



International Journal of Operations & Production Management

The EFQM Model as a framework for total quality management in healthcare:

Results of a longitudinal quantitative study

Steffie van Schoten Carolien de Blok Peter Spreeuwenberg Peter Groenewegen Cordula Wagner

Article information:

To cite this document:

Steffie van Schoten Carolien de Blok Peter Spreeuwenberg Peter Groenewegen Cordula Wagner , (2016), "The EFQM Model as a framework for total quality management in healthcare Results of a longitudinal quantitative study ", International Journal of Operations & Production Management, Vol. 36 Iss 8 pp. 901 - 922

Permanent link to this document:

<http://dx.doi.org/10.1108/IJOPM-03-2015-0139>

Downloaded on: 22 December 2016, At: 05:08 (PT)

References: this document contains references to 56 other documents.

To copy this document: permissions@emeraldinsight.com

The fulltext of this document has been downloaded 584 times since 2016*

Users who downloaded this article also downloaded:

(2016), "Operational antecedents of integrated patient planning in hospitals", International Journal of Operations & Production Management, Vol. 36 Iss 8 pp. 879-900 <http://dx.doi.org/10.1108/IJOPM-05-2014-0237>

(2016), "Investigating the readiness of people in manufacturing SMEs to embark on Lean Six Sigma projects: An empirical study in the German manufacturing sector", International Journal of Operations & Production Management, Vol. 36 Iss 8 pp. 850-878 <http://dx.doi.org/10.1108/IJOPM-11-2014-0530>

Access to this document was granted through an Emerald subscription provided by emerald-srm:213934 []

For Authors

If you would like to write for this, or any other Emerald publication, then please use our Emerald for Authors service information about how to choose which publication to write for and submission guidelines are available for all. Please visit www.emeraldinsight.com/authors for more information.

About Emerald www.emeraldinsight.com

Emerald is a global publisher linking research and practice to the benefit of society. The company manages a portfolio of more than 290 journals and over 2,350 books and book series volumes, as well as providing an extensive range of online products and additional customer resources and services.

Emerald is both COUNTER 4 and TRANSFER compliant. The organization is a partner of the Committee on Publication Ethics (COPE) and also works with Portico and the LOCKSS initiative for digital archive preservation.

*Related content and download information correct at time of download.

The EFQM Model as a framework for total quality management in healthcare

Results of a longitudinal quantitative study

Steffie van Schoten

NIVEL – The Netherlands Institute for Health Services Research, Utrecht, The Netherlands

Carolien de Blok

NIVEL – The Netherlands Institute for Health Services Research, Utrecht, The Netherlands and

Department of Operations, Faculty of Economics and Business, University of Groningen, Groningen, The Netherlands

Peter Spreeuwenberg

NIVEL – The Netherlands Institute for Health Services Research, Utrecht, The Netherlands

Peter Groenewegen

NIVEL – The Netherlands Institute for Health Services Research, Utrecht, The Netherlands and

Department of Sociology, Department of Human Geography, Utrecht University, Utrecht, The Netherlands, and

Cordula Wagner

NIVEL – The Netherlands Institute for Health Services Research, Utrecht, The Netherlands and

Department of Public and Occupational Health and EMGO Institute for Health and Care Research, Vrije Universiteit Medical Center (VUmc), Amsterdam, The Netherlands

EFQM
Model as
a framework
for TQM

901

Received 9 March 2015
Revised 11 July 2015
13 October 2015
Accepted 16 October 2015

Abstract

Purpose – To guide organizations toward total quality management (TQM), various models have been developed such as the European Foundation for Quality Management Excellence Model (EFQM Model). The purpose of this paper is to conduct a longitudinal investigation of whether the EFQM Model can serve as a framework for TQM in healthcare.

Design/methodology/approach – Data on a national representative survey about quality management (QM) in the hospital population in the Netherlands were used to conduct this study. The survey had five measurement points between 1995 and 2011.

Findings – The results of the study show that applying the EFQM Model in hospitals is related to improvement in organizational performance over time, a feedback loop in which hospitals use their



Funding: this research was partly funded by the Ministry of Education, Culture and Science in the Netherlands.

The authors would like to thank all participating organizations for returning the questionnaire.

International Journal of Operations
& Production Management
Vol. 36 No. 8, 2016
pp. 901-922
© Emerald Group Publishing Limited
0144-3577
DOI 10.1108/IJOPM-03-2015-0139

results to further improve their organizational processes is established, and improvement is stronger when all the model's elements are considered simultaneously.

Practical implications – The results of the study can be applied by quality managers of healthcare institutions to achieve higher quality of care.

Originality/value – Previous research on the relationship between the EFQM excellence model and TQM neglects two essential characteristics of the TQM philosophy, namely, the holistic perspective on QM and the presumed feedback loop of organizational performance that feeds a cycle of continuous quality improvement. The study provides new insights into the long-term benefits of applying the EFQM Model as a framework for TQM in healthcare.

Keywords Total quality management, Empirical, Quality management, Continuous improvement, Longitudinal, EFQM excellence model

Paper type Research paper

Introduction

The last decades, the standards and expectations of customers have risen and as a result there has been a growing concern about quality of goods and services. In response, many quality improvement (QI) methods have been developed. One of these methods is total quality management (TQM) and is defined as an integrative management philosophy that aims for continuous improvement in the quality of products and services within an organization (Bou-Llugar *et al.*, 2009; Hackman and Wageman, 1995; Sun, 1999; Wruck and Jensen, 1994). Various models have been developed to guide organizations toward TQM such as the Malcolm Bridge Quality Award and the European Foundation for Quality Management Excellence Model (EFQM Model) (Bou-Llugar *et al.*, 2009; Shaw, 2000).

