

# Improving Quality and Operational Performance of Service Organizations: An Empirical Analysis Using Repeated Cross-Sectional Data of U.S. Firms

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**Abstract**—Research in quality management has provided new insights and directions on how to incorporate quality principles into organizational, operational, and policy decisions. However, most research into quality management has focused on manufacturing firms, which differ from service organizations in their structural and organizational characteristics, thus limiting the value of the findings for service organizations and highlighting the need for further research to assess quality practices in service organizations. In addition, whether quality management practices can provide sustainable quality results for service organizations is overlooked in the literature, primarily due to the lack of availability of reliable and valid data. This had led to inconsistent research findings, which limits theory development and managerial relevance of quality management for service organizations. Building upon the contingency theory of quality management, we examine the determinants of quality results in service organizations and determine the magnitude of the impacts of quality excellence programs on customer satisfaction and operational results in service organizations on a more detailed level. We use repeated cross-sectional data of 16 years from the Baldrige Quality Award program. The results show that *information, analysis, and knowledge management* is a significant predictor of quality and operational results, and *management of process quality and human resource (HR) management* significantly influence customer focus and satisfaction, controlling for the firms' year. We also find that HR management has the strongest impact on customer focus and satisfaction in service organizations, followed by the management of process quality. In addition, the quality and operational improvements resulting from quality management implementation diminish over time in service enterprises. This article provides insights for service organizations and policymakers to enhance service quality and operational performance in service organizations.

**Index Terms**—Malcolm Baldrige National Quality Award (MBNQA), quality management, service organizations, structural equation modeling (SEM).

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## I. INTRODUCTION

THE ACADEMIC literature widely acknowledges the critical role of service quality and service operations management as key drivers of the performance and competitiveness of service organizations [32], [69], [130], [142], [148]. Several disciplines—including human resource management, marketing, operations management, quality management, and innovation management—have helped us to understand and develop service operations management and the management of service organizations [55].

Improving the management of service operations has been widely popularized by borrowing the principles and practices associated with process improvement and operations management from manufacturing sectors [87]. Thus, researchers and scholars have examined the applicability of many operations management theories and practices to the context of service industries [31], [49]. One practice that has been transferred from manufacturing to the service sector is quality management practices. Research into quality management has been promoted by models such as the traditional TQM and business excellence frameworks and models such as the Deming Prize, the European Foundation for Quality Management (EFQM), the Malcolm Baldrige National Quality Award (MBNQA), and other national quality excellence models based on EFQM or MBNQA, as well as approaches such as ISO 9001, Lean, and Six Sigma [29], [76]. A common principle among all these prominent quality systems is how they improve business efficiency and effectiveness by providing a model through which organizations can understand their current quality management practices, develop a quality plan, assess their quality performance, and identify areas for quality improvement [19], [21]. However, some authors have expressed doubts about the effectiveness of the MBNQA, the EFQM, and similar national quality excellence programs for improving business outcomes because they believe these models represent more of an external prescription rather than an effort for genuine internal improvement; thus, organizations tend to target scores and awards rather than real improvements through these programs [134]. Sandbrook [135] argues that organizations focus on the enablers of the EFQM rather than the results and goals, while Simms *et al.* [143] compare the MBNQA to a thermometer instead of showing how to get better. It is, therefore, crucial to empirically investigate the effects of implementing the MBNQA on service business outcomes and performances. What is more, service

organizations have different organizational structures compared to manufacturing organizations, so they require special attention that takes into consideration how they differ from manufacturing organizations [24], [44].

The MBNQA is an annual award given by the U.S. government through the National Institute of Standards and Technology (NIST), which is under the U.S. Department of Commerce [94]. This framework aims to improve quality and operations management practices, and it can be applied to any enterprise regardless of its size, type, and industry sector [12]. Nevertheless, so far, there is only limited evidence about the effectiveness of this initiative for quality improvement in service organizations, and some argue that the low level of participation of such businesses in the program could undermine its credibility [82]. For a long period, it was impossible to examine the effect of the MBNQA model on improving organizational quality outcomes because the Baldrige assessment data for firms were kept confidential and not made publicly available. Thus, examining the effectiveness of this model for assessing quality management practices in service organizations remains an unexplored area that warrants further research. Although previous studies into quality management for service organizations have provided some insight into the relationship between service quality practices and organizations' quality outcomes, they generally suffer from a lack of an overarching theoretical and conceptual framework that relates quality practices to service quality outcomes and business results. In addition, most prior studies have used cross-sectional surveys to obtain data from key informants within organizations, and such an approach to data collection generally suffers from various types of biases that are inherent in survey research [51], [129].

In this article, we aim to address these gaps in the research by seeking to better understand quality management in service organizations. First, we examine the association between quality management and the quality outcomes and operational results of service organizations by applying the MBNQA criteria. Using MBNQA as the framework for examining service quality provides a suitable platform from which to investigate quality in service organizations, both in terms of theoretical rigor and managerial relevance due to the nature of the Baldrige model, its development, and its adoption by organizations around the globe [108], [109], [149]. Second, we use 15 years of data for quality practices that were collected from service organizations. Although the use of long-term data is recommended when studying service operations management [69], such studies are rare due to the challenge of collecting data across multiple timeframes. However, such an assessment provides more robustness due to the quality of the data when compared to cross-sectional data that can suffer from response bias. Thus, the rigorous collection and evaluation of data by trained independent reviewers ensure a high degree of reliability for the data, one that could likely never be achieved by conducting surveys [145]. Furthermore, using repeated cross-sectional data allows us to examine relationships among variables over time, providing further evidence to establish causality among quality practices and quality and operational results, which in turn informs both the theoretical and practical aspects of quality management and service operations management while it provides policy directions for investment in quality in service organizations.

In summary, our article provides two important contributions to the theory and practice of quality management systems, such as the Baldrige model in service organizations. First, from the theoretical aspect, our article examines the validity and reliability of the Baldrige model for service organizations. With the understanding that quality management systems emerged from manufacturing firms and taking into account the unique characteristics of service organizations (which differ from those of manufacturing enterprises), it is important to examine whether business excellence models such as the Baldrige model are applicable in service organizations. Second, from the managerial and practical aspect, it is important for managers in service organizations to know how to maximize investment in quality management and to have an understanding of the magnitude of the impact of different quality management practices on organizational quality outcomes.

## II. MALCOLM BALDRIGE NATIONAL QUALITY AWARD

The MBNQA program is regarded as a reference model for superior quality management, one that supports world-class quality and operational performance and emphasizes process improvement [48]. This model goes beyond self-assessment as a quality excellence award program for enterprises, and it is considered an important catalyst for transforming the businesses of American firms [54]. As discussed in the literature, applying the MBNQA model can help organizations to promote a culture of learning and innovation and develop other quality management practices—such as Kaizen, lean systems, and Six Sigma—for improving their competitiveness, investment returns, and so on. According to Schmidt [138], the total benefits of participating in the MBNQA outweigh the total implementation costs by a ratio of 820:1.

Due to the crucial role that the MBNQA program plays among the various international and national quality award programs, as well as current criticisms about the effectiveness of such programs, it is crucial to examine the efficacy of this model for improving organizational quality outcomes. While some studies have discussed the validity of the MBNQA framework using self-reported survey data (e.g., [35], [106], [158]), there are only limited empirical studies that sought to measure the effects of the MBNQA using objective long-term national MBNQA assessment data [108], [109].

