from general managers of four-star hotels. The respondents were from the areas of Sharm el-Sheikh (41.3%), Red Sea (40.9%), and Greater Cairo (17.8%). The majority of responses (80%) were from international hotel chains, with the remainder (20%) from independent hotels. The results of one-sample Z-test (two-sided) showed that our sample size (N=288) exceeded the required sample size for alpha .05 and power .80. An examination of boxplots did not detect any unexpected outliers. An inspection of skewness, kurtosis, histograms, and Normal Q-Q Plots confirmed that the normality assumption was met. There was no multicollinearity between variables, as evidenced by correlation

coefficients (ranging from .35 to .86), variance inflation factors (ranging from 1.94 to 2.54) and tolerance values (ranging from .39 to .52) (Hair et al., 2010).

To assess the validity of the relations contained in the six hypothesized models, we employed structural equation modelling (SEM), using AMOS v18 with maximum likelihood estimation. We tested the validity of full latent variable models comprising both measurement and structural models (Byrne, 2010). In this approach, the unobserved (latent) variables (factors) are regressed on other factors (representing structural models presented in Figure 1), as well as on appropriate observed variables (representing measurement models discussed below).

Regarding the measurement models of the six competing models (Figure 1), indicators of quality management and financial performance used in previous studies were analyzed and relevant indicators were selected for the purpose of this study (see Table 1). Specifically, to determine indicators of quality management, we reviewed measures used in prior empirical studies (discussed in Section 2). We identified practices that may positively impact organizational performance. This process resulted in constructing a 22-item instrument. For analytical purposes, the 22 observed variables were structured into six subscales (containing related QMPs), each measuring one aspect of quality management (latent variables). The latent variables were also labelled as infrastructure or core quality management practices, following Flynn et al.'s (1995) classification (see Table 1). To determine indicators of financial performance, we reviewed measures used in prior studies aimed at predicting financial performance (e.g. Aas & Pedersen, 2011; Barros, 2005; Tarí, Pereira-Moliner, Pertusa-Ortega, López-Gamero, & Molina-Azorín, 2017). We selected three objective measures of financial performance representing hotel financial performance: average total revenue (the mean for the last three years); employee productivity (the mean of the hotel's total revenue for the last three years divided by the number of hotel employees);

revenue per room (the mean of the hotel's total revenue for the last three years divided by the number of rooms). The financial performance data was obtained from the survey respondents. Confirmatory factor analysis (CFA) was used to test the validity and reliability of the measurement models. Results of these tests (reported in Section 4) demonstrate the validity and reliability of the measurement models.

Several ex-ante techniques were used in our research design to minimize common method bias that can occur in self-report studies (Chang, Van Witteloostuijn, & Eden, 2010; Podsakoff, MacKenzie, Lee, & Podsakoff , 2003). Specifically, the ratio scale that measured quality management was different from the ratio scale that measured financial performance. To measure quality management, respondents were asked to report how long (number of years) the hotel implemented each of the 22 quality management practices (QMPs). To measure financial performance, respondents were asked to provide data about their number of employees, number of hotel rooms and total revenue for 2007, 2008 and 2009. It was expected that the high ranking respondents (general managers), who were assured of the anonymity and confidentiality of their responses, would use facts (organizational records) to answer the survey questions. To reduce item ambiguity, a glossary was included in the questionnaire. Questionnaire items were reviewed by academics and hotel industry experts, and pilot-tested using personal interviews with 20 hotel managers. The survey questionnaire was written in English and then translated professionally into Arabic (the respondents' native language), and back into English. We employed post hoc Harman single factor analysis and confirmatory factor analysis to detect any potential common method bias (Chang et al, 2010; Podsakoff et al., 2003). Results of these tests (reported in Section 4) suggest that common method bias is not an issue in this study.

Regarding the structural components of each model (Figure 1), all models comprise one first-order endogenous latent variable (financial performance) that is influenced directly

or indirectly by exogenous latent variables. Other structural components of models presented in Figure 1 differ. Model 1 comprises one exogenous second-order latent variable (quality management), manifested by six first-order latent variables representing groups of quality management practices (QMPs). Models 2 and 3 comprise respectively six and four first-order exogenous latent variables (QMPs). Models 4 and 5 comprise four first-order exogenous latent variables (infrastructure QMPs) and 2 mediating variables (core QMPs), but the relations among these components differ: Model 5 shows both direct and direct effects, while Model 4 shows only indirect effects. Model 6 has one first-order exogenous latent variable (top management leadership QMP) and 5 mediating variables (five QMPs). All models are recursive.

Regarding model identification, the six models presented in Figure 1 are over-identified. Specifically, Model 1 has 40 fixed regression weights, 325 distinct sample moments and 57 parameters (24 regression weights and 33 variances) to be estimated, thereby leaving 268 degrees of freedom based on an over-identified model. Model 2 contains 33 fixed regression weights, 325 distinct sample moments and 56 parameters (24 regression weights and 32 variances) to be estimated, thereby leaving 269 degrees of freedom. Model 3 has 25 fixed regression weights, 190 distinct sample moments and 42 parameters (18 regression weights and 24 variances) to be estimated, thereby leaving 148 degrees of freedom. Model 4 contains 35 fixed regression weights, 325 distinct sample moments and 60 parameters (28 regression weights and 32 variances) to be estimated, thereby leaving 265 degrees of freedom. Model 5 has 35 fixed regression weights, 325 distinct sample moments and 64 parameters (32 regression weights and 32 variances) to be estimated, thereby leaving 261 degrees of freedom. Model 6 has 38 fixed regression weights, 325 distinct sample moments and 68 parameters (36 regression weights and 32 variances) to be estimated, thereby leaving 257 degrees of freedom.

