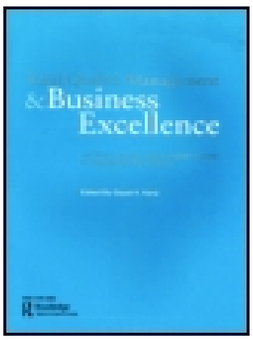

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Reference models and competitiveness: an empirical test of the management excellence model (MEG) in Brazilian companies

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This study analyses how robust the management excellence model (MEG) is as a guide for implementing best practices from different reference models to achieve greater quality and excellence in management. The study starts by discussing the model's assumptions and purposes and how it has been applied to a diverse and large group of Brazilian companies with the expectation of improving business performance. The study is based on 389 independent assessments of 8 MEG criteria in 52 Brazilian companies participating in the Minas Quality Award (PMQ) in the State of Minas Gerais, Brazil, between the 2008-and-2011 cycle. From a theoretical background, 13 proposed hypotheses were tested using the structural equation model (SEM) with a partial least squares (PLS) estimation. Empirical tests support the conceptual framework of MEG, positioning leadership and information management as forces that lead to the strategic management of people, markets, processes, and societal concerns, which in turn are strong predictors of business performance.

Keywords: reference models; performance; quality management; business excellence

1. Introduction

The global market today is now characterised by demanding customers, increasing competitiveness, and challenges for environmental and social responsibility that need to be addressed by organisations. For Krugman (1992), productivity is not everything but, in the long run, the ability to expand the standard of living of citizens depends almost entirely on the ability of organisations to increase output per worker. Focusing on a micro perspective, 'Deming Cycle' represents a tool for excellence with the goal of minimising errors, improving quality, and lowering costs (Deming, 1990).

Research results in this field, according to Lee, Rho, and Lee (2003), suggest that adoption of quality and excellence criteria, such as the Malcolm Baldrige National Quality Award Criteria, can serve as a path to continuous improvement of productivity. The study proposed by the authors supports the evidence that best practices grounded on leadership and information management improve business performance.

Based on evidence about the potential of best practice approaches, such as Malcolm Baldrige, different actors worldwide have been proposing and promoting different reference models. In general, these models serve as references for decision-makers in establishing practices to be used in operations and organisational processes usually associated with awards, certificates, or consultancies.

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Similarly, in Brazil in 1992, the National Quality Award (Prêmio Nacional da Qualidade – PNQ) was created to promote management excellence based on world-class manufacturing and other successful experiences, especially the Malcolm Baldrige award. The PNQ is supported by the Management Excellence Model (Modelo de Excelência em Gestão – MEG – in Portuguese), an approach based on a systemic approach that consolidates best practices aimed at facilitating the achievement of sustainable competitive advantages in harmony with the environmental and social context of organisations. It is an approach with international acceptance aimed at improving business performance and estimating the degree of management maturity of different formats and types of organisations (Bonfa, 2010).

Thus, this work focuses on testing the validity of the management excellence model (MEG) using data from the Minas Quality Award (Prêmio Mineiro da Qualidade – PMQ), an Award given to a significant number of business organisations of different sizes in the state of Minas Gerais, Brazil. The main objective of this study is to test empirically how robust and valid is the MEG as a model of excellence and its impact on performance through the development of best practices for business.

2. Theoretical background

2.1. *Reference models, competitiveness, and performance*

The key to improving business performance is to accept the competitive game and establish strategies regarding planning, execution, control, and evaluation. According to Baker and Hunter (1989), quality management refers to one subject within general organisational theory that focuses on programmes and methods aimed at improving business practices and processes, leading to a managerial paradigm shift (Bounds, Yorks, Adams, & Ranney, 1994). A similar approach to organisational theory and change can be grouped according to Figure 1.

Theories located on the left side of Figure 1 are similar in that they focus on the content of the strategy and the adoption of a rational approach to their determination but differ in many other respects. Similarly, the theories positioned on the right side of Figure 1 focus on organisational change, adaptation, innovation, and learning. Areas 1 and 3 have in common the focus on the content of the strategy and the adoption of a rational planning for their determination but differ in many other respects. As a conceptual framework, the management excellence model (MEG) has concepts and practices across all dimensions of Figure 1, focusing on external and internal factors and their relation to the industry structure and companies' capability to adapt to uncertainty.

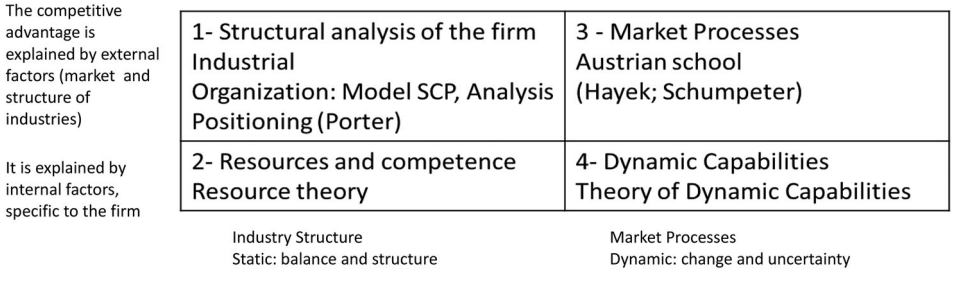

Figure 1. Competitiveness approaches.
Source: Vasconcelos and Cyrino (2000).