Previous research into the relation between the EFQM Model and TQM neglects two essential characteristics of the TQM philosophy: the holistic perspective on quality management (QM) and a continuous cycle of QI that is presumed to be established through a feedback loop of organizational performance (Bou-Llugar *et al.*, 2009; Doeleman *et al.*, 2014). Previous research was mostly based on testing isolated relations of the EFQM Model within cross-sectional study designs (Bou-Llugar *et al.*, 2009; Doeleman *et al.*, 2014; Samson and Terziovski, 1999). However, a holistic approach that takes account of all organizational aspects and organizational performance over a longer time period is required. The aim of this paper is to investigate whether the EFQM Model can serve as a framework for TQM and takes a longitudinal approach. Our study contributes to a deeper understanding of the EFQM Model. The question empirically tested by means of longitudinal survey research is: "Can the European Foundation for Quality Management Excellence Model serve as a framework for Total Quality Management?"

We chose to conduct this research in a sector with a high societal relevance, namely, the healthcare sector. More specifically: in hospitals. Even though the EFQM Model was originally developed for the for-profit sector, to date the model has also been applied in not-for-profit sectors such as healthcare and education (Calvo-Mora *et al.*, 2006; Moeller, 2001; Nabitz *et al.*, 2000; Naylor, 1999). In healthcare, QI has become increasingly important over recent years, as it is supposed to have a direct effect on both clinical outcomes and patient satisfaction. The improvement of quality in this sector has the potential to improve the quality of lives or even save lives.

Literature overview

The concept of TQM

Several definitions for TQM have been developed which all share the general idea that TQM is an integrative management philosophy that aims at continuous QI to meet

customer expectations (Bou-Llusar *et al.*, 2009; Hackman and Wageman, 1995; Kaynak, 2003). According to TQM, this can only be attained when the individual parts of an organization are managed in an inter-related (holistic) way (Kaynak, 2003; Powell, 1995; Terziovski *et al.*, 1997). In the literature three main principles that underlie TQM are distinguished. First, the core concepts of TQM fall into two categories: the “social-soft” dimension and the “technical-hard” dimension (Bou-Llusar *et al.*, 2009; Kaynak, 2003; Prajogo and Sohal, 2006). The “social-soft” dimension encapsulates the human resource management aspects of an organization, whereas the “technical-hard” dimension considers continuous improvement of goods and services by improving production processes. Second, the two dimensions and their underlying aspects need to be managed simultaneously because they are interrelated (Bou-Llusar *et al.*, 2009; Flynn *et al.*, 1994; Hackman and Wageman, 1995; Wruck and Jensen, 1994; Sun, 1999). As pointed out by Hietschold *et al.* (2014): “The main focus of TQM is on the organization as a whole”. Third, the management of both dimensions will lead to improved organizational performance. Several studies have confirmed a causal relationship between dimensions of TQM and performance of organizations (Kaynak, 2003; Powell, 1995; Terziovski *et al.*, 1997; Samson and Terziovski, 1999; Boulter *et al.*, 2013; Calvo-Mora *et al.*, 2013, 2015). However, about 70 percent of organizations fail to put TQM in practice (Fu *et al.*, 2015). Therefore it is important to know the mechanisms through which TQM leads to continuous QI. As TQM is a long-term approach, the improvement achieved in performance is expected to persist and accumulate over time leading to a cycle of continuous improvement. However, as yet there is no evidence for a cycle of continuous improvement in the literature.

TQM in healthcare

As a result of quality methods being applied in the industrial sector as a part of daily business processes, healthcare became interested in such methods as well. TQM initiatives were implemented in healthcare from the early 1990s to ensure and improve the quality of care and reduce costs (Øvretveit, 2000; Van Rooyen *et al.*, 1999). The application of TQM spread rapidly (Øvretveit, 2000), partly due to the fact that it is an appealing approach for customer-oriented sectors (Striem *et al.*, 2003). This follows from the definition of TQM in healthcare: “the systematic involvement of healthcare teams in identifying the underlying causes of unnecessary variation in processes and outcomes of care, and taking corrective and preventive action with the goal of continuous QI in patient care delivery” (Shortell *et al.*, 2000). TQM in healthcare has the potential to reduce variation in outcomes and aims to detect opportunities for improvement both in terms of clinical outcomes and cost-effectiveness (Van Rooyen *et al.*, 1999; Nicolay *et al.*, 2012).

Despite this, questions are raised about the universal applicability of TQM (Sousa and Voss, 2002) because there is growing awareness that successful implementation of TQM highly depends on contextual variables (Hietschold *et al.*, 2014; Jayaram *et al.*, 2010). Previous studies identified industry type as an important context factor (Sousa and Voss, 2002). In relation to this, some studies have been conducted to identify practices underlying the success of TQM implementation in healthcare settings (Talib *et al.*, 2011). In addition, a review by Nicolay *et al.* (2012) identifies the performance effects of TQM implementation for various medical disciplines and patient groups. However, more research is needed that concerns the detailed impact of dimensions of TQM on performance, taking into account the entire organization as well as (longitudinal) performance measures that are relevant to both healthcare organizations and patients (Nicolay *et al.*, 2012; Talib *et al.*, 2011).

Quality models have been designed to guide organizations toward TQM, and multiple studies consider such quality models as operational frameworks for TQM (Bou-Llusar *et al.*, 2009; Curkovic *et al.*, 2000; Lee *et al.*, 2003; Van Der Wiele *et al.*, 2000). In this paper we focus on the EFQM Model as a framework for organizations to reach TQM since this model has been widely used throughout Europe.

The EFQM model as a framework for TQM

The EFQM model

Since the early 1990s, the EFQM Model has been used to shape organizations' quality policy and detect areas for improvement. The model is a broad, generic and non-directive framework (EFQM, 2013) that is applied in three ways. First, it is used as a frame of reference for an organization's quality policy. Second, the model can serve as a self-assessment instrument to identify the strengths and weaknesses of an organization's QM. Lastly, organizations use it to apply for the European Quality Awards (Bou-Llusar *et al.*, 2009; Nabitz and Klazinga, 1999). The EFQM Model consists of five enabler criteria (organizational areas) and four result criteria (outcome areas), see Figure 1.