To evaluate the descriptive adequacy of the six hypothesized models, we employed a model chi-square goodness of fit test. We also used absolute, incremental and parsimony goodness of fit measures. Additionally, we used predictive fit indices: Akaike information criterion (AIC), and the Browne–Cudeck criterion (BCC). We compared our SEM results of the goodness of fit tests with the most stringent acceptable model fit values found in the literature (see Table 2). Following the evaluation of the descriptive adequacy of the competing models, we compared fit indices of models that fit the data well. Since the fit indices do not tell us about aspects such as theoretical consistency of models, we also compared explanatory power (squared multiple correlation) and path coefficients of the models that fit the data well.

4. Results

The results of confirmatory factor analysis (CFA) demonstrate the validity and reliability of the measurement models. Composite reliability values for the six quality management factors and for the financial performance factor indicate satisfactory internal consistency because they range from .82 to .96, thus exceeding the recommended cut-off level of .70 (Nunnally & Bernstein, 1994). Furthermore, data in Table 1 indicates convergent validity of the scales because all factor loadings are sufficiently high and significant and the average variance extracted (AVE) exceeds .50 for all constructs, as recommended by Hair et al. (2010). Regarding quality management factors, Table 1 also shows that the values of average variance extracted (AVE) exceed the values of both average shared variance (ASV) and maximum shared variance (MSV), which indicates a good discriminant validity of the study constructs (Hair et al., 2010).

---Insert Table 1 about here---

Results of post hoc Harman single factor analysis suggest that common method bias is not an issue in this study, as the factor explains 41% of the variance. This is further supported by the results of CFA, which show that a model where all items are allowed to load on their theoretical constructs fits the data well ($\chi2(254, N=288)= 289.87$; P=.06; $\chi2/df=1.41$; RMSEA=.02; SRMR=.24; GFI=.93; AGFI=.91; CFI=.99; NFI=.96; TLI=.99; PCFI=.84; PNFI=.82). In contrast, a model where all items are allowed to measure only one factor does not fit the data well ($\chi2(275, N=288)= 3,200.09$; P=.000; $\chi2/df=11.64$; RMSEA=.19; SRMR=.10; GFI=.44; AGFI=.34; CFI=.61; NFI=.59; TLI=.58; PCFI=.56; PNFI=.54).

Table 2 presents goodness of fit indices for the six structural models of quality management and financial performance. The chi-square is significant (P<.01) for Models 2, 3, 4, and 5. However, it is not significant for Model 1 (P=.03) and Model 6 (P=.05). This means that the null hypothesis (H0: the model fits the data well) is rejected for Models 2 – 5, but not for Models 1 and 6. In other words, the significant $\chi2$ statistic indicates that the observed covariance matrix (S) does not match the estimated covariance matrix ($\sum k$) in case of Models 2 – 5. The results also show that Model 6 has higher probability associated with chi-square than Model 1. This means that, relative to Model 1, Model 6 demonstrates a closer fit between the hypothesized model and the perfect fit (Byrne, 2010).

---Insert Table 2 about here---

Table 2 also shows that the values of Wheaton, Muthen, Alwin, & Summers' (1997) relative chi-square ($\chi2/df$) are below the recommended level of 2.00 (Tabachnick & Fidell,

2007) for Models 1 and 6, but they are greater than 2.00 for Models 2, 3, 4, and 5. This indicates that while Models 1 and 6 are consistent with the data, Models 2 – 5 are not. Additionally, the results in Table 2 show that other absolute and incremental fit indices for Models 2 – 5 consistently deviate from the acceptable fit values for these measures. For example, RMSEA (Root Mean Square Error of Approximation) values for these models are higher than the recommended cut-off level of .07 (Steiger, 2007), ranging from .09 for Model 4 to .81 for Model 5. This means that Models 2 – 5, with unknown but optimal parameters values, do not fit well the population covariance matrix if it is available. Using NFI (Normed Fit Index) as another example of poor fit of Models 2 – 5, we can see in Table 2 that NFI values for these models are lower than the recommended acceptable minimum of .95 (Hu & Bentler, 1999). Models 2 – 5 thus have inadequate fit relative to the null model (in which all correlations are equal to zero).

Overall, the results presented in Table 2 provide evidence that model fit indices for Models 2, 3, 4, and 5 consistently deviate from the acceptable fit values for absolute and incremental fit measures. This indicates that our data does not support these models and the postulated relations among their variables. Not surprisingly, therefore, the results presented in Table 3 show that Models 2, 3, 4, and 5 have lower explanatory power relative to Models 1 and 6. Furthermore, Models 2 and 5 are inconsistent with theoretical models because they contain insignificant and / or negative paths (see Table 3).