This article addresses the effects of the MBNQA and its dimensions and relationships in service organizations using data from this national program. In this award program, a team of quality management experts acts as independent auditors and examiners for assessing quality practices in service organizations, thus assigning scores to each firm for all seven MBNQA criteria shown in Fig. 1. Using such a rigorous approach to data collection and reporting ensures high-quality data, thanks to the robustness of the evaluation process, which in turn enhances the validity of the results of this article and its findings.

### A. Structure and Design of the Baldrige Model

The MBNQA framework was introduced in 1988 and subsequently revised and improved in 1992 and 1997 to better address business excellence needs. The Baldrige program was

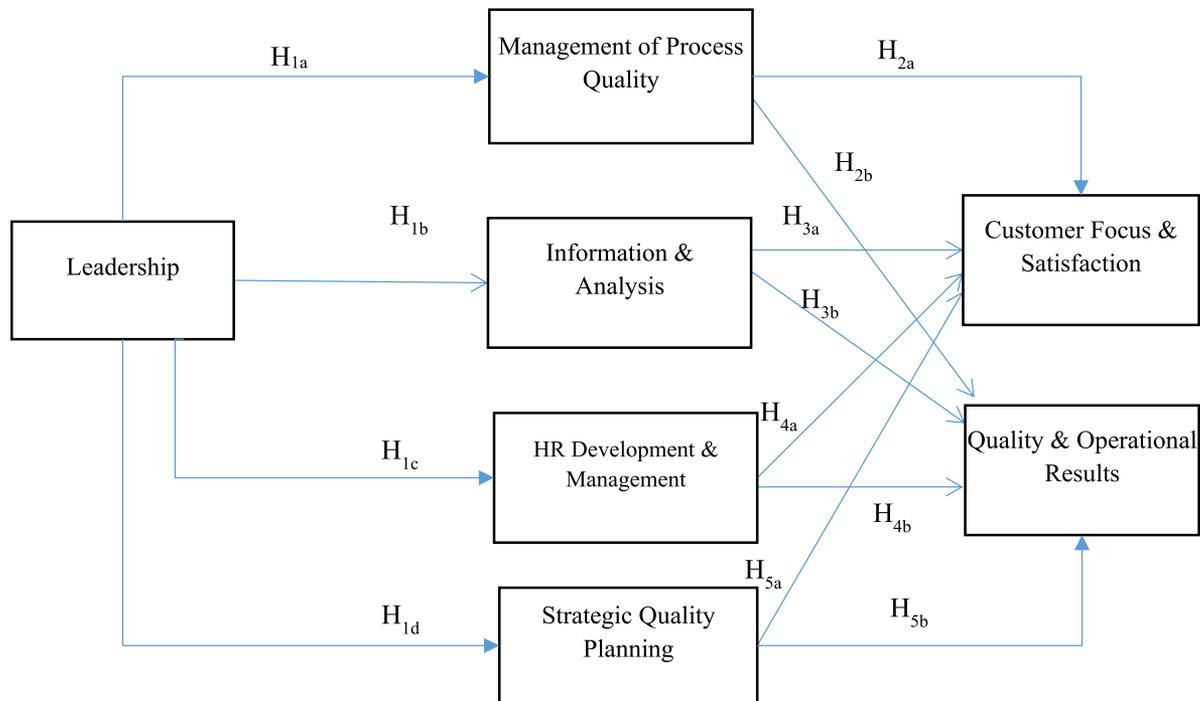


Fig. 1. Structural model for quality management in service organizations (adapted from [109]).

established by the Malcolm Baldrige National Quality Improvement Act of 1987 (Public Law 100–107), which was named for Malcolm Baldrige, who was the Secretary of Commerce during the Reagan administration. In 2010, the program’s name was changed to the Baldrige Performance Excellence Program [100].

The MBNQA considers leadership as the main driver of a business system, but the interrelationships among the model’s elements are not clearly established. Instead, it seems that the MBNQA model simply assumes that each element is related to the others [109], [158]. This lack of clarity about the interrelations among the MBNQA criteria presents a major obstacle to understanding the dynamics of the model, but researchers have offered different versions of the interrelationships among constructs in order to examine the model validity (e.g., [48], [108], [109]). This article focuses on the MBNQA’s theoretical foundations (i.e., the measurement model) and the interrelationships among constructs (i.e., the structural model) for service firms that applied to the MBNQA program during the 1990–2006 period.

### B. Previous Studies in the MBNQA Model

Studies of the MBNQA fall into three main groups: The first group investigates the validity of the MBNQA model as a reference for quality management practices [40], [62], [133]. The second group, meanwhile, focuses on the validity of the MBNQA framework and its elements (e.g., [35], [106], [158]), using quality data at the state level in the U.S. [74], [105]. More recently, Pannirselvam and Ferguson [106] analyzed the details of the MBNQA constructs, and they divided the “customer focus and satisfaction” construct into two subdimensions. Flynn and

Saladin [48], meanwhile, used self-reported data from several countries to validate 1988, 1992, and 1997 versions of the MBNQA model. Similarly, Rao *et al.* [127] conducted another international study using self-reported data for several countries, resulting in an instrument with 13 quality management constructs.

Some studies have delved deeper into the MBNQA model and its underlying principles. For example, Evans and Ford [45] analyzed the MBNQA core values and their underlying assumptions, ultimately offering a conceptual framework for the MBNQA and the interrelationships among its constructs. Wilson and Collier [158], meanwhile, showed that a modified version of the 1992 MBNQA model is a more effective predictor of quality and operational outcomes. Furthermore, Flynn and Saladin [48] analyzed all three MBNQA versions (1988, 1992, and 1997) and illustrated the effectiveness of the MBNQA for business performance. Finally, Lee *et al.* [83] applied a modified version of the 1997 MBNQA model to the Korean manufacturing sector, concluding that quality information/analysis has significant effects on strategic planning for quality and process management. They also found process management and HR management to be the most effective predictors of quality outcomes.

The third set of studies, which have been conducted in more recent years, use actual Baldrige data to test the reliability and validity of the MBNQA model [108], [109]. Once the actual Baldrige data were released in 2011, researchers were then able to examine the validity and reliability of the MBNQA model and the relationships among its constructs. These studies have shown this model to be an effective framework for assessing quality management, as well as a reliable and robust solution

for measuring quality management practices over different time-lines [109]. In a more recent study, Parast and Golmohammadi [108] analyzed the validity of the MBNQA model for healthcare organizations. Their findings suggest that leadership is the key driver in this model, with it positively influencing all the other MBNQA constructs. The result of this article showed that 1) information and analysis significantly influence quality outcomes; 2) HR management and development significantly influence customer focus/satisfaction, as well as quality outcomes; and 3) strategic planning for quality significantly influences customer focus and satisfaction. This article extends this research branch by examining the validity of the MBNQA for service businesses and assessing the relationships among the MBNQA elements and their effects on quality outcomes. We further discuss and compare the results of our article in service organizations with the study in the healthcare conducted by Parast and Golmohammadi [108]. Our evaluation further validates the distinction between healthcare organizations with other service firms, which has been already incorporated into the MBNQA model.