The organizational areas are often referred to as "enabler criteria," whereas the outcome areas represent the "result criteria" of an organization or in other words the performance of an organization. In this paper we adopt this terminology and will refer to the areas of the model as enabler criteria and result criteria. The enabler criteria are leadership, policy and strategy, human resources, resources, and process control. The result criteria are: professionals (in healthcare: healthcare professionals such as

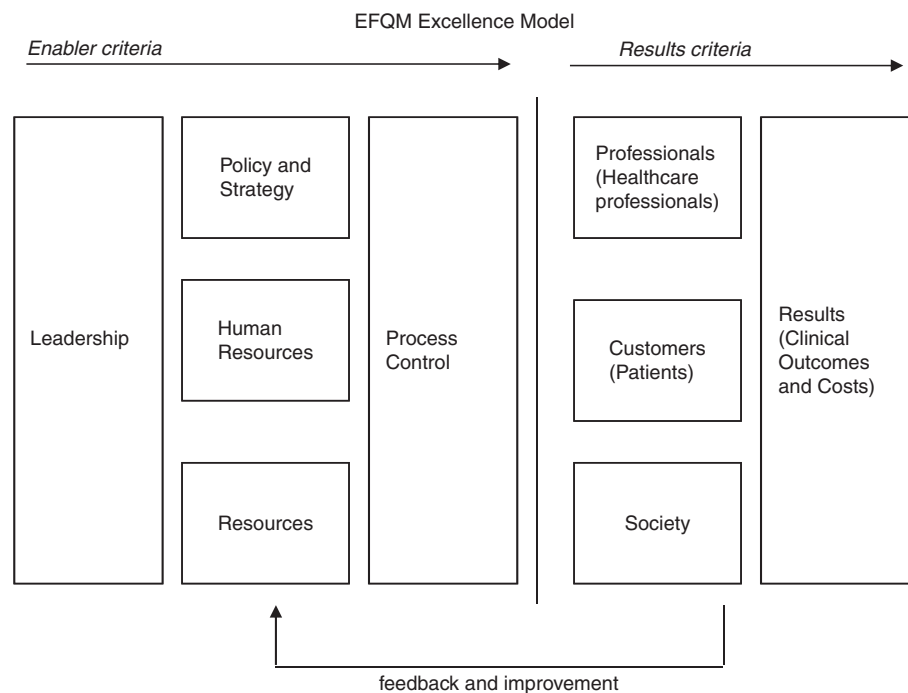


Figure 1.
The EFQM model

Source: Adapted from EFQM (2013)

physicians and nurses); Customers (in healthcare: patients); society, and results (in healthcare: clinical outcomes and costs). Table I describes the enabler and result criteria. The model is based on the assumption that improving operational processes will lead to improvement and superiority of performance (Bou-Llusar *et al.*, 2005; EFQM, 2013; Heras-Saizarbitoria *et al.*, 2012; Nabitz *et al.*, 2000; Doleman *et al.*, 2014; Boulter *et al.*, 2013). The EFQM Model proposes a pattern of relationships within (Flynn *et al.*, 1995a, b) and between (Bou-Llusar *et al.*, 2005; Moeller, 2001; Gómez *et al.*, 2015; Suárez *et al.*, 2014) the enabler criteria and result criteria. The model assumes that an organization should focus on all its activities and levels to establish continuous improvement (Nabitz and Klazinga, 1999). In addition, the various elements should be balanced: combining the management of all the enabler criteria will have a larger effect on result criteria compared to focussing on individual enabler criteria (EFQM, 2013).

Literature on the results of applying the EFQM excellence model

In practice the use of the EFQM Model is accepted and widespread. Empirical research on the causal relationships within the EFQM Model is extensive, however, the evidence suggesting that applying the EFQM Model leads to improvement of performance is limited (Bou-Llusar *et al.*, 2009; Doleman *et al.*, 2014; Boulter *et al.*, 2013). Existing research is mostly based on descriptive studies that use single cases or lack control groups (Bou-Llusar *et al.*, 2009; Doleman *et al.*, 2014). Furthermore, previous research focussed on partial or isolated relationships. The following paragraph briefly describes the important contributions to the literature on the empirical evidence of applying the EFQM Model in terms of improved performance. For a more in-depth description of this literature, we refer to the papers by Bou-Llusar *et al.* (2009) and Doleman *et al.* (2014) which contain detailed literature reviews on the topic.

<i>Enabler criteria</i>	<i>Description</i>
Leadership	Leaders need to demonstrate their commitment to excellence and continuous improvement and support improvement and involvement by providing adequate resources and support
Policy and strategy	Policy and strategy includes the organization's mission, vision, values and strategy, how these reflect a total quality orientation and how these are developed, communicated, implemented, regularly updated and improved
Human Resources	Human resources concerns the management of the people in the organization, how their full potential is released, their resources improved, capabilities sustained and developed; how performance is continuously assessed; how people are involved, empowered and recognized
Resources	Resources refer to how the resources of an organization are effectively deployed in support of policy and strategy
Process control	Process control addresses how processes are identified, reviewed, and revised in order to sustain continuous improvement of the organization's service
<i>Result criteria</i>	<i>Description</i>
Professionals	Comprehensively measure and achieve excellent results with respect to their professionals
Customers (patients)	Comprehensively measure and achieve excellent results with respect to their customers (patients)
Society	Comprehensively measure and achieve excellent results with respect to society
Results (clinical outcomes and costs)	Comprehensively measure and achieve excellent results with respect to results (clinical outcomes and costs)