---Insert Table 3 about here---

In contrast to Models 2, 3, 4, and 5, the absolute and incremental fit indices for Models 1 and 6 consistently conform to the acceptable fit values for these measures (see Table 2). Furthermore, the parsimony fit indices for Models 1 and 6 are higher than for other models. This indicates that Models 1 and 6 provide an adequate fit to the data. A comparison of goodness of fit indices for Models 1 and 6 (see Table 2) shows that Model 6 has slightly better absolute and incremental model fit indices than Model 1. In addition, AIC and BCC values show a modest preference of Model 6 over Model 1, as these values are slightly lower for Model 6 (Model 1: AIC=483.98, BCC =495.33; Model 6: AIC=430.90, BCC=444.45). However, Model 6 has slightly worse parsimony fit indices relative to Model 1. Overall, the results of the direct comparison of model fit indices for Models 1 and 6 are inconclusive in terms of preference of one model over another.

To ascertain whether the models that fit the data well are theoretically consistent, let us examine explanatory power and path coefficients for Model 1 and Model 6. The results presented in Table 3 show that Model 1 explains 62% of the variance in financial performance. Furthermore, Model 1 accounts for: 70% of the variance in top management leadership and in process management; 62% of the variance in employee management and in quality data and reporting; 60% of the variance in customer focus; and 54% of the variance in supplier management. Factor loadings for the quality management dimensions range from .80 to .96, and those for the financial performance from .71 to .84 (see Figure 3). Thus, the factor loadings indicate strong associations between each dimension and its indicators. Moreover, the multidimensional quality management in Model 1 has a very high, positive and significant impact on financial performance (β = .78, P <.001). The paths running from multidimensional quality management to its dimensions (supplier management, customer focus, employee management, top management leadership, process management, quality data and reporting) are all positive and significant too, with path coefficients ranging from .73 to

.84 (see Figure 3 and Table 3). Overall, the results for Model 1 are consistent with the theoretical model.

---Insert Figure 3 about here---

Model 6 explains 63% of the variance in financial performance. The explanatory power of Model 6 is thus similar to the explanatory power of Model 1. However, the explanatory power of Model 6 is lower relative to Model 1 with regard to quality management practices (see Table 3). In detail, Model 6 accounts for: 68% of the variance in process management; 52% of the variance in employee management; 49% of the variance in quality data and reporting; 55% of the variance in customer focus; and 46% of the variance in supplier management. In Model 6, factor loadings for the quality management practices range from .79 to .96, and for financial performance from .72 to .89 (see Figure 4). Thus similarly to Model 1, the factor loadings in Model 6 indicate strong associations between each dimension and its indicators. However, results of the path analysis for Model 6 show that only 16 out of 18 paths are positive and significant, with path coefficients ranging from .15 to .52 (see Figure 4 and Table 3). The path from quality data and reporting to financial performance is insignificant ($\beta = 0.02$, $p = 0.12$), and that from process management to financial performance is negative and insignificant ($\beta = -0.14$, $p = 0.75$). The results of the path analysis for Model 6 are therefore inconsistent with the theoretical model.

---Insert Figure 4 about here---

5. Discussion

In attempting to identify an adequate model of quality management that can improve financial performance, we have tested statistically the validity of relations contained in six competing models, using the same measures and the same sample data. We have compared the six conceptually and structurally different models that we hypothesized from theory and findings of prior studies, with a view to answering three research questions:

(1) Does each of the six hypothesized models provide an adequate fit to the data?

(2) Which of the six competing models provides the best account of the data?

(3) Is the model that provides the best account of the data theoretically consistent?

The results of this comparative study show, for the first time, that only one model (Model 1) is theoretically consistent and meets the validity criteria of providing an adequate fit to the data. Models 2, 3, 4, and 5 have not met the validity criteria of providing adequate fit to the data. In addition, Models 2, 5, and 6 are inconsistent with the expectation of the performance improvement theory because some effects are negative and/or insignificant.

The negative effect of process management on financial performance and the insignificant positive effect of quality data and reporting on financial performance that we have found in Models 2, 5, and 6 corroborate with the results of several other researchers, who also found that core quality management practices do not have a direct significant positive effect on organizational performance. For example, Samson & Terziovski (1999) reported a negative impact of quality data and reporting (significant) and process management (insignificant) on operational performance in a study of manufacturing firms in Australia and New Zealand. Further, Sit et al. (2009) found among Malaysian service firms

an insignificant negative effect of process management on customer satisfaction. Likewise, Jaafreh & Al-abedallat (2012) found a negative link between process management and organizational performance in a study of commercial banks in Jordan. Other researchers (e.g. Dow et al., 1999; Njenga, 2016; Powell, 1995) also indicated that core quality management practices have no direct positive link with organizational performance, and that only infrastructure practices can directly improve it. Based on such prior findings, in this study we have hypothesized and tested Model 3, showing direct positive effects of infrastructure quality management practices on financial performance. However, our data does not support this model. Likewise, our data does not support Models 4 and 5, which have hypothesized the mediating role of core quality management practices.