### III. CONTINGENCY THEORY OF QUALITY MANAGEMENT

The contingency theory of quality management provides a suitable theoretical lens to examine how quality management is implemented in service organizations and how these practices are unique to service organizations. The contingency theory of quality management asserts that organizational and contextual factors such as organizational strategy, organizational culture, product lifecycle, and customer focus would have impacts on how an organization can approach implementing quality management [91]. This perspective to quality management challenges the context-free approach that argues that quality management can be universally applied across all industrial sectors and would achieve similar results [146]. The contingency theory approach to quality management provides a more theory-driven and practice-driven perspective to quality management, saying that the quality management principles are applicable and relevant across industries, but the relationships between quality management practices and the magnitude of their impacts should be different across industrial sectors. Therefore, the industrial sector is the context.

Thereby, any theory development in the Baldrige model should be driven by industry-specific studies in order to capture the role of the contingency factors. From a practical perspective, service organizations need to emphasize a different set of quality management practices to maximize their investment in programs such as the Baldrige model.

#### A. Research Background and Hypotheses

Previous research posits that management practices in service organizations need to pay attention to the unique characteristics of service organizations, which differ from those of manufacturing enterprises [24], [56]. For instance, compared to manufacturing firms, service organizations require a significantly lower level of financial investment [42]. Other characteristics of service firms that differentiate them from manufacturing firms include the simultaneous production and delivery of services

[60], [95], [156] and a greater emphasis on people and customers [17], [22], [42], [95], [156]. In addition, services tend to have lower levels of standardization and formalization. Because of the intangible nature of service products, the development of performance metrics for service operations can be problematic. All the above mentioned makes activities, such as process improvement and service innovation in service organizations, more challenging than in their manufacturing counterparts [44].

Research into quality management for service organizations has followed a similar trajectory to other management practices that have been translated from the manufacturing setting to a service environment. The current status of research in the quality management field for both service and manufacturing organizations is mixed. One group of studies highlights the differences between the manufacturing and service sectors when implementing quality management. These studies generally find that practices such as statistical process control and process management are emphasized more in manufacturing firms [13], [34]. In contrast, Prajogo [120] report no differences in quality management implementations for service and manufacturing organizations in Australia. Although prior studies have not been able to provide a clear empirical assessment of the differences between service and manufacturing sectors from a quality management perspective, Lenka *et al.* [86] allude to them from a quality management point of view. Manufacturing firms are oriented toward technology and tools with an emphasis on technical skills in recruitment and quality measurement assessment through statistical tools. Service organizations are more people oriented, however, with an emphasis on communication skills and an evaluation of quality measurement based on customer satisfaction. Thus, to better understand quality management in service organizations, researchers should conduct more studies that are targeted at these organizations. Although quality management principles can be extended to service organizations, researchers should avoid making the oversimplified assumption that quality management findings can be transferred directly from manufacturing to service settings.

Research into service quality can be categorized into two segments: The first segment, which is mostly concerned with the quality of service delivery to customers, has received considerable attention in the literature, especially from a marketing perspective. This stream of research was triggered by the seminal studies of Parasuraman and his colleagues [113], [114], resulting in the development the SERVQUAL instrument for assessing service quality, which has been extensively applied in the service industry by academic researchers and practitioners alike [4]. Although this research stream has provided effective insights into the quality of service delivery and customer satisfaction, its primary focus has been the interaction with the customer and the delivery of services. The second research stream has been promoted by the quality and operations management literature, and it probes the association between quality management solutions and organizational quality outcomes. Such an approach provides a more holistic view of quality in service organizations and posits that organizations can improve their quality outcomes by emphasizing quality management practices. The current article is concerned with this line of research, so it views service quality in service organizations from an operations management

perspective, which has the advantage of providing insights into the antecedents of service quality and quality results in service organizations. It, therefore, provides theoretical implications and managerial insights for how service organizations can enhance their service quality outcomes through an emphasis on quality management practices. In other words, this approach investigates the mechanisms that improve service quality in service settings.

We present a review of the studies about quality management in service organizations in Table I. A common theme among these studies concerns how quality management has been widely used in service organizations around the globe, demonstrating the generalizability and popularity of quality management principles for improving quality in service organizations. We also realize that changes in organizational processes (i.e., business process reengineering) can have a significant impact on organizational quality outcomes and firm performance [124], suggesting the relationships among management of process quality, customer satisfaction, and organizational quality results in service organizations. We also see that both the service quality perspective (SERVQUAL) and the quality and operations management perspectives have been used in previous studies. A comparative assessment of the studies that use SERVQUAL would be more insightful, however, because such studies use the established constructs of SERVQUAL, thus enabling more consistency in research design and survey development. This is not the case for quality management studies conducted within the operations management domain because such studies use different frameworks and theoretical perspectives when defining quality management and its implementation for services. Furthermore, we also notice that quality management implementation supports the successful implementation of other management initiatives, such as environmental management and corporate social responsibility (CSR) [117], [125], [150].

The review of previous studies also provides some other important insights. For example, none of these studies applied the MBNQA framework or other similar frameworks for quality excellence (e.g., Deming prize, EFQM excellence model, etc.) to examine the association between quality management solutions and quality and operational outcomes within an organization. We also find that while implementing quality management enhances firm performance, it is not clear how different practices associated with quality management improve different dimensions of organizational quality performance. More importantly, the relative importance of different quality management practices for improving organizational quality outcomes is overlooked in the literature. This article, therefore, aims to examine the effects of one quality and business excellence framework, namely the MBNQA, on business outcomes and address the criticisms, limitations, and gaps in the literature.

The association between leadership and other elements of the Baldrige model has been discussed in several studies. (e.g., [106], [109], [158]). Empirical analysis of the Baldrige data shows leadership to be the main driver of the quality system,

TABLE I  
PREVIOUS STUDIES INTO QUALITY MANAGEMENT IN SERVICE ORGANIZATIONS  
(SORTED ALPHABETICALLY BY MAIN AUTHOR)