Sources: EFQM (2013), Shergold and Reed (1996)

Table I.
Description of the
EFQM model enabler
criteria and
result criteria

Oakland and Oakland (1998) showed a significant relationship within the result criteria of the EFQM Model where achievements in one are associated with improved outcomes in other result criteria. Eskildsen and Kanji (1998) conducted a study that found that poor management of people and processes is reflected in two of the results criteria. Prabhu *et al.* (2000) demonstrated strong associations between the enabler criterion human resources and the result criterion professionals; between the enabler criterion leadership and the result criterion customers through the assurance of good training for employees; and between people-related issues and operational outcomes measures. Eskildsen and Dahlgaard (2000) showed that the enabler criteria human resources and process control are positively associated with the result criterion professionals. Bou-Llusar *et al.* were the first to take into account all of the elements of the model by testing the relationships between the various enabler criteria and the result criteria and thereby made an important contribution to the understanding of the complete set of relationships. They found evidence that the enabler criteria and result criteria are strongly associated. Furthermore, they concluded that a positive enabler-result criteria correlation exists when all the criteria in the model are considered simultaneously and a balanced approach in the development of the enabler criteria allows the correlation between enabler criteria and result criteria to be maximized (Bou-Llusar *et al.*, 2005). Despite the fact that this study took an integrative approach, the study was cross-sectional and did not consider the long-term relationship between the enabler criteria and result criteria (Bou-Llusar *et al.*, 2005). In the light of continuous improvement, analyzing the long-term effects of enabler criteria is a prerequisite if premises are to be stated about the contribution of the EFQM Model to organizational performance (Bou-Llusar *et al.*, 2005, 2009; Doeleman *et al.*, 2014). Furthermore, as it can be assumed that the implementation of QM aspects does not have an instant effect but requires time before any effect becomes manifest, it seems reasonable to suppose that the results of this implementation will not be visible if measured at the moment of implementation, but only at a later point in time (Doeleman *et al.*, 2014; Rusjan, 2005).

Hypotheses

The hypotheses that will be tested in this study are derived from the main ideas of TQM, which were described in the previous section: the management of enabler criteria of the EFQM Model lead to improved organizational performance; the management of enabler criteria of the EFQM Model lead to improved organizational performance that will persist and accumulate over time resulting in a feedback loop of continuous improvement; the relationships between the enabler criteria and the result criteria of the EFQM Model are stronger when all the enabler criteria are managed in parallel, because they are interrelated. This leads to the following hypotheses that will be tested in this study:

- H1. There is a positive causal relationship between the enabler criteria and the result criteria of the EFQM Model. High scores for the enabler criteria will lead to high scores for the result criteria.
- H2. The enabler criteria and the result criteria of the EFQM Model continuously improve over time, resulting in a feedback loop of continuous improvement of both the enabler criteria and the result criteria.
- H3. The relationships between the enabler criteria and the result criteria of the EFQM Model will be stronger when all of the enabler criteria are developed.

Methodology

EFQM enabler and result criteria were measured using data from a national representative survey among the hospital population in the Netherlands. The survey had multiple measurement points and was carried out in 1995, 2000, 2005, 2007 and 2011 by the Netherlands Institute for Health Services Research (Wagner *et al.*, 1999; Van Schoten *et al.*, 2013). The questionnaire was originally developed and validated in the Netherlands in 1995 and was used to measure QM activities and quality system development in hospitals through self-assessment (Wagner *et al.*, 1999; Van Schoten *et al.*, 2013). For the fifth measurement in 2011 the questionnaire was slightly adjusted to correspond to current issues and definitions within the hospital sector (Van Schoten *et al.*, 2013). For the purpose of the current research, items were regrouped according to the various enabler and result criteria of the EFQM Model using the definitions of the enabler and result criteria in Table I. This regrouping was undertaken by the first author in consultation with the co-authors, who all had significant experience in research in the field of QI and quality models. The final set of items are shown in the Appendix.

Study design, sample and questionnaire

A total of 548 questionnaires were sent to the total population of Dutch hospitals over the years 1995, 2000, 2005, 2007 and 2011. The number of hospitals in the Netherlands decreased over that timeframe due to mergers. The average response over the years was 73 percent, the average number of completed questionnaires per measurement point was 80, and in total 398 questionnaires were completed during the length of the study (see Table II). The questionnaire was completed by either a member of the management team or the quality coordinator of the hospital. The views of nurses, medical specialists, patients or other stakeholders were not included in this survey.

Data preparation

The questionnaire contained both positively and negatively worded items. The latter were recoded to ensure that a high score reflects a more positive response. Hospitals were allowed to have missing data on items for the various criteria; however, at least one of the items for each of the criteria needed to be answered in order to include that criterion in the analyses. If this was not the case, the hospital was excluded from the analyses for this criterion. Mergers of hospitals were dealt within the analyses as follows. Hospitals were assigned a unique identifier at the first year of measurement that was used as a unit of analysis. This unique identifier remained the same during the entire study period unless one of the following two situations occurred: a larger or more (financially) dominant hospital took over a smaller or less dominant hospital; two hospitals started working together as a new organization. In the first case, the two hospitals had a unique identifier up to the point of the merger. After the merger, the identifier of the smaller hospital disappeared as a unit of analysis and the identifier of

	1995	2000	2005	2007	2011	Total
<i>n</i>	143	117	96	97	95	548
Completed questionnaires	112	80	71	62	73	398
Response %	78	68	74	65	77	73

Table II.
Response per
measurement year

the larger hospital remained in the study. This assumes that the policy of the larger, more dominant hospital was “forced upon” the smaller hospital. In the second case, the two hospitals started jointly working together as a new organization, with neither of the two being more dominant. Each hospital had its own unique identifier before the merger, but a new unique identifier was created thereafter for the new joint organization. The two original individual identifiers were excluded from the analyses for the remaining period of the study after the merger.