The results of this study therefore suggest that, among the six models tested in this study, only Model 1 is theoretically consistent and meets the validity criteria of providing an adequate fit to the data. While, to our knowledge, this is the first study that has compared the validity of several conceptually and structurally different models in one study, using the same measures and the same sample data, our finding that multidimensional quality management has a significant positive effect on financial performance is consistent with results of several prior studies that tested the link between multidimensional quality management and various aspects of organizational performance (e.g. Benavides-Chicón & Ortega 2014; Bou-Llusar et al., 2009; Prajogo, 2005; Shafiq et al., 2019 – see Section 2.1 for detail). One of the likely reasons why Model 1 demonstrates that quality management can significantly contribute to improving financial performance is that, unlike the other models hypothesized in this study, its structure reflects a holistic view of quality management (see Section 2.1), wherein all quality management practices are interconnected and explicable only by reference to the whole quality management system (Tamimi, 1998). Thus from the perspective of the general systems theory (Bertalanffy, 1968), an effective quality management system produces a

synergy effect where 'the combined return of the "whole" is greater than the sum of the returns from the individual parts' (Knoll, 2008, p. 14). However, more comparative research is needed to see if differences in results of competing models of quality management and financial performance improvement can be attributed to the holistic view of quality management.

Another probable reason why Model 1 demonstrates an adequate fit to the data and is theoretically consistent, while the other alternative models tested in this study do not meet one or more of the validity criteria, is that the valid model (Model 1) conceptualizes quality management as a multidimensional second-order construct comprising a superordinate factor (quality management) manifested by first-order dimensions representing groups of quality management practices (as discussed in Section 2.1). In contrast, the models that provide inadequate fit to the data and/or are theoretically inconsistent (Models 2 – 6) conceptualize quality management as a first-order construct (as discussed in Section 2.2). Indeed, prior studies that conceptualized quality management as a first-order construct produced inconsistent results, indicating both positive and negative effects of quality management on organizational performance (e.g. Flynn et al., 1995; Jaafreh & Al-abedallat, 2012; Njenga, 2016). In contrast, prior studies that conceptualized quality management as a second-order construct (e.g. Benavides-Chicón & Ortega 2014; Bou-Llusar et al., 2009; Prajogo, 2005; Shafiq et al., 2019) produced consistent results, showing a direct positive effect of multidimensional quality management on financial performance. More comparative research is needed to see if differences in the results of competing models of quality management and financial performance improvement can be attributed to the conceptualization of the quality management construct.

6. Conclusion

In an attempt to identify an adequate model that can improve financial performance, this study has hypothesized and tested six competing models of quality management and financial performance improvement. The hypothesized models differ conceptually and structurally, but the statistical tests of the six models have used the same measures of quality management, the same measures of financial performance, and the same sample data. The analysis suggests that quality management can improve financial performance, especially when quality management is viewed holistically as a commonality of its interconnected practices, including: top management leadership, employee management, customer focus, supplier management, process management, quality data and reporting. The results of this study have important theoretical, practical and research implications that we discuss below.

6.1 Theoretical Contribution

This study makes a significant theoretical contribution in several areas.

Firstly, this study advances our knowledge of the roles of alternative models of quality management in improving financial performance. The models proposed in this study are new in terms of model specifications (measurement models and structural models), as discussed in Section 3. While prior studies have occasionally tested some of the structural relations among the latent variables of Models 1 – 5 (albeit using different measurement models), the structure of Model 6 (i.e. the direct and indirect relations among the latent variables) is new, as it has emerged from our review of literature and analysis of patterns in the results of prior studies examining the effects of quality management on organizational performance.

Of particular importance in this study is the use of the same data, the same measures of quality management and financial performance, and the same analytical methods in the

tests of the six competing models. This increases comparability of study results and enables the examination of the alternative models' relative abilities to explain the data. To the best of our knowledge, this is the first study to hypothesize and statistically test the validity of several conceptually and structurally different models of quality management and financial performance improvement using this approach. By adopting this approach, we have demonstrated important differences in the results of competing models attributable to the conceptual and structural differences of the alternative models.

Secondly, the current study provides new evidence that addresses an important gap in knowledge about the effects of quality management on financial performance improvement. The analysis of the six competing models suggests that quality management can improve financial performance when quality management is viewed holistically as a commonality of its interconnected practices, including top management leadership, employee management, customer focus, supplier management, process management, quality data and reporting. The current study thus deepens our understanding of the main features of quality management systems that could enhance organizational performance relative to other competing models.

Thirdly, the results of this study contribute to the ongoing debate in the quality management literature on whether quality management practices should be implemented comprehensively (e.g. Douglas and Judge, 2001), or whether implementation of only some quality management practices suffices (e.g. Powell, 1995) to enhance organizational performance. The results of this study support the former view, as the validated model (Model 1) requires implementation of all interconnected quality management practices within a quality management system to improve financial performance.

Fourthly, this study contributes to the service management literature on factors that impact financial performance. By demonstrating that multidimensional quality management

can improve financial performance, the findings enhance our understanding of models capable of improving financial performance in the service sector.

6.2 Implications for Practice

This study has a number of implications for practice in various areas.

Firstly, the findings yield insights into financial performance improvement, particularly in the context of the hotel industry. A key lesson is for managers to differentiate between the alternative models highlighted by the research. The differentiation arises from conceptual differences and performance results of each model. Thus, hotel managers may need to review their approaches to quality management implementation, if quality management is to contribute to better financial performance.

Secondly, the results provide guidance for managerial interventions aimed at improving financial performance. The study demonstrates that, to improve financial performance, quality management is best viewed as a commonality of its interconnected practices including top management leadership, employee management, customer focus, supplier management, process management, quality data and reporting. The key implication for practice is that managers must secure buy-in from a range of stakeholders and integrate them into an effective quality management system.