Study	Research	Country	Quality practices	Performance outcomes	Major findings
Aljeri and Meneah [2]	Survey	Ghana	Top management support; Teamwork; People engagement and development; Effective and open communication	Customer dissatisfaction	A medical records department realized the key benefit of applying quality management practices for service delivery; however, they did not adequately meet the required quality management principles and standards.
Ali and Reza [165]	Survey	Pakistan	Appearance; Reliability; Tangibles; Empathy; Responsiveness; Compliance	Customer focus and satisfaction	"The compliance dimension of the SERVQUAL model proved its importance by showing the highest contributing factor in the overall model."
Arshad and Sa [7]	Survey	Pakistan	Customer focus; Continuous improvement; Information system's quality; Information and communication technology usage; Knowledge sharing; Service culture	Service quality; Product and process innovation	Implementing quality management practices significantly improves service innovation and service quality.
Benavides-Velasco, et al. [16]	Survey	Spain	Leadership; Employees; Strategy; Products/services; Processes	Net income; Employee results; Customer results; Society results	Quality management implementation improved a hotel's performance and optimized its capacity, thus increasing the benefits for stakeholders.
Bourant et al. [20]	Survey	Greece Mexico Spain	Customer focus and relationship; Employee development and training; Process management; Employee quality management; Quality practices of top leadership team	Employee-focused Performance; Customer-focused performance	The adoption of quality management factors differs across service sectors and countries. Some quality management elements are drivers of employee- and customer-focused outcomes.
Deming et al. [34]	Survey	Turkey	Quality commitment of employees; Perception of leadership's commitment to quality; Perceived effectiveness of work team; Information sharing level in the organization	Customer orientation	The study confirms that leadership commitment improves the development of quality commitment practices among staff. It therefore improves staff behavior, team effectiveness, information sharing, and customer orientation.
Filaliath, Harvey, and Chebat [47]	Survey	USA	Top leadership engagement and support; Quality control system; Effective employees' relation and engagement and highlighting their critical role; Defined and shared quality objectives; Regular service quality survey for feedback and improvement	Customer satisfaction	Quality management solutions are mostly concerned with customer loyalty and satisfaction rather than financial outcomes. A main issue is that quality has been usually defined/redefined as a productivity term.
Gonzalez-Cruz et al. [55]	Survey	Spain	Customer orientation; Leadership and management commitment; HR active participation and commitment; Continuous improvement; Cooperation along the supply chain	Innovation capability	Customer orientation, a competitive strategy and management innovation to apply quality management are the main factors associated with the innovation capacity of a firm. The effects of quality management on innovation depend mainly on management's understanding of the quality management philosophy.
Gupta et al. [59]	Modeling	India	Committed management and workforce; Network and resource planning; Service quality and reliability; IT application and information sharing; Understanding and analyzing customer needs; Benchmarking best practices and high standards; Integrating access and infrastructure; Integrated logistics management; Using environmental friendly and recyclable materials for packaging; Using clean environmental friendly energy resources; Cost optimization; Managing inventory integration	Critical success factor for high quality and sustainable logistic services	The four most-prioritized factors are managers' and employees' commitment, identifying customer needs and expectations, service reliability and quality, and integrated logistics services.
Jalilvand et al. [66]	Survey	Iran	Human resource management; Strategic planning; Customer focus; Information & analysis; Process management	Entrepreneurial orientation; Corporate social responsibility	Quality management positively affects CSR, and it is an important antecedent for an enterprise's social orientation.
Janda, Trochim, and Givner [67]	Survey	Malaysia	Security; Access; Performance; Information; Sensation	Customer Satisfaction; Word-of-mouth; Likelihood of future purchase; Likelihood of complaining	They discuss consumer perception about Internet retail services through two separate qualitative and quantitative studies to identify and validate the most important determinants of this perception, including the following: access, security, sensation, information, and performance.
Jaradat and Al-Sagoff [68]	Survey	Saudi Arabia	Security; Access; Customer focus; Responsiveness; Communication; Competence; Credibility; Courtesy; Tangibles; Reliability	Perceived service quality	The survey scored low in the area of responsiveness and reliability but high in the dimension of tangibles. Service quality was perceived differently according to customer type.
Jayaram and Na [69]	Survey	China	Employee development and professional training; Customer focus	Quality performance; Efficiency performance	The knowledge management dimensions of employee development and professional training as well as customer focus have differing impacts on efficiency and the quality of services. In addition, greater employee development and training programs improve both quality and efficiency of the systems.
Kersten and Koch [75]	Empirical	Germany	Employee development and management; Customer orientation; Leadership commitment and support; Process management and continuous improvement; Quality data and assessment; Supplier quality management	Business success	The study is about measuring the quality of logistics services through three main factors of service process, potential, and outcomes. The study confirms the positive impacts of quality management practices on these factors as well as business success.
Melina [92]	Empirical	USA	Organizational integration; Capacity management; Facility management; Product management; Service promotion; Service distribution	Enhanced organizational performance	Both technology and people are important for improving a firm's performance through the adoption of quality management solutions.
Petrucci, Moliner et al. [117]	Empirical	Spain	Leadership; Quality management; Process management and continuous improvement; Customer orientation; Supply chain management	Market success; Stakeholder relation; Financial performance	Quality management and environmental management positively influence several aspects of business performance. Implementing quality management practices helps develop skills for effective environmental management in the hotel sector.
Priyo, Mohamad, Adhoni [121]	Empirical	Indonesia	Tangibles; Assurance; Empathy; Responsiveness; Reliability	Customer satisfaction and loyalty	Customer satisfaction is an effective mediator between SERVQUAL and customer loyalty.
Prasanna and Jais [123]	Empirical	Spain	Quality management execution by top leadership team; Employee training and development; Employee quality management; customer orientation; Process management	Operational and financial performance; Customer satisfaction; Product/service quality performance	The TQM implementation factors that are most relevant to service organization performance concern employees, customers, and the top management team as the main organizational stakeholders.
Quintana-Garcia, Marchante-Lara, and Benavides-Chioin [125]	Empirical	Spain	Leadership; Partnerships and resources; Employees; Strategy; Processes, products and services	Hotel performance	The adoption of quality management and CSR improves stakeholder benefits and hence business performance in the hotel sector. However, the gender diversity effect on hotel performance is mediated by CSR.
Talib, Rahaman, and Qureshi [135]	Empirical	India	Top leadership support and commitment; employee engagement, training and development; Process management and continuous improvement; Customer orientation; Supply chain management; Information and analysis; Quality management systems and culture; Benchmarking; Strategic planning; Product and service design; Teamwork and Communication	Quality performance	Quality management practices partially correlate with quality performance. Based on the results, the main dominant quality practice is quality culture, followed by quality systems, teamwork, employee training and education, and benchmarking, all of which positively affect quality performance.
Yee et al. [161]	Empirical	Hong Kong	Employee satisfaction and loyalty; Customer satisfaction and loyalty; Service quality	Organizational profitability	Employee satisfaction is strongly correlated with both service quality as well as customer results and satisfaction. The latter then influences business profitability, which in turn moderately and non-recursively improves employee satisfaction, leading a cycle of "satisfaction=quality=profit". Employee satisfaction is therefore crucial to enhancing service quality and customer satisfaction.
Zhang et al. [162]	Empirical	China	Service philosophy; Strategic and tactical; Human resource management; Management practice; Brand management	Operating performance; Social responsiveness	A customer-focused service philosophy, service innovation, and effective CSR are important for top Chinese service enterprises.

TABLE II  
DESCRIPTIVE STATISTICS

Year	Leadership	Strategic Quality Planning	Customer Focus & Satisfaction	Information & Analysis	HR Development & Management	Management of Quality Process	Quality & Operational Results
1990 (18)	(.38, .27)	(.36, .24)	(.33, .23)	(.31, .20)	(.42, .18)	(.44, .21)	(.31, .29)
1991 (21)	(.54, .18)	(.45, .17)	(.43, .17)	(.41, .15)	(.50, .14)	(.41, .21)	(.54, .19)
1992 (15)	(.62, .13)	(.59, .16)	(.54, .15)	(.49, .11)	(.51, .11)	(.52, .16)	(.56, .12)
1993 (13)	(.64, .10)	(.57, .12)	(.52, .12)	(.47, .12)	(.59, .10)	(.50, .15)	(.60, .14)
1994 (17)	(.63, .10)	(.54, .13)	(.50, .11)	(.47, .11)	(.58, .10)	(.49, .13)	(.59, .09)
1995 (10)	(.63, .09)	(.53, .14)	(.50, .09)	(.54, .07)	(.54, .12)	(.47, .09)	(.55, .08)
1996 (6)	(.57, .09)	(.55, .07)	(.50, .09)	(.50, .10)	(.55, .08)	(.49, .12)	(.57, .06)
1997 (7)	(.53, .12)	(.48, .15)	(.53, .13)	(.50, .10)	(.50, .12)	(.50, .16)	(.41, .16)
1998 (5)	(.49, .15)	(.42, .12)	(.48, .13)	(.39, .08)	(.46, .13)	(.47, .12)	(.33, .13)
1999 (11)	(.47, .08)	(.40, .14)	(.48, .12)	(.43, .11)	(.46, .08)	(.47, .07)	(.32, .12)
2000 (5)	(.50, .09)	(.46, .09)	(.47, .06)	(.42, .16)	(.48, .05)	(.48, .12)	(.36, .13)
2001 (4)	(.43, .16)	(.39, .18)	(.49, .18)	(.47, .17)	(.45, .13)	(.44, .17)	(.40, .17)
2002 (3)	(.50, .13)	(.46, .14)	(.49, .15)	(.49, .19)	(.47, .11)	(.49, .15)	(.43, .15)
2003 (8)	(.51, .11)	(.47, .11)	(.54, .06)	(.52, .09)	(.48, .10)	(.52, .11)	(.43, .10)
2004 (5)	(.55, .14)	(.52, .12)	(.54, .18)	(.58, .10)	(.54, .06)	(.53, .12)	(.42, .13)
2005 (6)	(.49, .17)	(.44, .18)	(.50, .16)	(.50, .19)	(.48, .16)	(.51, .20)	(.37, .16)
2006 (4)	(.61, .10)	(.58, .08)	(.57, .03)	(.59, .12)	(.56, .12)	(.55, .13)	(.46, .10)