Econometrics model

Econometrics is a statistical multi-level method to evaluate the validity and reliability of imperfect measures of contextual properties (Raudenbush, 2003; Raudenbush and Sampson, 1999). The aim of this method is to measure latent characteristics of “ecological units” (in this study the hospital). Furthermore, the method aims to combine multiple observations into one scale to analyze reliability and validity of the scale. With an econometrics approach, all available data can be used in a multiple response model (Raudenbush, 2003; Raudenbush and Sampson, 1999). An econometrics approach was needed in the current study for two reasons. First, to handle the fact that not every hospital participated in every year of measurement and not all items were measured in every year of measurement, and second, because the data are hierarchical, since the different measurements are clustered within hospitals. The data structure is as follows: the items are at the lowest level (level 1) and these are nested in hospitals at the highest level (level 2).

A weighted average scale value is calculated by the model (intercept fixed part) overall items using equal weights for the items. Each item had its own level 1 error variance, which captures the measurement error. At the hospital level for every year of measurement a separate between hospital variance is estimated. From this for every hospital a residual (deviation from the average scale value) is estimated for every measurement year. The sum of the average scale score and the residuals give for every hospital a scale score in that year of measurement (if the hospital has data in that year). The remaining analyses were based on these yearly hospital scale scores.

The internal consistency of the various enabler and result criteria was calculated to ensure that our measurement instrument was reliable and that hospitals were responding consistently to the items within any one criterion. The reliability coefficient was calculated in a multi-level multiple response model. The interpretation of this value is comparable to Cronbach’s α in psychometric studies (Raudenbush, 2003; Raudenbush and Sampson, 1999). When the items within a certain criterion are measuring the same construct, the coefficient should be at least 0.6 (Twisk, 2006).

Multi-level linear regression analyses within a time lag model

To test the hypotheses in a multi-level linear regression model, a time lag data model was built beforehand. A time lag model takes account of the temporal sequence of a possible causal effect. An observed relationship might be causal when the cause (x) precedes the effect (y). As we assume that the implementation of QM aspects does not have an instant effect but instead requires time to become manifest, a time lag model is the appropriate approach (Doeleman *et al.*, 2014; Rusjan, 2005). The time sequence between our predictor variables (the enabler criteria) and the outcome variables (the result criteria) was modeled in this time lag model. Furthermore, to test the presumed feedback loop in the model, whereby the results of the QM system feedback into the

organization (in other words, improved result criteria lead to improved enabler criteria) leading to improved policy and processes, the same procedure was followed the other way around. We hypothesized that organizations with improved result criteria are likely to adjust their enabler criteria to further improve, therefore we performed the same principles to the effect of result criteria on enabler criteria. This way we were able to analyze the possibility of a continuous cycle of QI. The resulting data structure, which was used to test the causal relationships in this study, is illustrated in Figure 2.

Given that the time lag in the data set took account of the year of measurement, there was no need to perform separate analyses for the different years of measurement and all data stemming from one year of measurement could be combined in the analyses. This was the starting point for the multi-level linear regression analyses.

The multi-level linear regression analyses were done in several steps. First, separate analyses were performed for every enabler-results relationship in the model, both with and without controlling for year of measurement. Second, separate analyses were performed for every results-enabler relationship in the model to test the feedback loop, again with and without controlling for year of measurement. And third, the relationship between the combined enabler scores and the results was analyzed, with and without controlling for year of measurement. For this last analysis, a new variable was constructed to reflect the total development of all the enabler criteria combined. This variable was construed according to a procedure called summated rating scale construction (Spector, 1992). Each hospital was assigned a score of 0 or 1 for each of the enabler criteria. A hospital that had performed better than average on an enabler criterion was assigned a score of 1 and hospitals performing at or below average on an enabler criterion were assigned a score of 0. The sum of these five scores became a hospital's score for the overall development of the enabler criteria. The range of this new variable was between 0 and 5, as there are five enabler criteria. The score was used

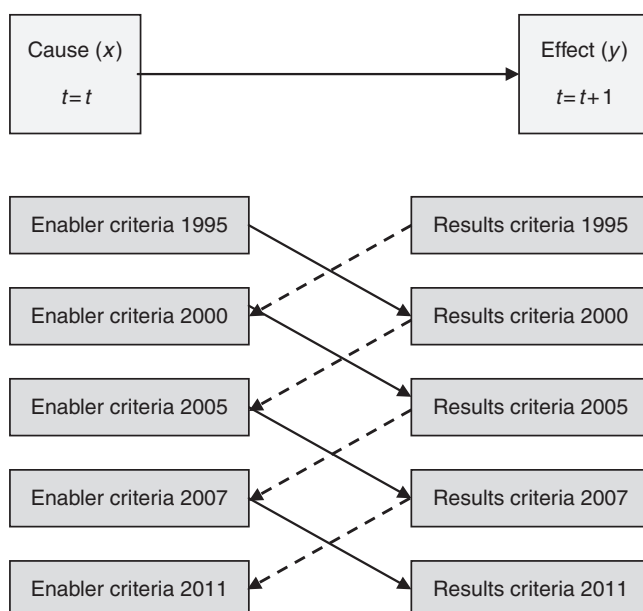


Figure 2.
Time lag
model for the
relationship between
enabler criteria and
result criteria and
feedback loop

in the last multi-level linear regression analysis to test whether hospitals that had developed all enabler criteria simultaneously were performing better in terms of results compared to hospitals that developed fewer enabler criteria. The descriptive analyses were performed using STATA 13.0. Multi-level analyses were performed using MLwiN 2.24. Coefficients in the multi-level regression analyses were considered statistically significant at $p < 0.10$, because of the relatively small number of hospitals and because hypothesis testing was one-sided.