Thirdly, the study has important implications for the implementation of quality management systems. It emphasizes the importance of a comprehensive approach that addresses diverse stakeholder and system requirements. This suggests that managers need to operate with both strategic and flexible approaches to integrate and interconnect quality management practices into a system that can improve financial performance. In so doing, they could use established quality management frameworks (e.g. ISO 9000, EFQM,

MBNQA) as practical guides for designing and implementing a multidimensional quality management system.

6.3 Study Limitations and Directions for Future Research

There are several study limitations in relation to which we identify directions for future research.

Firstly, the hypothesized models have emerged from our analysis of patterns in the results of prior studies reporting positive effects of quality management on organizational performance. As research in this area is constantly evolving, other patterns may emerge in the future and alternative models, especially those showing complex interdependent direct and indirect effects of quality management practices on financial performance, may be plausible. Future research into other relationships between quality management and organizational performance are therefore encouraged.

Secondly, this quantitative study is cross-sectional and has used self-report data that was collected in 2010 from single respondents (general managers) in four- and five-star hotels in Egypt. While the data is relevant for the purpose of this study and our results suggest that common method bias is not an issue in this study, future longitudinal studies that employ mixed methods and control for common method bias are needed. More work is also needed to examine the link between quality management and financial performance improvement using alternative models in other areas of the service sector, to determine whether the patterns identified in this study are generic. Such future studies could further develop our understanding of the link between quality management and performance improvement and provide additional insights into implementation issues.

Thirdly, this study has examined impacts of quality management on financial performance only. Future studies could therefore examine effects of quality management on

other performance outcomes, such as quality, customer satisfaction and operational performance. More work is also needed to examine combined effects of quality management and other factors on organizational performance. Finally, more international comparative studies are required to consider the importance of cultural and institutional factors.

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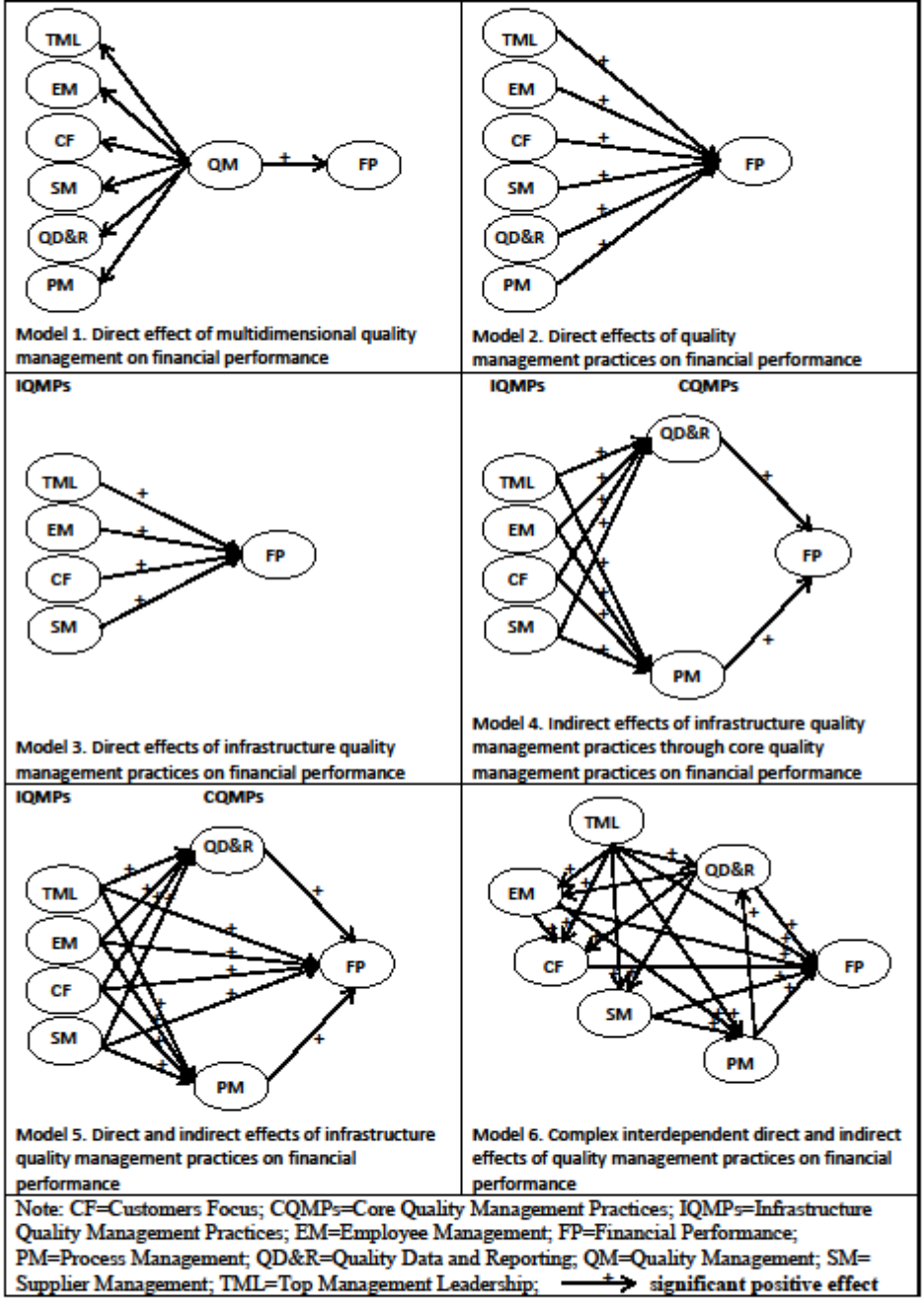
Figure 1. Competing theoretical models of quality management and financial performance improvement