In pursuit of improving business performance, the total quality management movement has been strengthened with the emergence of multiple Business Excellence Models such as ISO (International Standardization for Organization), PMBOK (Project Management Body Of Knowledge), the COSO (Committee of Sponsoring Organizations of the Tread way Commission), TPM (Total Preventive Maintenance), ITIL (Information Technology Infrastructure Library), CMMI (Capability Maturity Model Integration), the Lean SIX SIGMA (Statistical Model for Lean Production Management), the WCM (World Class Manufacturing), and BSC (Balanced Scorecard). More comprehensive criteria have been established as the MBQNA (Malcolm Baldrige Quality Awards of Excellence Criteria) and EFQM (European Foundation Quality Management) encourage the development of other models worldwide. Driven by this movement, the National Foundation of Quality (FNQ), which is based out of Brazil, developed the management excellence model (MEG) in 1991 from different standards of excellence and adapted for the Brazilian context. This 'Bundling', quoted in Cardoso (2008), enables a common language for driving customised solutions for organisations in Brazil.

In line with the widespread models of excellence in management and their vast application in diverse contexts and countries, academic researchers have proposed the study of the effectiveness of such practices over time. One of the early studies in this subject, Wilson and Collier (2000), studied causal linkages related to the Malcolm Baldrige National Quality Award (MBNQA), concluding that leadership is the focal construct for driving organisational performance. This conclusion provides support for the theoretical background around this reference model. Lakhal, Pasin, and Limam (2006) tested a model linking quality management practices and performance in a survey of 133 Tunisian companies, revealing a positive relationship with organisational performance. Testing a model inspired in the Baldrige methodology, Oakland and Tanner (2008) examined the Kanji and Sa Leadership Excellence Model, providing a positive correlation between quality management practices and organisational performance, in public and private sectors. In a meta-analysis, Nair (2006) theorises on the performance implications of adopting quality management practices and finds evidence of many hypothesised relationships. In a more recent study, Peng and Prybutok (2014) used the PLS approach to test a structural model to evaluate the relative effectiveness of two Baldrige categories in the MBNQA 2013–2014 framework, finding evidence for the validity of model assumptions and consequences.

The preceding paragraphs disclose part of what this research aims to test, i.e. the performance implications of using reference models similar to Malcolm Baldrige National Quality Award (MBNQA) through a structural equation approach. This study proposes an additional effort in this area by testing MEG and translating it into a structural model, representing the first empirical test of the effectiveness of the model in the Brazilian market. Considering that Brazil is a significant player in the world economy, this study has broad relevance for reinforcing the usage of business excellence and quality management practices.

2.2. *Overview of the management excellence model (MEG)*

The MEG-FNQ reference model tested in this research was designed to provide a standard for improving business practices, leading organisations to achieve competitive advantage. To reach this goal, the model is based on internationally recognised references in business excellence, translating tenets and processes into performance

factors found in many world-class organisations, especially those that seek to adapt to global changes. Thus, the model comprises a set of general criteria, here defined as 'second-order factors', which, in turn, are grounded in a set of items, 'first-order factors', which can be empirically measured within different organisations. According to Ferguson and Pannirselvam (2001), the adoption of the Baldrige criteria as a general excellence model usually met or exceeded expectations, especially with regard to the continuous improvement factor aligned to the standardisation of the strategic routines of the organisation.

As an approach based on the Malcom Baldrige Award, the MEG consists of the measurement of seven best practice criteria (second-order factors) composed of 17 items (first-order factors). The model also proposes organisational performance to be an endogenous criterion defined by six different items. As such, in the MEG, organisational performance is classified as a second-order factor reflected by six items. Therefore, it is correct to state that the MEG is a model comprising eight dimensions/criteria.

When applied to the evaluation of practices and results, items are added to generate scores against each criterion, including performance which represents organisational maturity in business excellence. The total score can reach up to 1000 points, and organisations can be classified as: (1) First Steps (up to 100 points); (2) Criteria Commitment Excellence (250 points); (3) Towards Excellence Criteria (500 points); or (4) Criteria for Excellence (1000 points, PNQ).

Each item (first-order factor) is broken down into questions answered by trained consultants who work within each company during the evaluation period. For measuring *Best Practices,* a set of four questions is applied to each item (first-order factor) as follows:

(1) *Focus*, or the degree to which the required management processes align with the best practices;
(2) *Application*, or the degree to which best practices are applied to processes;
(3) *Learning*, or the degree to which processes are internalised within culture; and
(4) *Integration*, or the degree to which integration, consistency, and inter-functional coordination are used when applying best practices.

Performance items are measured using the following three items:

(1) *Relevance*, which represents the level of importance of the result for strategic and operational objectives;
(2) *Trend*, which refers to the degree that the result achieves a positive effect over the last three periods; and
(3) *Current Level*, which is a comparison of performance against competitors or other market standards.

To apply these criteria and items, a team of professional judges was trained in the MEG structure, purposes, and methodology. The staff was then split into groups of at least three people, according to operational expertise. Participants received standard material and secondary data required for evaluating each item and criterion, including the existent plans, description of IT systems, structure, history, and other background materials. Afterwards, personnel meetings were scheduled to evaluate the practices, processes and results. Only afterwards did the judges start the evaluation process independently. In the case of noticeable inconsistencies (identified by specialised software designed for the task), the

judges were then called to discuss primary or secondary data that could dismiss the divergent items. The judges could also propose additional inspection of the organisation or request additional data to solve the problem. Finally, the judges must evaluate the inconsistent items to arrive at a final score.

In the wake of the National Quality Award (PNQ), the regional awards were developed. In particular, the Minas Quality Award (PMQ), a recognised cycle applied in the State of Minas Gerais (Brazil), was designed. When applying the MEG to quantify maturity towards excellence, the PMQ uses a scale of 500 points, which is used for organisations of varied sizes that have already started structuring their management systems towards excellence criteria, revealing some advanced approaches and procedures.