Findings

Reliability of the measurement scales

All the scales had acceptable to good internal consistency except for the scale that measures the result criterion professionals, which had a reliability coefficient of 0.30 (see Table III). Deleting items in this scale did not contribute to the internal consistency. It seems that it was not possible to capture the intended underlying construct of this results criterion with the items used in this study.

Descriptive statistics of the scales

Table IV gives an overview of the averages scores of all participating hospitals for the enabler criteria for the different years of measurement. The mean score for all enabler criteria increased over time. Standard deviations decreased over time, indicating that the spread in scores between hospital on the enabler criteria decreased over time.

Table V shows averages scores of all participating hospitals for the result criteria, for the different years of measurement. The mean score for most of the result criteria increased over time. In one of the result criteria (professionals), there was an increase up until the final measurement in 2011, when the average score decreased slightly. The standard deviations in the results criteria increased over time, which indicates that there is a larger spread in scores between hospitals in the final measurement than in earlier measurements.

Table VI gives the between hospital variance in scores for the enabler criteria for every measurement year. The variance decreased over time for each enabler criterion. Hospitals' scores for the enabler criteria became more similar over time which is another indication for the fact that the organizational input of hospitals became more similar between hospitals over time.

Table VII gives the between hospital variance in scores for the result criteria for every measurement year. For professionals, variance was relatively consistent over time. For the criterion results, variance decreased first, but increased again in the last two measurements. For customers and society, variance increased over time, indicating that there were larger differences in scores for these criteria during the final measurements than for the earlier measurements.

Table III.
Internal consistency
coefficients of
measurement scales

Enabler criteria	Internal consistency	Result criteria	Internal consistency
Leadership	0.85	Professionals	0.30
Policy and strategy	0.82	Customers	0.69
Human resources	0.96	Society	0.78
Resources	0.85	Results	0.81
Process control	0.94		

Enabler criteria	Leadership			Policy and strategy			Human resources			Resources			Process control		
	Mean	SD	Range (0-1)	Mean	SD	Range (1-3)	Mean	SD	Range (0-1)	Mean	SD	Range (0-1)	Mean	SD	Range (0-1)
1995	0.55	0.23	0.19-0.94	1.82	0.38	1.10-2.62	0.53	0.30	0.06-0.98	0.36	0.29	0.05-0.96	0.73	0.21	0.12-0.97
2000	0.56	0.23	0.20-0.94	2.43	0.19	1.71-2.77	0.66	0.18	0.26-0.96	0.63	0.23	0.14-0.95	0.82	0.12	0.51-0.97
2005	0.82	0.11	0.42-0.88	2.53	0.02	2.47-2.57	0.88	0.10	0.40-0.96	0.65	0.08	0.41-0.77	0.86	0.11	0.39-0.96
2007	0.80	0.13	0.41-0.91	2.55	0.11	2.22-2.71	0.87	0.08	0.71-0.97	^a	^a	^a	0.91	0.08	0.63-0.98
2011	0.83	0.11	0.41-0.91	2.56	0.06	2.38-2.65	0.87	0.16	0.22-0.98	0.64	0	0.64-0.64	0.91	0.06	0.73-0.96
Note: ^a There are no observations for resources in 2007															

Table IV.
Mean enabler criteria
scores between
1995 and 2011

Table VIII shows the correlations between the enabler criteria of the EFQM Model and Table IX shows the correlation between the result criteria. All correlations were positive, and significantly different from 0.

Multi-level linear regression analyses

Table X shows the results of the separate multi-level linear regression analyses of the enabler criteria against the result criteria. All the coefficients are positive which

Table V.
Mean result criteria scores between 1995 and 2011

Results criteria	Professionals			Customers			Society			Results		
	Mean	SD	Range (1-3)	Mean	SD	Range (1-3)	Mean	SD	Range (1-3)	Mean	SD	Range (1-3)
1995	2.26	0.08	1.94-2.37	2.23	0.05	2.21-2.35	2.13	0.21	1.74-2.65	1.96	0.21	1.57-2.56
2000	2.27	0.01	2.24-2.30	2.21	0.28	1.39-2.76	2.13	0.24	1.42-2.68	1.99	0.22	1.45-2.68
2005	2.29	0.05	2.15-2.41	2.29	0.28	2.08-2.77	2.24	0.32	1.72-2.84	2.10	0.25	1.64-2.68
2007	2.28	0.08	2.09-2.47	2.30	0.30	2.07-2.87	2.26	0.32	1.72-2.84	2.17	0.34	1.64-2.80
2011	2.26	0.12	1.96-2.53	2.34	0.39	1.65-2.84	2.23	0.36	1.21-2.86	2.14	0.28	1.77-2.78

Table VI.
Between hospital variance in scores for enabler criteria for every measurement year

	Leadership		Policy and strategy		Human resources		Resources		Process control	
	Var.	SE	Var.	SE	Var.	SE	Var.	SE	Var.	SE
1995	3.87	1.13	0.69	0.14	7.02	1.62	6.22	1.63	3.24	0.84
2000	3.71	0.91	0.07	0.02	2.75	0.59	2.42	0.68	1.58	0.40
2005	1.31	0.65	0.00	0.01	1.37	0.39	0.51	0.37	1.51	0.33
2007	1.39	0.68	0.03	0.01	0.96	0.32	^a	^a	1.26	0.41
2011	1.35	0.66	0.01	0.01	2.77	0.67	0	0	0.91	0.28

Note: ^aThere are no observations for resources in 2007

Table VII.
Between hospital variance in scores for result criteria for every measurement year