Note: CF=Customers Focus; CQMPs=Core Quality Management Practices; IQMPs=Infrastructure Quality Management Practices; EM=Employee Management; FP=Financial Performance; PM=Process Management; QD&R=Quality Data and Reporting; QM=Quality Management; SM= Supplier Management; TML=Top Management Leadership; → significant positive effect

Figure 2. Three-stage data collection process

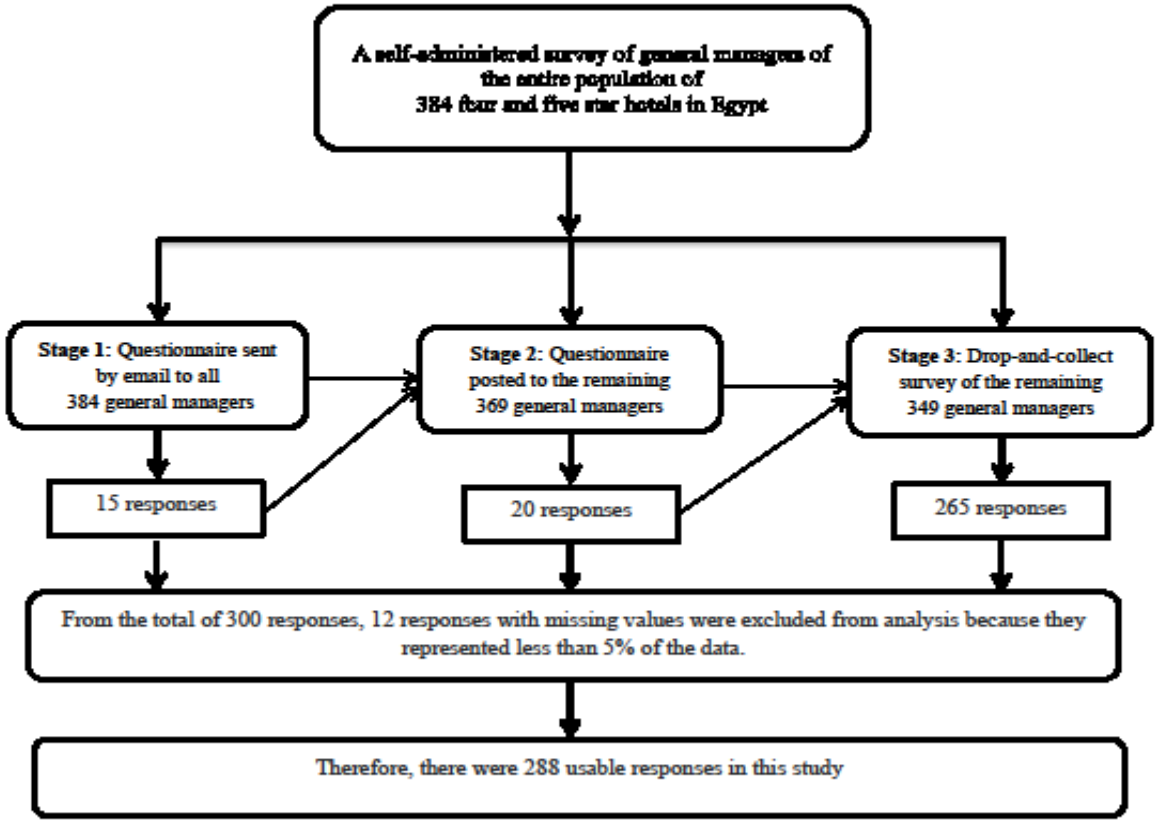


Table 1. Measures of quality management and financial performance used in this study