which in turn impacts strategic quality management, information and knowledge management, the management of process quality, and human resource development and management. These practices then collectively determine two quality-related outcomes, namely quality and operational results, as well as customer focus and satisfaction. We examine the relationships among these elements in the structural model for the MBNQA framework (see Fig. 1) and test all hypotheses using empirical data for service organizations. While we do not rule out the applicability of alternative Baldrige models, in the absence of any meaningful quality management model for service organizations, it would be prudent to use the proposed model developed in prior studies.

Figure 1 presents the hypotheses to support the possible relationships between the MBNQA criteria. These hypotheses were developed based on prior studies in the MBNQA model and other literature in quality management (e.g., [108], [109], [158]).

#### IV. METHODOLOGY

We apply the Baldrige criteria for quality management, which are the same ones that were used when collecting the data. These criteria are: Leadership; Strategic quality planning; Customer focus and satisfaction; Measurement, analysis, and knowledge management; HR development and management; Management of process quality; and Quality and operational results [101]. Details of these criteria can be found through the MBNQA program on the NIST website.

##### A. Data

The data for service organizations were collected as part of the MBNQA program operated in the US National Institute of Standards and Technology (NIST) [101]. Independent professional auditors scored each service organization that applied for the MBNQA between 1990 and 2006. This presents a unique opportunity to examine the theoretical and causal associations

between the variables in the MBNQA model (see Fig. 1). What is more, this dataset does not comprise self-reported data, so its high level of objectivity and robustness ensures a greater degree of reliability in our data analysis [46], [109].

##### B. Sample

This article uses a relatively large sample of service enterprises that applied for the MBNQA program between 1990 and 2006 in the U.S. However, we excluded the data for 1990 from the analysis because this was the first year of data collection. This left us with a total of 140 observations for service firms during the 1991–2006 period.

*Sample characteristics:* Our sample comprised service firms that applied for the MBNQA between 1990 and 2006. Due to confidentiality concerns, the names of these organizations were not disclosed, so we were unable to identify the individual organizations. Despite this, we believe that our sample is a good representation of all service organizations that are committed to achieving better quality levels. While the availability of organizational and contextual data—such as firm size, firm age, and the implementation of any complementary process improvement programs—could have widened the scope of our results, the research questions we pursued in this article were unaffected by the lack of such data.

*Scoring system:* Since the MBNQA framework allocates weights to each criterion or construct, a data-normalization process divided the reviewers' scores by the maximum score in order to obtain a consistent score for all criteria [108]. The maximum possible MBNQA score is 1000, but these points are not equally distributed among the seven MBNQA criteria. For instance, *Strategic planning* has a maximum of 80 points, while the *Leadership* dimension has a maximum of 120 points. This normalization step helped to obtain consistent data with the same measurement range for each construct. Following this normalization step, each construct was awarded a value ranging from zero to one.

TABLE III  
CORRELATIONS AMONG CONSTRUCTS

	Mean	S.D.	1	2	3	4	5	6	7
1. Leadership	.56	.14	1.00						
2. Strategic planning	.50	.15	.793***	1.00					
3. Customer focus and satisfaction	.50	.13	.723***	.744***	1.00				
4. Information and analysis	.47	.13	.730***	.701***	.745***	1.00			
5. Human resource development and management	.52	.11	.731***	.733***	.716***	.614***	1.00		
6. Management of process quality	.48	.15	.667***	.747***	.782***	.716***	.644***	1.00	
7. Quality and operational results	.49	.16	.795***	.727***	.574***	.579***	.705***	.563***	1.00

\*\*\*p < 0.01.

Table II presents a summary and the descriptive statistics of our data by year. The first column is the year, with the sample size for that year being shown in parentheses. The remainder of the columns presents the various MBNQA criteria with their associated means and standard deviations, respectively, in parentheses for each year. We calculated both skewness and kurtosis measures to assess normality. If the asymmetry and kurtosis values are between  $-2$  and  $+2$  and  $+10$  and  $-10$ , respectively, then the data show normal behavior, and this is acceptable for proving a normal univariate distribution [25], [140], [141], [154]. Our empirical findings show that the entire sample meets the requirement of normality.

As Table II illustrates, the mean values of some variables improved over time, and this could be associated with the widespread application of quality management solutions in the service sector. For example, the average score (point estimate) for *Leadership* increased from 0.38 in 1991 to 0.61 in 2006. We can see a similar trend for other key variables of the MBNQA model: *Customer focus and satisfaction* (from 0.33 to 0.57), *Strategic planning* (from 0.36 to 0.58), *Information and analysis* (from 0.31 to 0.59), *HR development and management* (from 0.42 to 0.56), and *Management of quality process* (from 0.44 to 0.46). In terms of the mean, average, standard deviation, and correlations, as Table II shows, the overall average for quality management ranges from 0.48 to 0.56 (with 1.00 being the maximum score for each variable). This demonstrates that, on average, significant gaps exist in the quality management implementations of the service enterprises, and there is also room for quality improvement in the service organizations. For example, while we see organizations score as much as 0.86 (out of 1), other organizations' scores are just 0.15 and 0.16 in areas such as *Strategic quality planning* and *Information and analysis*, respectively. Another important observation concerns the reduction in the point estimate for the standard deviation of the Baldrige criteria over the years. Although the sample size declined over time, the point estimate for the standard deviation also shows a declining trend. This suggests that over the years, the service organizations became more homogenous in their implementations of quality management practices, thanks to benchmarking and implementing best practices. In addition, the significant pairwise correlations among the MBNQA model's variables (shown in Table III) further support the interrelationship among variables that was envisioned in the literature.

## V. DATA ANALYSIS AND ESTIMATION PROCEDURE

We applied confirmatory factor analysis (CFA) as well as structural equation modeling (SEM) for examining the model. Hair *et al.* [61] confirmed the importance of CFA for analyzing the full measurement model and applying goodness-of-fit tests. The SEM method enables us to simultaneously analyze the potential complex associations among multiple independent and dependent variables. Besides, SEM is applied to examine the structural associations between observed and latent variables (for example, [11], [26]).