	Professionals		Customers		Society		Results	
	Var.	SE	Var.	SE	Var.	SE	Var.	SE
1995	0.02	0.01	0.02	0.03	0.08	0.03	0.11	0.05
2000	0.00	0.01	0.11	0.03	0.10	0.03	0.08	0.02
2005	0.01	0.01	0.12	0.03	0.13	0.03	0.08	0.02
2007	0.02	0.01	0.13	0.03	0.13	0.03	0.14	0.03
2011	0.03	0.01	0.20	0.04	0.16	0.03	0.10	0.02

Table VIII.
Correlations between enabler criteria

	Leadership	Policy and strategy	Human resources	Resources	Process control
Leadership	1.00				
Policy and strategy	0.52*	1.00			
Human resources	0.62*	0.60*	1.00		
Resources	0.30*	0.60*	0.37*	1.00	
Process control	0.45*	0.44*	0.50*	0.32*	1.00

Note: * $p < 0.001$

indicates that a higher score on enabler criteria results in a higher score on result criteria in the next measurement year. The results are statistically significant ($p < 0.10$) for the relationships between all the enabler criteria and the result criteria customers, society and results, but not for the result criterion professionals.

Table XI shows the results of the separate multi-level linear regression analyses of the enabler criteria against the result criteria, controlled for measurement year. A similar pattern emerges when the same analyses are performed with the measurement year as a control variable: the relationships between enabler and result criteria are again positive and some, but not all, remain statistically significant ($p < 0.10$).

Table XII shows the results of the separate multi-level linear regression analyses of the result criteria against the enabler criteria, the feedback loop. Almost every

Table IX.
Correlations between
results criteria

	Professionals	Customers	Society	Results
Professionals	1.00			
Customers	0.27*	1.00		
Society	0.34*	0.56*	1.00	
Results	0.32*	0.54*	0.56*	1.00

Note: * $p < 0.001$

Table X.
Separate multi-level
linear regression
analyses of the
enabler criteria
against the result
criteria

Results criteria	Professionals		Customers		Society		Results	
	Coef.	SE	Coef.	SE	Coef.	SE	Coef.	SE
<i>Enabler criteria</i>								
Leadership	0.019	0.024	0.154	0.101	0.193*	0.102	0.202*	0.084
Policy and strategy	0.009	0.015	0.188*	0.061	0.230*	0.061	0.202*	0.050
Human resources	0.019	0.024	0.294*	0.099	0.288*	0.101	0.289*	0.082
Resources	-0.001	0.018	0.278*	0.094	0.241*	0.098	0.280*	0.089
Process control	0.005	0.040	0.327*	0.168	0.257	0.170	0.313*	0.140

Note: * $p < 0.10$

Table XI.
Separate
multi-level linear
regression analyses
of the enabler
criteria against the
result criteria,
controlled for
measurement year

Results criteria	Professionals		Customers		Society		Results	
	Coef.	SE	Coef.	SE	Coef.	SE	Coef.	SE
<i>Enabler criteria</i>								
Leadership	0.042	0.029	0.014	0.120	0.126	0.122	0.089	0.099
Measurement year	-0.008	0.006	0.052*	0.025	0.025	0.025	0.042*	0.020
Policy and strategy	0.030	0.020	0.145	0.085	0.290*	0.085	0.186*	0.070
Measurement year	-0.010	0.007	0.021	0.029	-0.030	0.028	0.008	0.023
Human resources	0.045	0.030	0.214*	0.124	0.272*	0.125	0.215*	0.102
Measurement year	-0.009	0.006	0.027	0.026	0.005	0.026	0.025	0.021
Resources	-0.010	0.020	0.233*	0.106	0.158	0.109	0.165*	0.099
Measurement year	0.007	0.006	0.030	0.033	0.056	0.034	0.075*	0.030
Process control	0.021	0.044	0.169	0.184	0.150	0.187	0.155	0.154
Measurement year	-0.005	0.005	0.045*	0.023	0.031	0.023	0.044*	0.019

Note: * $p < 0.10$

Table XII.
Separate multi-level
linear regression
analyses of the result
criteria against the
enabler criteria
(feedback loop)

coefficient is positive, which indicates that a higher score on result criteria leads to higher scores on enabler criteria. However, only a few relationships proved to be statistically significant at $p < 0.10$. Statistically significant relationships were found between professionals and leadership. Furthermore, statistically significant relationships were found between society and leadership, policy and strategy, human resource management and process control. And last, statistically significant relationships were found between results and leadership, policy and strategy, human resource management and process control.

Table XIII shows the results of the separate multi-level linear regression analyses of the results criteria against the enabler criteria (feedback loop), controlled for measurement year. When the same analyses are performed controlling for measurement year, none of the relationships are statistically significant which indicates that measurement year has an effect on the enabler criteria.

Table XIV shows the results of the multi-level linear regression analysis of the total development against the enabler criteria. The results show that developing all enabler criteria has a positive effect on results criteria. The effect of the total development is positive and significant for all result criteria except the result criterion professionals.

Table XV shows the results of the multi-level linear regression analysis of the total development against the enabler criteria, controlled for the measurement year. The results of this analysis are similar; the positive relationship between the total development score and result criteria is still present. However, only the relationship between the total development score and the results criterion results is not statistically

Enabler criteria	Leadership		Policy and strategy		Human resources management		Resources		Process control	
	Coef.	SE	Coef.	SE	Coef.	SE	Coef.	SE	Coef.	SE
<i>Results criteria</i>										
Professionals	0.358*	0.214	0.214	0.142	0.270	0.185	0.064	0.147	0.066	0.118
Customers	0.041	0.056	0.058	0.037	0.066	0.047	0.018	0.040	0.046	0.030
Society	0.111*	0.049	0.054*	0.033	0.090*	0.041	-0.005	0.036	0.045*	0.027
Results	0.092*	0.053	0.065*	0.035	0.121*	0.044	0.004	0.034	0.052*	0.029
Note: * $p < 0.10$										

Table XIII.
Separate multi-level
linear regression
analyses of the result
criteria against the
enabler criteria
(feedback loop),
controlled for
measurement year