Latent variables	Observed variables (Indicators)	FL	*M*	*SD*	CR	AVE	MSV	ASV
Top Management Leadership (Infrastructure)	X1: Provision of the necessary financial resources to implement quality management related practices	.89	5.79	1.86	.94	.83	.48	.41
	X2: Availability of an established quality planning process.	.93	5.65	1.89				
	X3: Evaluating results by comparing them to planned results.	.91	5.80	1.93				
Employee Management (Infrastructure)	X4: Involvement of all departments in quality related activities.	.88	5.18	1.82	.95	.79	.46	.38
	X5: Training in statistical techniques.	.90	4.93	1.92				
	X6: Discussing employee quality related suggestions at a monthly inter-departmental meeting.	.89	4.92	1.81				
	X7: Implementing quality related suggestions.	.88	4.85	1.81				
	X8: Creating work environment that encourages employees to perform to the best of their abilities.	.90	4.95	2.00				
Customer Focus (Infrastructure)	X9: Contact with customers to be updated about their requirements.	.89	4.55	2.04	.96	.81	.48	.39
	X10: Contact with customers to update them about new products.	.91	4.54	1.92				
	X11: Considering customer requirements in the product design process.	.92	4.49	1.98				
	X12: Studying results of customer satisfaction surveys.	.90	4.39	1.97				
	X13: Having an effective process for resolving customer complaints in a timely manner.	.90	4.42	2.09				
Supplier Management (Infrastructure)	X14: Establishing long-term relationships with high reputation suppliers.	.79	2.01	1.55	.92	.79	.56	.42
	X15: Providing suppliers with a clear specification of the required product.	.91	2.75	1.53				
	X16: Consideration of supplier capabilities in the product design process.	.95	2.64	1.75				
Quality Data and Reporting (Core)	X17: Displaying quality data (defects and errors rates; control charts) in most departments.	.90	3.20	2.13	.95	.87	.48	.40
	X18: Using quality data to evaluate employee performance.	.93	3.27	2.11				
	X19: Displaying progress towards quality related goals.	.96	3.29	2.15				
Process Management (Core)	X20: Giving employees standardized instructions about their tasks.	.92	4.53	2.14	.95	.86	.55	.41
	X21: Using statistical techniques to reduce variance in processes.	.93	4.30	2.11				
	X22: Using a preventive maintenance system.	.93	4.31	2.12				
Financial Performance	Y1: Average total revenue for the last three years (million US dollars).	.69	2.59	0.23	.82	.78	.53	.39
	Y2: Employee productivity (thousand US dollars).	.80	5.79	3.57				
	Y3: Revenue per room (thousand US dollars).	.83	6.80	4.60				

Note: ASV=Average Shared Variance; AVE=Average Variance Extracted; CR=Composite Reliability; FL=Factor Loading; M=Mean; MSV=Maximum Shared Variance; SD= Standard Deviation.

Table 2. Model fit indices for the six competing models of quality management and financial performance improvement

	Chi square ($\chi 2$), Degrees of freedom (df), P value		Absolute Fit Measures					Incremental Fit Measures				Parsimony Fit Measures	
	$\chi 2$ (df)	P	$\chi 2$/df	RMSEA	SRMR	GFI	AGFI	CFI	IFI	NFI	TLI	PCFI	PNFI
Acceptable Fit Values	*$\chi 2$ low relative to df*	> *.01*	< *2.00*	< *.07*	< *.08*	> *.90*	> *.85*	> *.95*	> *.95*	> *.95*	> *.95*	*The closer to 1 the better*	
MODEL													
Model 1: Direct effect of multidimensional QM on FP	**370 (268)**	**.03**	**1.38**	**.04**	**.04**	**.91**	**.89**	**.99**	**.99**	**.95**	**.99**	**.88**	**.85**
Model 2: Direct effects of QMPs on FP	1264 (269)	.00	4.69	.11	.43	.67	.60	.87	.87	.84	.85	.78	.75
Model 3: Direct effects of IQMPs on FP	611 (148)	.00	4.13	.10	.37	.80	.74	.91	.91	.89	.90	.79	.77
Model 4: Indirect effects of IQMPs through CQMPs on FP	836 (265)	.00	3.15	.09	.35	.80	.75	.92	.92	.89	.91	.82	.79
Model 5: Direct and indirect effects of IQMPs on FP	749 (261)	.00	2.87	.81	.34	.82	.77	.94	.94	.90	.93	.81	.79
Model 6: Complex interdependent direct and indirect effects of QMPs on FP	**294 (257)**	**.05**	**1.15**	**.02**	**.03**	**.93**	**.91**	**.99**	**.99**	**.96**	**.99**	**.85**	**.82**

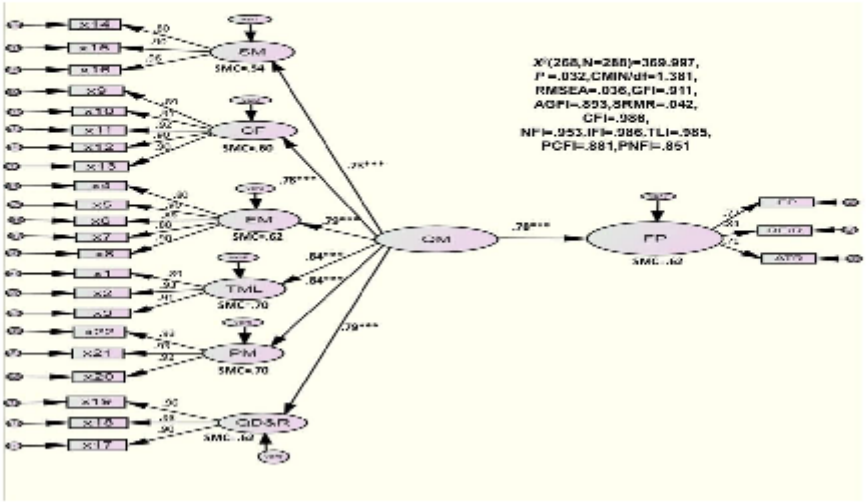
Note: AGFI=Adjusted Goodness of Fit Index; CFI=Comparative Fit Index; CQMPs=Core Quality Management Practices; FP=Financial Performance; GFI=Goodness of Fit Index; IFI=Incremental Fit Index; IQMPs=Infrastructure Quality Management Practices; NFI=Normed Fit Index; PCFI=Parsimony Comparative Fit Index; PNFI=Parsimony Normed Fit Index; QM=Quality Management; QMPs=Quality Management Practices; RMSEA=Root Mean Square Error of Approximation; SRMR=Standardized Root Mean Square Residual; TLI=Tucker–Lewis Index; $\chi 2$/df=relative chi square; Values in **bold** represent values within *acceptable fit values.*