### A. Measurement Model: Validation and Assessment

We applied CFA for the entire MBNQA model using various goodness-of-fit tests to examine the overall model's fitness ( $\chi^2/df = 1.14$ ; RMSEA = 0.032 (0.01, 0.057); RMR = 0.002). All the key parameters of Chi-Square, RMSEA, and RMR were within the recommended range [65], [73], [137]. In addition, we used the Kaiser–Meyer–Olkin to assess the validity of the factor model [72]. The statistics were KMO = 0.95 and  $\chi^2 = 2139.10$  with  $p < 0.01$ , suggesting there were no concerns with the factor model. Next, we calculated Cronbach's alpha for our MBNQA constructs. All estimated reliability values for the model were high and within the acceptable range (greater than 0.80), as given in Table IV.

Since the standardized loadings estimates were all significant, this proved convergent validity. We also examined composite reliabilities and average variance extracted (AVE) to ensure convergent validity and discriminant validity [64].

### B. Robustness Tests

*Normality:* The verification of normality of errors is necessary for conducting regression analysis. For the SEM analysis, nonnormality does not impact the consistency of the parameter estimates [18], [85], [139].

*Heteroscedasticity:* We examined the heteroscedasticity to ensure that the variance of regression disturbances was constant across our observations, thus leading to unbiased model estimates [58]. In order to address any potential bias related to any inequality in the variance in error terms (heteroscedasticity), we plotted a scatter plot of the standardized residuals versus the

TABLE IV  
PROPERTIES OF THE MODEL

Scale	Measurements				
	Reliability	Composite reliability	Item	Loading	Average Variance Extracted
Leadership	.90	.83	L <sub>11</sub>	.94	.83
			L <sub>12</sub>	.88	
Strategic Planning	.86	.78	S <sub>21</sub>	.84	.78
			S <sub>22</sub>	.92	
Customer Focus and Satisfaction	.85	.80	C <sub>31</sub>	.91	.80
			C <sub>32</sub>	.88	
Information and Analysis	.82	.74	I <sub>41</sub>	.84	.74
			I <sub>42</sub>	.84	
HR Development and Management	.84	.69	H <sub>51</sub>	.78	.68
			H <sub>52</sub>	.84	
			H <sub>53</sub>	.86	
Process Management	.84	.81	P <sub>61</sub>	.87	.81
			P <sub>62</sub>	.93	
			Q <sub>71</sub>	.92	
Quality and Operational Results	.93	.78	Q <sub>72</sub>	.83	.78
			Q <sub>73</sub>	.89	
			Q <sub>74</sub>	.89	

standardized predicted values. The results revealed there were no heteroscedasticity concerns in our data.

*Multicollinearity:* We examined the multicollinearity among variables to make sure that the outcomes were not sensitive to correlation among variables [15], [61]. All the VIF values in our regression analysis were well below the recommended value of 10 (the highest VIF value was 3.79), confirming that there were no multicollinearity concerns in this analysis.

### C. Structural Model and Hypotheses Testing

*Control variables:* The two control variables of industry (service organizations) and application year were used in this article. For the year of application, as one of our control variables, a vector of seven dummy variables was assigned for 15 years (Y<sub>1992</sub> through Y<sub>2006</sub>), with 1991 being used as the reference year. In order to control the year-effect, we correlated the dummy control variables for each year in the SEM model. In addition, we regressed all control variables to the quality practices in the model in order to assess/control the year-effect of quality management practices. This process determines the true effect of quality management practices controlling for the year-effect in a pooled cross-sectional data.

*Statistical procedure:* We use a repeated cross-sectional estimation process to examine the research questions [37], [38]. Because we are dealing with cross-sectional data that are collected for 16 years, the estimation process needs to capture the dynamic of change in the model over time. Repeated cross-sectional studies are quite rare in operations management due to the challenges associated with data collection over multiple years [99]. These types of datasets are suitable for public policy analysis since we would be able to capture dynamics of change in the sample over time. In order to examine the relationship between the constructs and quality outcomes illustrated in Fig. 1, we used structural equation modeling in AMOS 25.0.

Table V provides the point estimates (regression coefficients) and p-values. The results support most of our hypotheses (H<sub>1a</sub>–H<sub>1d</sub>). For example, *Leadership* is a significant predictor for *Management of process quality* ( $\beta = 0.836$ ,  $p < 0.01$ ), *Information and analysis* ( $\beta = 0.900$ ,  $p < 0.01$ ), *HR development* ( $\beta = 0.742$ ,  $p < 0.01$ ), and *Strategic planning* ( $\beta = 0.893$ ,  $p < 0.01$ ). *HR development*, meanwhile, is a significant predictor of *Customer focus and satisfaction* ( $\beta = 0.446$ ,  $p < 0.01$ ). Next, the *Management of process quality* is a significant predictor for *Customer focus and satisfaction* ( $\beta = 0.358$ ,  $p < 0.10$ ). *Information and analysis* is a significant predictor for *Quality and operational results* ( $\beta = 0.671$ ,  $p < 0.01$ ). The model shows variability of 83% for *Quality and operational results* and 89% for *Customer focus and satisfaction*. Further discussion is provided in the following section.

## VI. DISCUSSION

Our article has made some important theoretical contributions. It also has some managerial implications for managing quality in service organizations that we discuss in the following.

### A. Theoretical Contributions

This article contributes to the literature about service management, operations and quality management, public policy, and management practices. First, this article validates the use of the MBNQA model as a reference for assessing quality management practices in service organizations, and it helps service organizations to improve their quality management when they follow and implement the MBNQA criteria. This model also even goes beyond quality and operations management. It starts by evaluating a firm's leadership before moving on to processes, information management, HR management, and the firm's strategy for quality. These are the main components of any organization,

TABLE V  
RESULTS

Controls	Dependent Variables			Independent Variables		
	Customer focus & satisfaction	Quality & operational results	Strategic quality planning	Information & analysis	HR Development	Management of process quality
Y <sub>1992</sub>	-.240	-.155	.372**	-.039	-.047	.172
Y <sub>1993</sub>	-.444	.135	.393**	-.172	.303	.227
Y <sub>1994</sub>	-.461	.123	.365**	-.163	.287	.215
Y <sub>1995</sub>	-.139	-.287***	.123	-.077	-.098	.003
Y <sub>1996</sub>	-.064	-.197**	.186*	.117	-.035	.048
Y <sub>1997</sub>	-.101	-.195*	.174*	.025	.148	.188**
Y <sub>1998</sub>	-.031	-.224**	.075	-.021	.035	.291**
Y <sub>1999</sub>	.001	-.302***	.121	.083	.113	.235**
Y <sub>2000</sub>	.130	-.301***	-.084	.032	-.033	.160
Y <sub>2001</sub>	.159	-.214**	-.049	.124*	-.048	.180
Y <sub>2002</sub>	.027	-.174**	0.25	.116**	.008	.249
Y <sub>2003</sub>	.249*	-.467***	-.022	.257***	-.111	.255
Y <sub>2004</sub>	.163	-.497***	-.014	.219***	-.082	.215
Y <sub>2005</sub>	.141	-.406***	.016	.194*	-.041	.011
Y <sub>2006</sub>	.106	-.414***	-.026	.157**	-.112	.111
Predictors	Customer focus & satisfaction	Quality & operational results	Strategic quality planning	Information & analysis	HR Development	Management of process quality
Leadership	n.s.	n.s.	.893***	.900***	.742***	.836***
Strategic quality planning	.312	-.006				
Information and analysis	-.085	.671**				
HR Development	.446***	-.069				
Management of process quality	.358*	.162				

\*p &lt; 0.10 \*\*p &lt; 0.05 \*\*\*p &lt; 0.01 n.s. no hypothesis.