2.3. *Criteria, itemisation, and hypotheses: structural presentation of MEG*

While the previously presented structure sustains the central format and purpose of the MEG, this section aims to present the itemisation and criteria, including references and arguments which sustain the proposition of a structural model. This proposal is based on the work of Lee et al. (2003), translating the model into a set of structural relations coherent with the proposal of the management excellence model (MEG) and its impact on organisational performance. In this manner, this section aims to present the evaluation criteria (second-order factors) and the itemisation (first-order factors) of PMQ, their conceptual bases, and the associated inferences that are translated into the hypotheses tested in this research. The section's structure starts by describing the exogenous variables of MEG – *Leadership* and *Information and Knowledge* – then progressively presenting the endogenous variables, the corresponding hypotheses, and their links, as determinant factors of organisational performance.

2.3.1. *Leadership*

In the MEG structure, the starting point is leadership. This variable is conceived as a set of management processes that promote excellence aligned with the organisational philosophy and strategic control. The design of the variable is built on the realisation that the involvement of leaders is essential in building an integrative approach that allows balance between the planned strategy (Porter, 1980) and the emergent perspective (Mintzberg, 1973). Thus, leadership is a crucial variable so that management models culminate in an above-average performance or gain (Barney & Hesterly, 2011). In the MEG, Leadership is characterised by three items (first-order factors):

(1) *Corporate Governance*, which comprises the mechanisms that generate commitment to excellence and sustainability and also transparence before the *stakeholders* (Arora & Dharwadkar, 2011);
(2) *Promotion of the Culture of Excellence*, which is associated with the processes that engage the workforce and *stakeholders* with the excellence strategies and practices; and
(3) *Analysis of the Organisational Performance*, which is connected to the *modus operandi* of performance evaluation in terms of reaching goals and objectives.

As an exogenous variable of the model, leadership is an independent variable that culminates in other MEG criteria, which shall be dealt with in the following.

2.3.2. *Information and knowledge*

Knowledge management is a prerequisite for reaching competitive advantage in a scenario in which changes in the external environment require constant monitoring and adaptation on the part of organisations (Moustaghfir, 2009). In the MEG, this criterion comprises the treatment of information and the mechanisms for the development, promotion, and maintenance of intangible assets, especially knowledge. There are two items (dimensions) to evaluate for this criterion:

(1) *Organisation Information*, which relates to the capabilities of the organisation's management and technological systems to generate up-to-date, precise, and secure information for users; and
(2) *Intangible Assets and Organisational Knowledge*, which comprises practices and processes for the development and protection of the organisation's intangible assets.

2.3.3. *Strategy and plans*

In the MEG, structure planning and strategy are central terms which are understood as an integrated set of philosophies and practices associated with the conception and execution of strategies. This includes the definition of goals and metrics and how the follow-up on the plans occurs. Therefore, in the MEG, we may divide the concept of plans and strategies into the following items:

(1) *Formulation of Strategies*, which comprises the forms of generating and developing ideas, aimed at creating competitive business models; and
(2) *Strategy Implementation*, which involves the approaches for unfolding, execution, and revision of organisational strategies.

As Lee et al. (2003) tested, leadership is relevant because it determines the form by which the creation of organisational strategies and plans are conceived. This implies that in organisations with well-developed leadership in small and micro companies (SMEs), the philosophy, practices, and strategic processes are more effectively conducted (Ladzani, Smith, & Pretorius, 2012). From this input, the following hypothesis is formulated:

H1. 'Leadership' has a positive direct effect on 'Strategies and Plans'.

Knowledge and information management aimed at conceiving and creating strategies and plans in organisations allows for planning and strategies to be implemented and perfected (Moustaghfir, 2009). This learning supports the establishment of the following hypothesis:

H2. 'Information and Knowledge' has a positive direct effect on 'Strategies and Plans'.

2.3.4. *People management*

Capabilities for structuring the environment and creating an environment that promotes teamwork is an important guiding factor in the MEG structure. In this regard, people management, or *People*, is defined as the mechanisms that promote the creation of high-performance teams, as well as the development of competencies and the maintenance of employees' well-being. Thus, the *People* criterion, as a second-order construct, comprises three dimensions:

(1) *Work Systems*, which refers to the conception and execution of systems for policies that aim at creating high-performance collaborators and teams;
(2) *Training and Development*, which concerns the training and development structures that enable workforce training; and
(3) *Life Quality*, which is how the organisation promotes a safe and healthy environment that leads to personnel well-being, satisfaction, and commitment.

By definition, the *People* construct reveals a strict association with the sense of community and shared values (Atchison, 2007), as well as the presence of human resource management procedures connected to proactive leadership and good governance practices (Guest, 2011). We therefore argue that leadership is crucial to strengthen the organisation's human resource management systems and processes, contributing to the creation of a work environment that privileges harmony and effort synergy (Ogbonna & Harris, 2000). In this aspect, the following research hypothesis was established:

H3. 'Leadership' has a positive direct effect on 'People'.

In the day-to-day practices of people management, innumerous data sources are needed, not only in the administrative processes but also in the development of competencies and practices for promoting well-being in the work environment (Drnevich & Croson, 2013). Moreover, the existence of information and knowledge management systems is crucial to people management as a mediator of performance (Lee et al., 2003). Therefore, we define the following research hypothesis:

H4. 'Information and Knowledge' has a positive direct effect on 'People'.