Table 3. Explanatory power and path coefficients for the six competing models of quality management and financial performance improvement

Explanatory power (SMC)	**Model 1**: Direct effect of multi-dimensional QM on FP	***Model 2**** *Direct effects of CQMPs on FP*	***Model 3**** *Direct effects of IQMPs on FP*	***Model 4**** *Indirect effects of IQMPs through CQMPs on FP*	***Model 5**** *Direct and indirect effects of IQMPs on FP*	**Model 6**: Complex interdependent direct and indirect effects of QMPs on FP
FP	.62	*.44*	*.40*	*.28*	*.42*	.63
TML	.70					
PM	.70			*.53*	*.52*	.68
EM	.62					.52
QD&R	.62			*.38*	*.38*	.49
CF	.60					.55
SM	.54					.46
Path coefficients						
QM → FP	.78***					
QM → TML	.84***					
QM → PM	.84***					
QM → QD&R	.79***					
QM → EM	.79***					
QM → CF	.78***					
QM → SM	.73***					
TML → CF						.40***
TML → EM						.52***
TML → SM						.31***
TML → PM				*.33****	*.32****	.35***
TML → QD&R				*.20****	*.20****	.42***
TML → FP		*.45****	*.44****		*.49****	.40***
CF → FP		*.29****	*.29****		*.31****	.22**
EM → FP		*.32****	*.32****		*.35****	.26***
SM → FP		*.17****	*.14****		*.22****	.15*
PM → FP		***-.11****		*.31****	***-.15***	***-.14***
QD&R → FP		***.05***		*.31****	***.01***	***.02***
QD&R → CF						.24***
QD&R → EM						.27***
QD&R → SM						.40***
EM → CF						.20**
EM → PM				*.22****	*.21****	.15*
CF → PM				*.17****	*.16**	
SM → PM				*.59****	*.59****	.44***
EM → QD&R				*.24****	*.23****	
CF → QD&R				*.27****	*.26****	
SM → QD&R				*.46****	*.47****	
PM → QD&R						.28***

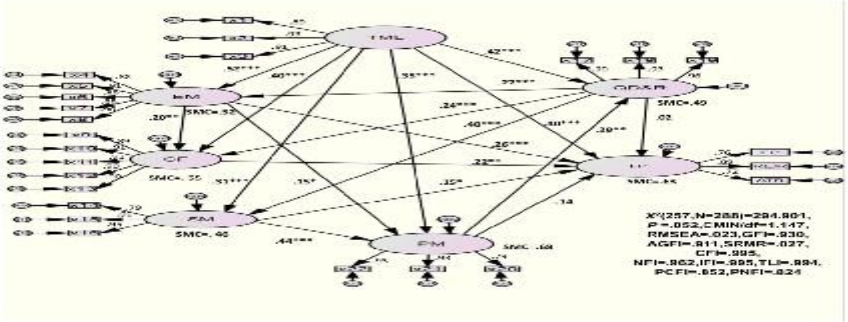
Note: ***Models 2,3,4, and 5 do not fit the data as shown in Table 2 so the relationships / path coefficients are not supported within each model as a whole.*** CF=Customers Focus; CQMPs=Core Quality Management Practices; EM=Employee Management; FP= Financial Performance; IQMPs=Infrastructure Quality Management Practices; PM=Process Management; QD&R=Quality Data and Reporting; QM=Quality Management; QMPs=Quality Management Practices; SM= Supplier Management; SMC=Squared Multiple Correlation; TML=Top Management Leadership; *p < .05; **p < .01; *** p < .001; values in ***bold italics*** show paths inconsistent with theoretical models (negative and/or insignificant)

Figure 3. Model 1 - Direct effect of multidimensional quality management on financial performance



Note: ATR=3 year average total revenue; CF=Customers Focus; EM=Employee Management; EP=Employee Productivity; FP=Financial Performance; PM=Process Management; QM=Quality Management; QD&R=Quality Data and Reporting; RE/R=Revenue per Room; SM=Supplier Management; SMC=Squared Multiple Correlation; TML=Top Management Leadership; X1-X22=quality management indicators (see Table 1); e1-e25=measurement error associated with the observed variables; var1-7=residual error in the prediction of unobserved endogenous factors; The model also contains path coefficients between the factors and factor loadings from the factors to the observed variables; *p < .05; **p < .01; *** p < .001

Figure 4. Model 6 - Complex interdependent direct and indirect effects of quality management practices on financial performance.



Note: ATR=3 year average total revenue; CF=Customers Focus; EM=Employee Management; EP=Employee Productivity; FP=Financial Performance; PM=Process Management; QD&R=Quality Data and Reporting; RE/R=Revenue per Room; SM=Supplier Management; SMC=Squared Multiple Correlation; TML=Top Management Leadership; X1-X22=quality management indicators (see Table 1); e1-e25=measurement error associated with the observed variables; var1-7=residual error in the prediction of unobserved endogenous factors; The model also contains path coefficients between the factors and factor loadings from the factors to the observed variables; *p < .05; **p < .01; *** p < .001