and improving these hard and soft management elements can significantly enhance a service organization's performance and outcomes, improve its resilience, and reduce the risk of failure or negative growth. Furthermore, according to [101], the execution of the Baldrige model in service organizations significantly improves both customers' and employees' satisfaction and engagement, product/service outcomes, and a firm's social responsibility. Therefore, a key implication of this article concerns how service enterprises can apply the MBNQA model as a powerful holistic self-assessment and diagnosis tool for enhancing their quality, operations, performance, and customer satisfaction, as well as other aspects indicated above, all of which consequently improves business sustainability and profitability. Based on our knowledge and our literature review, this article is the first empirical analysis of service organizations' assessments through the MBNQA model with objective data for 140 firms over a 16-year period. Second, this article builds on previous research into quality management in service organizations that have tested the effect of implementing quality management solutions on improving quality outcomes in organizations across multiple service sectors, as well as the associated benefits [7], [10], [75]. In this respect, this article presents a more nuanced evaluation of the association between quality management solutions and quality and operational results by incorporating two important factors that were not addressed in former studies: 1) using the Baldrige model assessment data provided by independent reviewers for assessing firms' scores in various quality, leadership,

and managerial areas, so this dataset is robust, objective, comprehensive, reliable; and 2) applying repeated cross-sectional quality performance data for 140 service organizations over 15 years, thus providing a more rigorous research analysis of the quality and performance of service sector enterprises. The combination of the MBNQA model and the high-quality data ensures the validity and robustness of the study. In addition, our findings support the argument put forward by Parast [109] and Parast and Golmohammadi [108], who showed that the MBNQA model is a valid and reliable framework for quality management and can be used effectively in healthcare organizations. We expanded prior studies in this domain by providing empirical evidence that this model is valid and reliable framework for quality management in service organizations. We also found more unique characteristics of the Baldrige model in service organizations, which we discuss in the following sections.

The third contribution of this article concerns improving our understanding of how service enterprises can enhance their business excellence by applying the MBNQA framework. Consistent with the literature and prior studies into quality management in service organizations [36], [123], [128], based on our findings, *Leadership* is the main driver of quality management practices in service organizations. Leadership has a significant effect on all other quality management practices as well. We can examine the effect of *leadership* from two aspects. First, *Leadership* directly affects other aspects of a firm in our model, including *HR development and management*, *Information and analysis*,

*Strategic planning*, and *Management of process quality*. Improving *leadership* practices, therefore, positively and directly affects all the other MBNQA criteria. This finding reinforces the Baldrige theory that *Leadership* drives the business system, and it aligns with the findings of Parast [109], and Parast and Golmohammadi [108], who found that strong support and commitment from top leadership were critical to quality improvement. The second finding for service enterprises concerns the significant effects of *Leadership* on *Strategic planning* (with  $\beta = 0.893$ ,  $p < 0.01$ ) and *Information, analysis, and knowledge management* (with  $\beta = 0.900$ ). This means that leadership has the greatest effect on the Baldrige criteria (i.e., *Leadership*  $\rightarrow$  *Management of process quality*:  $\beta = 0.836$ ; *Leadership*  $\rightarrow$  *HR management*:  $\beta = 0.742$ ; *Leadership*  $\rightarrow$  *Information and analysis*:  $\beta = 0.900$ ). Leaders in service organizations must, therefore, recognize the critical role of long-term strategic planning for quality improvement and implement information, digitalization, and knowledge management systems, especially front-line workers of the service industry, as confirmed by Pemer [116]. Our results also support previous findings that have emphasized the importance of strategy development and investment in information systems as an important indicator for successfully executing a quality management solution in service organizations [36], [55], [90], [144]. Our findings are in line with the results reported by Parast and Golmohammadi [108] that examined the MBNQA or Baldrige model in healthcare organizations while we observe some differences. Parast and Golmohammadi [108] reported the following regression coefficients for healthcare organizations: *Leadership*  $\rightarrow$  *Strategic quality planning* = 0.914; *Leadership*  $\rightarrow$  *Information and analysis* = 0.935; *Leadership*  $\rightarrow$  *HR Development* = 0.788; *Leadership*  $\rightarrow$  *Management of process quality* = 0.825. A review of the point estimates for the regression coefficients shows that *Leadership* has a stronger effect on *Strategic quality planning*, *Information and analysis*, and *HR development* in healthcare organizations while its effect on *Management or process quality* is larger for service organizations. Because we do not have information about the standard deviations of these coefficients, we would not be able to conduct any statistical test to further examine whether these coefficients are statistically different and significant. However, these point estimates can be used to provide some initial evidence that the relationships between *Leadership* and other Baldrige criteria are different between the two industrial segments. This further supports the contingency theory of quality management.

The fourth theoretical contribution concerns the significant effect of *HR development* in service organizations. *HR development* has a significant effect on *Customer focus and satisfaction* ( $\beta = 0.446$ ,  $p < 0.01$ ), thus supporting the findings of Ab Wahid *et al.* [1] and Gupta *et al.* [59], who emphasized the crucial role that HR development practices play in service organizations. Indeed, an effective employee-development program can contribute to improving customer focus and satisfaction, which is an important performance outcome in service organizations [47], [67], [160]. The results provide empirical support for an argument put forward by some operations management scholars, namely that soft management aspects such as HR management and development, employee training, and employee involvement are necessary to achieve desirable

results [110], [111], [119]. Therefore, if quality improvement is a strategic concern for a service firm [50], it should invest in its HR development and management systems. Comparing our results with those reported by Parast and Golmohammadi [108], we found that the average (point estimate) for the effect of *HR development* on *Customer focus and satisfaction* is 0.446, which is greater than the same coefficient (0.354) for healthcare organizations reported by Parast and Golmohammadi [108].

Our fifth research contribution relates to the significant impact of *Management of process quality* on *Customer focus and satisfaction* ( $\beta = 0.358$ ,  $p < 0.01$ ). While previous studies have discussed the challenges associated with process management and process improvement in service organizations [44], our findings show that *Management of process quality* is a significant driver of *Customer focus and satisfaction*. Studies also show that implementing a process approach to quality improvements, such as Lean or Six Sigma, leads to significant improvements in organizational processes and business outcomes [9]. We also realize that service organizations can improve their business processes by incorporating customer feedback [124], further supporting the link between process management and customer satisfaction in service organizations. Research also shows that process-related factors such as order fulfillment, ease of return, and responsiveness are contributors to satisfaction in service settings [118]. Our findings also support those reported by Zhao *et al.* [164] and Harris *et al.* [63], who demonstrated the importance of process management in quality management success. Parast and Golmohammadi [108] did not report any significant relationship between *Management of process quality* with *Customer focus and satisfaction* in healthcare organizations.

Our sixth contribution concerns the significant link between *Information and Analysis* and *Quality and operational results* in service organizations ( $\beta = 0.671$ ,  $p < 0.01$ ), which has the largest coefficient of the quality management aspects for determining a firm's quality and operational results in service organizations. Previous studies have also underlined the critical role of information systems and knowledge sharing in improving organizational performance and quality outcomes [36], [90]. Thus, implementing information systems and paying attention to using information and analysis to improve organizational systems based on feedback from customers can be regarded as the most critical factor for improving quality and operational outcomes in service organizations. In healthcare organizations, the effect of *Information and analysis* on *Quality and operational results* is reported to be 0.567, which is lower than that of service organizations reported for this article (0.671).