2.3.5. *Society*

In a scenario in which the social and environmental impact of corporate actions becomes increasingly prominent, it is unthinkable to conceive a business model that is not based in the organisation's relations to its environment (Hitt, Ireland, Sirmon, & Trahms, 2011). In this regard, the MEG proposes the *Society* criterion, which represents the manner of interacting with the environment and social demands, with a focus on local development and sustainability. This concept comprises two dimensions:

(1) *Social–Environmental Responsibility*, which is associated with the degree to which the value proposals and the organisational processes are in line with social and environmental sustainability; and
(2) *Social Development*, which involves practices and policies that are integrated to the communities and organisations' ability to portray a favourable image to society.

Notoriously, policies associated with social and environmentally responsible practices may only deliver results when the culture is internalised and when they are integrated to the organisational strategies and plans (Leal & Monteiro, 2014). Otherwise, the necessary synergy between organisational actions and their social impact is compromised, limiting the mutual benefits of policies of this nature. Therefore, we propose the following research hypothesis:

H5. 'Strategy and Plans' has a positive direct effect on 'Society'.

2.3.6. *Business processes*

Business process management is a theme in full ascension, encompassing the importance of structuring management forms that allow for the translation and operationalisation of organisational strategies aimed at reaching goals and objectives (Vom Brocke, 2010). With this insight, it is natural that the MEG incorporates a criterion, named *Processes*, to understand internal- and external-focused business processes. In this direction, the *Processes* criterion contemplates three distinct items:

(1) *Main Business Processes and Support Processes*, which considers the operational processes and activities and their contribution in delivering value to the market and *stakeholders*;
(2) *Supplier-Related Processes*, which addresses the development and improvement of the supply chain and the commitment of suppliers/partners; and
(3) *Economical–Financial Processes*, which evaluates management processes connected to organisations' economic and financial sustainability.

It is well recognised that to conceive effective processes, it is necessary to cultivate learning mechanisms that allow for the development, promotion, and management of organisational activities (Vom Brocke, 2010). Even more so, it is necessary to collect, integrate, and make information available to organisational actors and channel partners, so that operations lead to the desired organisational objectives (Lee et al., 2003). We therefore present the following hypothesis related to MEG:

H6. 'Information and Knowledge' has a positive direct effect on 'Process'.

We also argue that in a scenario in which organisations adapt with increasing frequency to expected socially and environmentally responsible practices, it is necessary to structure internal and external processes to align with the new policies (Scherer & Palazzo, 2011). With this consideration, we propose the following research hypothesis:

H7. 'Society' has a positive direct effect on 'Process'.

2.3.7. *Clients and market*

The essence of any organisation is to create an offering that is perceived as valuable to a select target market (Barney & Hesterly, 2011). It is important to stress that fulfillment of market demands is the central objective of organisations, in which the conquest of loyalty through customer satisfaction is a necessary step (Ciavolino & Dahlgaard, 2007). In the context of best practices and management excellence models, there is theoretical evidence that customer satisfaction is crucial to obtain superior business performance (Cockalo, Djordjevic, & Sajfert, 2011). 'Clients and Markets' as an MEG criterion represents a central endogenous variable in the MEG model and involves mechanisms and processes to identify market needs, manage consumer data, and communicate with the target audience. At MEG, this concept is measured from two dimensions:

(1) *Market Image and Knowledge*, which involves the mechanisms for understanding the expectations of the target audience and the creation of a positive image of the organisation and
(2) *Relationship with Clients*, which refers to the practices for generating client satisfaction and loyalty.

When conceiving a value-focused strategy on client management, organisations must place market orientation explicitly as a central point of their strategy (Rodriguez Cano, Carrillat, & Jaramillo, 2004). Notably, to fulfil market demands in a satisfactory manner, it is fundamental to promote inter-functional coordination, integrating and sharing internal information and practices associated with client and market management (Ferraresi, Santos, Frega, & Pereira, 2012). This result cannot be reached without the processes executed with the aim to sustain a value strategy (Mintzberg, Ahlstrand, & Lampel, 2010). From these findings, we propose four hypotheses associated with the *Clients and Market* construct:

H8. 'Strategy and Plans'has a positive direct effect on 'Clients and Markets'
H9. 'Information and knowledge' has a positive direct effect on 'Clients and Markets'.
H10. 'Process'has a positive direct effect on 'Clients and Markets'.
H11. 'People' has a positive direct effect on 'Clients and Markets'.

2.3.8. *Performance*

In the MEG framework, performance is associated with different interdependent dimensions and is the most relevant criterion for evaluating business excellence (FNQ, 2011). Its criticality is because the adoption of a management model must, as a rule, lead the organisation to a sustainable competitive advantage translated in different observable factors (Alharthi, 2012). In the MEG framework, performance (a second-order factor) is connected to six dimensions (first-order items), which are: (1) financial–economical; (2) clients and markets; (3) society; (4) people; (5) business processes; and (6) suppliers. Lee et al. (2003) state that business processes have a direct impact on how practices and policies are translated into organisational results. In an analogous manner, the ability to fulfil market and client demands is the essence of reaching a sustainable competitive advantage (Hunt, 2012). We therefore propose two hypotheses regarding performance:

H12. 'Process' has a positive direct effect on 'Performance'
H13. 'Clients and Markets' has a positive direct effect on 'Performance'.

The previous sections sustain the constructs' conceptual and constitutive definition, as well as their structural relations. It is an opportune moment to present, in the following sections, the framework of MEG and its operationalisation.

2.4. *Design and testing of hypotheses*

The hypothetical relationships defined in the preceding paragraphs are explained in the following hypothetical structural equation model (SEM) shown in Figure 2. It is summarised by the following proposition: *Proper implementation of management practices and labour standards guided by the MEG model favours the management processes, which culminates in superior performance for Brazilian organisations*.

3. Methodology

The type of research used in this work is characterised as being conclusively descriptive using secondary data collected for PMQ awards.

3.1. *Measurement and data*

Data were collected from organisations participating in the PMQ award between 2008 and 2012. The measurements were taken by scoring the participating companies in the items

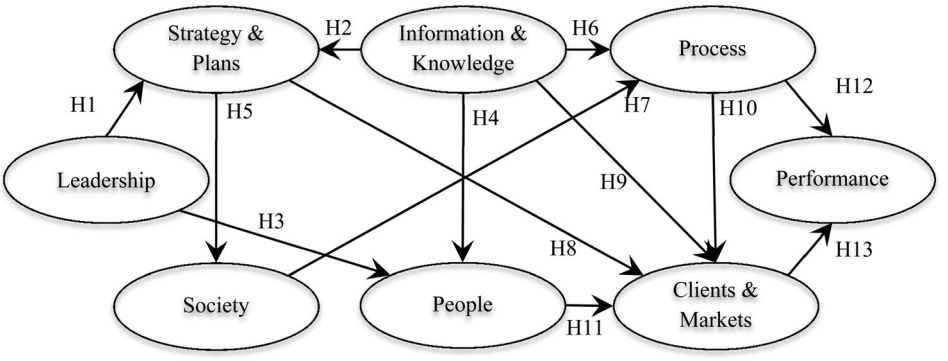

Figure 2. Structural model. Source: Proposed by the authors.
Note: Picture with general criteria (second-order factors) of MEG.

and criteria of the PMQ methodology given in Table 1. These assessments were conducted by teams of examiners trained in analysing the MEG criteria of participating organisations. Each first-order factor was measured on a 0-to-10 scale composed of four items (Focus, Application, Learning, and Integration), except for the Performance measure which consists of three items (Relevance, Trend, and Current Level). Each item represents the

Table 1. Measurement model for first- and second-order factors.

Criteria Second-order constructs	Items (First-order constructs)	W	E	T
Q1. Leadership	Q1.1. Corporate governance	0.91	0.01	73.79
	Q1.2. Leadership exercise	0.92	0.01	100.98
	Q1.3. Performance analysis	0.92	0.01	91.27
Q2. Strategies and plans	Q2.1. Strategic formulation	0.93	0.01	89.43
	Q2.2. Strategic implementation	0.93	0.01	88.95
Q3. Customers	Q3.1. Image and market knowledge	0.91	0.01	82.38
	Q3.2. Customers relationship	0.91	0.01	67.24
Q4. Society	Q4.1. Social responsibility	0.91	0.01	87.24
	Q4.2. Social development	0.91	0.01	82.61
Q5. Information and knowledge	Q5.1. Organisational information	0.88	0.01	69.64
	Q5.2. Intangible assets and organisational knowledge	0.88	0.01	64.32
Q6. People	Q6.1. Work systems	0.88	0.01	66.06
	Q6.2. Training and development	0.89	0.01	66.64
	Q6.3. Quality of life	0.89	0.01	84.30
Q7. Process	Q7.1. Business process	0.90	0.01	70.33
	Q7.2. Supply process	0.87	0.02	53.34
	Q7.3. Financial process	0.87	0.02	54.34
Q8. Performance	Q8.1. Economic and financial results	0.72	0.04	20.35
	Q8.2. Marketing and customers results	0.84	0.02	50.16
	Q8.3. Society results	0.86	0.02	51.77
	Q8.4. People results	0.82	0.02	40.00
	Q8.5. Business process results	0.84	0.02	47.75
	Q8.6. Supplier results	0.82	0.02	41.06

Source: Research data and general content adapted from FNQ (2011).
Notes: W = standardised factor loadings; E = standard error; T = T-value (all values are significant at the 0.01 level).

process and effectiveness of how companies apply the PMQ methodology, according to the training approach and manuals. Each judge scored the participating companies in four items for each of the first-order constructs in Table 1. The second-order factors were measured by the average scores of the first-order factors, with the number of items varying between two and seven dimensions.

The data were organised in a panel format, so that each company could be represented by more than one line in the data set. There were 389 observations in the data set representing an average of 7.48 judgements for the 52 companies. Sample size was enough to test a full structural model using the PLS methodology (Chin, 2000). All first- and second-order factors were estimated using a reflective approach, which is traditionally used in marketing (Mackenzie, Podsakoff, & Jarvis, 2005). The higher-order factors were estimated using the single average of the first-order factors as indicators (Ciavolino & Nitti, 2010).

4. Results

4.1. *Sample profile*

We analysed a total of 52 companies participating in the PMQ award in 2008, or 29%; in 2009, 13%; in 2010, 23%; in 2011, 21%; and in 2012, 13% of the evaluated companies. According to Brazilian revenue standards, 10% of businesses in the sample are classified as small, 10% are medium, and 81% are large. The companies could also be classified in the secondary (31%) and tertiary (69%) sectors of the economy.

4.2. *Preliminary data analysis*

The first step of analysis consisted of scanning for assumption violations (normality, linearity, and multicollinearity) and analysing the general quality of data (missing data and outliers). The second step involved an exploratory factor analysis, using principal components extraction testing the unidimensionality of the scales. The number of factors was decided by the Kaiser Criterion (eigenvalues greater than 1). The results confirmed that all first-order factors were unidimensional and that second-order factors could be deemed as unidimensional when the average scores were used as indicators of the second-order factors. The general quality of measurement was evaluated by composite reliability (CR), average variance extracted (AVE), and Cronbach's alpha (CA). The results show that all outcomes of CR and CA were above the minimum acceptable limits of 0.70, except for financial performance, with a value of 0.69 for AC (CR = 0.83). However, this value is very close to 0.70, and the CR is considered a more reliable measure in assessing the reliability of the AC, as proposed by Henseler, Ringle, and Sinkovics (2009).