Our seventh contribution concerns the magnitude of the association between *Strategic planning for quality* and *Customer focus and satisfaction* in service enterprises. This empirical study and its results show that *Strategic planning for quality* positively influences *Customer focus and satisfaction* ( $\beta = 0.312$ ,  $p > 0.10$ ). This finding supports those of Demirbag *et al.* [36] and Gonza'lez-Cruz *et al.* [55], who discussed the critical role of a customer-focused organizational strategy in improving quality outcomes for service organizations. Although the strength of the relationship is not statistically significant, we should be mindful of the magnitude of the coefficient between *Strategic quality planning* and *Customer focus and satisfaction*. One possible

explanation for this lack of significance for the coefficient may be the effect of firm size. As firm size increases, the effect of formalized management practices becomes more pronounced, which may in turn change the nature of the association between the *Strategic planning for quality* and *Customer focus and satisfaction* variables. Unfortunately, due to confidentiality issues related to the data, we did not have access to data on firm size. This is one of the limitations of this article that we discuss further in the following section. In comparison with prior studies, we also note that the effect of *Strategic quality planning* on *Customer focus and satisfaction* was reported to be 0.344 in the study of Parast and Golmohammadi [108] in healthcare organizations, which is larger than that of service organizations in this article.

Finally, our results provide additional knowledge for service organizations about the long-term impact of quality management practices on improving their quality and operational results. While the literature has mixed opinions about the effectiveness of quality management programs for service organizations [8], [14], [21], [39], [98], [147], we were able to shed some light on the long-term effect of quality management programs. By reviewing the year-on-year effects and comparing them with our reference year (1991), we were able to gather valuable insights into how the situation evolves in service organizations. When reviewing the coefficients for *Quality and operational results* on a yearly basis (see Table V), we find a negative trend from 1995 ( $\beta = -0.287$ ,  $p < 0.05$ ) to 2006 ( $\beta = -0.414$ ,  $p < 0.01$ ), suggesting that in comparison with 1991, we see a decline in quality and operational results over time. This implies that the service organizations were not able to make sustainable improvements in their business results by implementing the Baldrige model, with any marginal improvement decreasing over time. In contrast, we observe significant improvements in *Information and Analysis*, with the annual effect showing a positive trend from 1997 ( $\beta = 0.025$ ,  $p > 0.10$ ) to 2006 ( $\beta = 0.157$ ,  $p < 0.01$ ). This suggests that while implementing quality management in service organizations leads to improvements in *Information and analysis*, this does not necessarily translate into sustained improvements in *Quality and operational results*. The theoretical contribution of this observation can be related to the diminishing returns for quality management practices over time. This interesting observation may explain the mixed opinions in the literature about the effectiveness of quality management programs because this effect cannot be captured by cross-sectional surveys. This may also explain the emergence of other quality management programs, such as Six Sigma and Lean practices, as alternative process improvement programs for enhancing organizational quality outcomes, seeing as the marginal improvement from quality management programs diminishes over the years.

### B. Practical and Managerial Implications

This article also has several practical implications by providing several insights for operations managers in service organizations, who are usually in charge of quality management practices in most firms. First, they can apply the MBNQA model for diagnosing issues and reorganizing, restructuring, and

streamlining their processes to improve their quality outcomes and business efficiency. Indeed, if service enterprises want to enhance their business excellence, the MBNQA model represents an effective, robust, and holistic framework for assessing their organizations. In addition, service firms should consider the crucial role of *HR development* in service management and address the expectations and needs of HR managers. Satisfying and engaging customers, employees, and other stakeholders are also critical for ensuring the success and growth of service organizations.

Managers in service organizations should also pay close attention to process management as a major element of any business operation. Most quality improvement programs (e.g., TQM, ISO 9000, Kaizen, Lean, and Six Sigma) focus on business process improvement to enhance business outcomes such as customer focus and satisfaction and quality results. In addition, managers in service organizations should pay closer attention to the development of strategic and long-term planning for quality in order to address customer needs, overcome shortfalls, and improve business sustainability. In this regard, strategic planning for quality should be a top priority for managers and policymakers. Managers should also consider investing in information systems, data analysis, and knowledge management in order to ensure that information is collected systematically, both internally and externally, so they can make informed decisions about improving customer satisfaction and organizational processes using data-driven approaches. Therefore, in addition to the internal factors (e.g., value, brand, and relationship equity), a firm's external factors (social influence) are crucial for customers [52]. Finally, managers in service organizations should realize that any improvements in quality results that are associated with implementing the Baldrige criteria will diminish over time. They, therefore, need to develop plans to initiate other quality management and process improvement programs, such as Six Sigma and Lean management, so they can continue to improve their business processes, quality, customer satisfaction, and business performance.

## VII. LIMITATIONS AND FUTURE RESEARCH

This article has some limitations that should be considered. First, a lack of access to the most recent data for the MBNQA program is the first limitation of this article. The MBNQA data for service firms are available only for the 1990–2006 period, and the study may have been more effective if it could have also included the most recent MBNQA assessments by external professional reviewers. Unfortunately, such data are currently not publicly available. However, despite this limitation, we believe that our analysis of 16 years of data, along with the case analysis of the recent winners of the Baldrige award in the service sector, provides an effective and robust assessment of the dynamics of quality in service organizations. Another limitation of the study can be attributed to our sample size and the availability of more recent observations. While our sample size in this article satisfies the minimum requirement for conducting our statistical procedure, it is worth mentioning that a larger sample size provides more stable coefficients, thereby minimizing any potential biases. The literature suggests different

guidelines for determining the appropriate sample size for an SEM study, ranging from 10 to 1 to 20 to 1 for the ratio of observations to the number for parameters (Bentler and Chou, 1987; Schreiber *et al.*, 2006; Kline; 2015). Thus, it would be valuable to conduct a similar study using a larger sample size.

Due to the structural differences between manufacturing and service sector firms, future studies could focus on examining the association between quality management practices and operational and business results when using the Baldrige data for manufacturing organizations. Although some studies in the literature have specifically examined quality management practices in manufacturing, these studies lack consistency in the conceptualization and operationalization of quality management practices [13], [34], [120]. Thus, the findings of such studies are not compatible, and they cannot inform managers about the differences between service and manufacturing organizations. In this regard, future studies of the MBNQA data in manufacturing settings would be an important step toward gaining a holistic understanding of the dynamics of quality management in manufacturing and how manufacturing and service firms should address quality principles. Considering that many manufacturing organizations have service divisions that operate independently from the manufacturing division, such findings would be of utmost importance to organizations engaged in both manufacturing and service activities, especially when they have dedicated divisions under the same organizational structure. In the same vein, a comparative assessment between service and manufacturing firms with reference to the MBNQA model may provide important insights into clarifying the similarities and differences in quality solution implementation for these two important yet complementary business sectors.

We must also be mindful that our findings of the association between quality management solutions and organizational quality outcomes should be interpreted through the lens of the Baldrige framework. While other conceptualizations and theorizations for quality management in service organizations are quite possible, we stayed within the bounds of the MBNQA framework and the interrelationships among its criteria and their impact on business results. Thus, future studies should examine quality management practices using other quality frameworks, such as the European Foundation for Quality Management, to achieve a broader assessment of quality in service organizations. Along the same lines, assessing quality management with respect to supply chain quality and the ways in which service organizations extend quality throughout their supply chain networks could also be explored [12]. Indeed, supply chain quality practices emphasize different sets of quality practices, so it would be valuable to look at service quality from a supply chain perspective and assess quality issues beyond the firm itself.

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