Partial least squares (PLS) was used to estimate the construct validity of the structural model (Netemeyer, Bearden, & Sharma, 2003). This option is mainly motivated by the nature of the data because the variables show an unknown non-normal distribution. In Table 1 we present the loadings of the first-order constructs in the respective second-order factor, which ensures convergent validity of the proposed measurement model.

To evaluate the discriminant validity of paired constructs, the average variance extracted was compared with the squared correlation coefficient, as suggested by Fornell and Larcker (1981). Some constructs revealed a violation of discriminant validity by these criteria. Therefore, we compared the confidence interval of the de-attenuated correlation between each factor, using the Spearman Brown prophecy formula and the Fisher

Z approach. When applying this procedure, no violation of the discriminant validity between constructs was noticeable. As well, convergent validity was checked by the significance of factor loadings in the first- and second-order constructs, showing acceptable levels of measurement validity. A summary of the quality of measurement and validity can be found in Table 2.

4.3. *Model estimation hypotheses and model testing*

After checking measurement validity and reliability of scores, an SEM was designed using SMARTPLS 2.0 (Hair, Hult, Ringle, & Sarstedt, 2014). Partial least squares was used because: (1) raw data do not follow a multivariate normal distribution; (2) the model is complex and there are too many variables; and (3) sample size prevents the usage of structural equation modelling based on analysis of covariance (Hair et al., 2014). Hypotheses tests were conducted by the bootstrapping procedure to estimate standard error of paths, allowing the statistical significance testing of hypotheses (Table 3).

Table 3 reveals that all T values are greater than 2.58, which means that all weights are significant at the 0.01% level. Moreover, squared multiple correlation coefficients varied from 35% to 68%, meaning a moderate-to-high effect size of MEG criteria. Goodness of fit was analysed with GoF achieving 69%. Q^2 for endogenous constructs was greater than 50%, indicating an adequate predictive power. In the next section, the results are discussed and related to the theoretical background of research.

4.4. *Discussion*

As a starting point for discussion, the structural model stressed the relevance of 'Leadership' as a fundamental tenet for achieving business excellence. Because hypotheses *H1* and *H3* were supported, the effect of 'Leadership' on 'Strategies and Plans' and 'People' can be considered to be moderate (weight $\beta = 0.53$ and $\beta = 0.43$ weight, respectively). These results are noteworthy because leadership is the driving force that directly or indirectly influences other practices in daily activities, as proposed in the MEG. This finding is supported by studies such as Flynn, Schroeder, and Sakakibara (1995), pointing to the support of top management as a key indicator of quality in management.

As previously expressed, the construct 'People' was explained by 'Leadership' but also received a significant impact from 'Information and Knowledge' (*H4*; $p < .01$; weight $\beta = 0.38$). This is clearly an important part of the cultural process of an organisation, to repeat the virtuous cycle proposed by MEG. Together, both constructs were accountable for 59% of the variance of the construct 'People', but the relative importance of 'Leadership' was greater than for 'Information and Knowledge'. Although the construct 'Information and Knowledge' accounted for the construct 'Strategy and Plans' (*H2*; $p < .01$; weight $\beta = 0.31$), it still had less relevance than what was observed for the construct 'Leadership'. Both results reinforce the strategic role of information management as grounds for strategy (Drnevich & Croson, 2013) and human resources management (Moustaghfir, 2009). However, they also highlight that best practices cannot be accomplished without a strong sense of corporative governance and leadership (Ladzani et al., 2012).

The construct 'Clients and Markets' was explained by the constructs 'Strategies and Plans' (*H8*; $p < .01$; weight $\beta = 0.39$), 'Information and Knowledge' (H9; $p < .01$; weight $\beta = 0.18$), 'People' (*H11*, $p < .01$, $\beta = 0.18$ weight), and 'Process' (*H10*, $p < .01$, $\beta = 0.18$ weight), which together accounted for 68% of the variability of this

Table 2. Summary of measurement of quality and validity for first- and second-order constructs.

Cont.	N	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
Q1.	**1**	**0.58**																														
Q1.1.	**2**	0.82	**0.66**																													
Q1.2.	**3**	0.84	0.58	**0.68**																												
Q1.3.	**4**	0.84	0.54	0.58	**0.75**																											
Q2.	**5**	0.60	0.53	0.49	0.48	**0.59**																										
Q2.1.	**6**	0.49	0.44	0.41	0.38	0.86	**0.67**																									
Q2.2.	**7**	0.54	0.48	0.43	0.45	0.87	0.53	**0.69**																								
Q3.	**8**	0.61	0.52	0.52	0.49	0.57	0.49	0.49	**0.57**																							
Q3.1.	**9**	0.50	0.43	0.40	0.43	0.54	0.42	0.50	0.82	**0.68**																						
Q3.2.	**10**	0.50	0.42	0.45	0.39	0.41	0.39	0.32	0.82	0.42	**0.71**																					
Q4.	**11**	0.54	0.46	0.45	0.45	0.49	0.45	0.39	0.55	0.44	0.46	**0.59**																				
Q4.1.	**12**	0.47	0.41	0.39	0.39	0.46	0.43	0.36	0.50	0.40	0.42	0.83	**0.70**																			
Q4.2.	**13**	0.42	0.35	0.35	0.36	0.36	0.32	0.29	0.41	0.33	0.35	0.83	0.43	**0.72**																		
Q5.	**14**	0.62	0.50	0.51	0.55	0.53	0.45	0.46	0.52	0.44	0.42	0.48	0.42	0.37	**0.56**																	
Q5.1.	**15**	0.56	0.49	0.49	0.42	0.43	0.38	0.37	0.50	0.38	0.44	0.46	0.37	0.38	0.78	**0.69**																
Q5.2.	**16**	0.42	0.30	0.31	0.43	0.39	0.32	0.35	0.31	0.30	0.22	0.29	0.28	0.20	0.77	0.31	**0.75**															
Q6.	**17**	0.53	0.42	0.49	0.42	0.43	0.41	0.33	0.50	0.40	0.42	0.55	0.43	0.48	0.52	0.53	0.29	**0.53**														
Q6.1.	**18**	0.41	0.32	0.41	0.30	0.30	0.29	0.23	0.38	0.31	0.32	0.43	0.32	0.39	0.38	0.40	0.20	0.78	**0.66**													
Q6.2.	**19**	0.44	0.36	0.38	0.36	0.37	0.35	0.29	0.42	0.34	0.35	0.41	0.32	0.36	0.43	0.43	0.25	0.80	0.47	**0.68**												
Q6.3.	**20**	0.40	0.31	0.37	0.33	0.35	0.34	0.27	0.38	0.30	0.32	0.46	0.37	0.38	0.41	0.42	0.23	0.79	0.46	0.47	**0.68**											
Q7.	**21**	0.57	0.50	0.47	0.47	0.42	0.37	0.36	0.49	0.40	0.42	0.49	0.41	0.40	0.52	0.50	0.31	0.62	0.46	0.47	0.54	**0.55**										
Q7.1.	**22**	0.48	0.39	0.43	0.39	0.32	0.29	0.26	0.40	0.30	0.35	0.38	0.32	0.31	0.44	0.43	0.26	0.53	0.41	0.40	0.44	0.81	**0.72**									
Q7.2.	**23**	0.41	0.36	0.34	0.34	0.30	0.25	0.27	0.34	0.28	0.28	0.40	0.36	0.30	0.34	0.34	0.20	0.43	0.32	0.31	0.38	0.76	0.47	**0.73**								
Q7.3.	**24**	0.43	0.40	0.33	0.36	0.35	0.30	0.30	0.41	0.33	0.34	0.36	0.28	0.32	0.42	0.41	0.26	0.48	0.33	0.37	0.42	0.75	0.47	0.37	**0.71**							
Q8.	**25**	0.37	0.29	0.31	0.31	0.30	0.22	0.30	0.27	0.28	0.17	0.28	0.26	0.20	0.27	0.19	0.22	0.28	0.17	0.20	0.28	0.32	0.26	0.25	0.23	**0.45**						
Q8.1.	**26**	0.22	0.19	0.18	0.19	0.17	0.13	0.16	0.17	0.18	0.10	0.17	0.14	0.14	0.18	0.14	0.14	0.18	0.15	0.14	0.14	0.23	0.19	0.14	0.20	0.52	**0.61**					

(*Continued*)

Table 2. Continued.

Cont.	N	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
Q8.2.	**27**	0.29	0.23	0.25	0.25	0.26	0.21	0.24	0.19	0.19	0.13	0.21	0.18	0.18	0.21	0.14	0.18	0.20	0.12	0.16	0.20	0.24	0.19	0.18	0.18	0.71	0.27	**0.68**				
Q8.3.	**28**	0.25	0.19	0.23	0.20	0.24	0.16	0.26	0.20	0.22	0.12	0.18	0.20	0.11	0.16	0.11	0.13	0.16	0.09	0.12	0.16	0.16	0.13	0.11	0.13	0.74	0.26	0.49	**0.72**			
Q8.4.	**29**	0.24	0.19	0.24	0.19	0.17	0.12	0.17	0.16	0.17	0.10	0.18	0.15	0.14	0.16	0.14	0.11	0.19	0.13	0.12	0.21	0.20	0.18	0.14	0.13	0.68	0.24	0.43	0.46	**0.64**		
Q8.5.	**30**	0.28	0.23	0.20	0.26	0.19	0.14	0.19	0.21	0.20	0.14	0.23	0.21	0.17	0.23	0.18	0.18	0.21	0.11	0.16	0.23	0.29	0.22	0.27	0.18	0.71	0.40	0.40	0.37	0.41	**0.66**	
Q8.6.	**31**	0.20	0.15	0.17	0.18	0.19	0.15	0.18	0.15	0.18	0.08	0.15	0.18	0.09	0.14	0.09	0.14	0.18	0.11	0.13	0.20	0.19	0.14	0.17	0.14	0.68	0.26	0.36	0.45	0.34	0.41	**0.72**
CR		0.94	0.89	0.89	0.92	0.92	0.89	0.90	0.91	0.9	0.91	0.92	0.9	0.91	0.91	0.90	0.92	0.93	0.89	0.90	0.90	0.94	0.91	0.91	0.91	0.94	0.83	0.86	0.88	0.84	0.85	0.89
CA		–	0.83	0.84	0.89	–	0.83	0.85	–	0.84	0.86	–	0.86	0.87	–	0.85	0.89	–	0.83	0.85	0.84	–	0.87	0.87	0.86	–	0.69	0.76	0.81	0.72	0.74	0.81

Source: Research data.

Note: The shaded values in the main diagonal are the Average Variance extracted and there are no tests or significance values associated with that. Values below the diagonal correspond to the squared correlation between factors, estimated with PLS. Cases in grey scale are the ones that violate discriminant validity according to the Fornell and Larcker (1981) procedure.

Table 3. Hypotheses testing results.

H	Exogenous construct	Endogenous constructs	Weight	Error	*T*-value
H1	Leadership	Strategy and PlansR^2 = 64%	0.53	0.07	7.45***
H2	Information/knowledge		0.31	0.06	7.13***
H3	Leadership	PeopleR^2=59%	0.42	0.06	2.70***
H4	Information/knowledge		0.38	0.06	6.73***
H5	Strategies/plans	SocietyR^2 = 49%	0.70	0.03	5.08***
H6	Information/knowledge	ProcessR^2 = 60%	0.45	0.06	2.50**
H7	Society		0.39	0.07	6.99***
H8	Strategies/plans	Clients and MarketsR^2 = 68%	0.39	0.06	7.00***
H9	Information/knowledge		0.18	0.07	22.65***
H10	Process		0.18	0.07	5.89***
H11	People		0.18	0.07	3.42***
H12	Process	PerformanceR^2 = 35%	0.39	0.07	5.88***
H13	Customers		0.24	0.07	2.72***

Source: Research data.
Notes: (a) H refers to the number of the hypothesis tested; (b) weight: This is the standardised weight; and (c) Error: The estimated error of the estimate; and (d) *T*-value is the ratio of the standardised weight by its error. *** Indicates a significant T at 0.1% ($p < 0.001$). ** Indicates a significant T at 1% ($p < 0.01$).

construct. The results stress that the design and implementation of strategies are the major determinants of the effective implementation of strategies designed to improve relationships and promote organisations' brand recognition.

Approximately 68% of the variability of the construct 'Society' was accounted for by the construct 'Strategy and Plans' (*H5*; $p < .01$; weight $\beta = 0.70$), which reinforces the importance of planning and strategy as a driver of socially and environmentally sustainable attitudes (Leal & Monteiro, 2014).

The construct 'Processes' was explained by the constructs 'Society' (*H7*; $p < .01$; weight $\beta = 0.35$) and 'Information and Knowledge' (*H6*; $p < .01$; weight $\beta = 0.39$), which contributed almost equally to explain 60% of the variability of this construct. This demonstrates that the processes are structured in line with the pursuit of cultivating learning and organisational development (Vom Brocke, 2010) with an increase of social and environmental concerns of organisations (Scherer & Palazzo, 2011).

Finally, Business Performance was explained by the constructs 'Clients and Markets' (*H13*, $p < .01$, $\beta = 0.24$) and 'Processes' (*H12*, $p < .01$, $\beta = 0.39$), accounting for 36% of the variance of the dependent variable. The greater direct effect of processes on performance highlights the importance of developing organisational capabilities aimed at establishing standards and reinforces the belief that best-practice excellence models, such as MEG, can increase performance. Thus, the very adoption of excellence standards, such as MEG, can become sources of competitive advantage for organisations.

5. Final remarks

Kaplan and Norton (2000) emphasised the importance of establishing and validating causal relationships as a basis for the management and validation of strategy organisation. The Balanced Scorecard methodology proposed by these authors can also be noted as a critical element in the MEG-FNQ model, particularly in the validation of planning strategies and their applications. In both models, the focus is on a set of measures that provide a comprehensive managerial approach and its impacts on organisational performance. The model also could be applied, with slight changes, to any type and size of organisation. Kelada

(1996) found similar evidence that strategic alignment interacts with structural factors, concluding that strategic planning can improve organisational results (Mintzberg & Quinn, 2001).

Initially, the baseline assumption of this work is that organisational procedures which work with recognised worldwide standards in their design are dependent on the existing infrastructure. The world-class excellence criteria used in MEG also emphasise the need for efficient management of human resources, with standards that are practical and transparent. Additionally, the involvement of employees is required, so that the organisation can make substantial progress in its search for competitive response. This study demonstrated that leadership and information management are the bases for strategically improving people management, customer focus, processes, and sustainable practices, which leads to greater business performance.

The study provides an empirical evidence of MEG assumptions and its positive role in business performance when applied to a divergent context compared to the Malcolm Baldrige criteria. Additionally, as MEG is grounded in business excellence criteria and has been used as a reference model for a large group of Brazilian companies, this study reinforces that best practices and international management standards could also be applied in underdeveloped countries, increasing general productivity and leading to better living standards for its citizens.

Nevertheless, we noticed a great amount of variability in the relative importance of the MEG items (first-order constructs) in each criterion (second-order constructs). This could be an area to explore in future research to isolate and investigate further the different levels of importance items have in creating the total MEG score. Another important outcome to note relates to the information and knowledge criterion. In MEG model requirements, the organisation should be based on an adequate infrastructure able to provide information, including technical and human resources for collecting, recording, processing, storing, and delivering data and supporting users, with or without the use of technology resources. Using a more qualitative approach, the research developed by Oliveira (2004) also concludes that the adoption of the PNQ Excellence Model (MEG) is playing an important role in varying degrees in the evolution of performance measurement. Interestingly, the analysis provides evidence to confirm the validity of the criteria of the MEG-FNQ reference model, and the differences in results may be partly explained by heterogeneity in the sample and the relatively short time period of 5 years. The study also reinforces the validity of the Deming quality principle, i.e. strategy leads to improvement of productivity in different types of organisations. Therefore, the quality of the dynamic capabilities of management should be based on related concepts that support continuous improvement or innovation to help organisations stay competitive.

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No potential conflict of interest was reported by the authors.

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