Enabler criteria	Leadership		Policy and strategy		Human resources management		Resources		Process control	
	Coef.	SE	Coef.	SE	Coef.	SE	Coef.	SE	Coef.	SE
<i>Results criteria</i>										
Professionals	0.234	0.188	0.156	0.134	0.185	0.171	0.083	0.147	0.011	0.109
Measurement year	0.082*	0.011	0.038*	0.008	0.056*	0.010	-0.009	0.008	0.035*	0.006
Customers	-0.013	0.049	0.033	0.035	0.030	0.044	0.027	0.040	0.021	0.028
Measurement year	0.082*	0.011	0.038*	0.008	0.053*	0.010	-0.012	0.008	0.035*	0.006
Society	0.044	0.044	0.023	0.032	0.046	0.039	0.006	0.037	0.014	0.025
Measurement year	0.080*	0.011	0.038*	0.008	0.052*	0.010	-0.011	0.008	0.035*	0.006
Results	-0.018	0.049	0.014	0.035	0.054	0.043	0.021	0.036	-0.002	0.028
Measurement year	0.084*	0.011	0.039*	0.008	0.050*	0.086	-0.012	0.008	0.036*	0.007
Note: * $p < 0.10$										

significant at $p < 0.10$. This indicates that, for three out of four result criteria and controlled for the moment of measurement, developing all enabler criteria has a positive effect on results.

Discussion

This study examined whether the EFQM Model can serve as a framework for TQM in healthcare. Consistent with previous research, we found positive correlations between the various enabler criteria and between the various result criteria (Bou-Llusar *et al.*, 2005). This is according to expectations since the individual enabler criteria are all supposed to measure different aspects of enablers, and the individual result criteria all measure different aspects of organizational outcomes. Coherence is therefore a necessity. Our findings also showed that variance of scores between hospitals on enabler criteria and result criteria decreased over time. This indicates that hospitals became more similar over time, both in terms of their organizational structure and input as in terms of their organizational outcomes. This might be due to increased sector-wide standardization through the use of standards and protocols. Another possible explanation could be the plentitude of laws, national action programs and nation-wide improvement projects enrolled in Dutch hospitals in the last decade (De Blok *et al.*, 2013; Dückers, 2009). Consistently with the idea of TQM, the results show that applying the EFQM Model is related with better organizational performance. We found a positive causal relationship between the various enabler criteria and the various result criteria. These findings confirm *H1* of our study. Second, we also found a positive causal relationship between the various result criteria and the various enabler criteria over time. Although this effect was weaker than the relationship between enabler criteria and result criteria, it remains an indication for a cycle of continuous QI. *H2* of our study can thus be confirmed. In this study, we hypothesized that higher scores in result criteria lead to improved enabler criteria in the next time period. However, it could also be argued that low scores in results criteria at one point in time lead to improved enabler criteria in the next time period. The idea behind this is that low scores in result criteria urge organizations to improve their enabler criteria more

Result criteria	Professionals		Customers		Society		Results	
	Coef.	SE	Coef.	SE	Coef.	SE	Coef.	SE
Total development	0.003	0.002	0.026*	0.008	0.029*	0.009	0.027*	0.008

Notes: The total development is the sum of the development of all the different enabler criteria.
* $p < 0.10$

Table XIV.
Multi-level linear
regression analysis
of the total
development against
the result criteria

Result criteria	Professionals		Customers		Society		Results	
	Coef.	SE	Coef.	SE	Coef.	SE	Coef.	SE
Total development	0.004*	0.003	0.019*	0.010	0.022*	0.010	0.009	0.009
Measurement year	-0.005	0.003	0.020	0.133	0.017	0.014	0.048*	0.012

Notes: The total development is the sum of the development of all the different enabler criteria.
* $p < 0.10$

Table XV.
Multi-level linear
regression analysis of
the total development
against the result
criteria, controlled for
measurement year

than high scores in result criteria would. However, it is likely to expect that these improved enabler criteria should in the next time period lead to improved result criteria and the end result will be the same: both enabler criteria and result criteria improve over time. Furthermore, the results of our study show that the positive relationship between the enabler criteria and the result criteria of the EFQM Model is stronger when all of the enabler criteria are developed. This is in line with *H3* of our study. Overall, our study suggests that the EFQM Model could serve as a framework for TQM. However, stronger evidence for the feedback loop of continuous QI is desirable.

Implications

Our study replicates the findings of earlier studies on the internal structure of the EFQM Model in a different setting: healthcare. The results of our study indicate that hospitals became not only more quality oriented, but also more similar over time. Most quality approaches, including more recent ones such as Six Sigma and Lean (Nicolay *et al.*, 2012), aim to reduce variation by standardizing processes. The results of this study could be seen as evidence in favor of standardization. However, it is important to note that standardization is only desirable when it is thoroughly substantiated, and hospital managers as well as healthcare professionals should look into their processes in order to see where standardization can be applied and unnecessary and undesirable variation can be reduced in a way that processes are still being sensitive to individual patient needs and requirements.

This study established a positive causal relationship between the enabler criteria and the result criteria of the EFQM Model. This is consistent with findings of other studies in different sectors on the empirical evidence when applying the EFQM Model (Bou-Lluisar *et al.*, 2005, 2009; Doleman *et al.*, 2014). The results of the current study can be seen as a contribution to both theory and practice and in favor of using the EFQM Model as a framework for TQM in the healthcare sector. In addition, the longitudinal design reveals that it requires time before the results of quality activities become clearly visible in organizational outcomes. This implicates that managers and professionals should be urged not to expect quality changes instantly.

Consistently with the holistic TQM approach to QM, we found that the relationship between enabler criteria and result criteria is stronger when all of the enabler criteria are managed simultaneously. This is important, but perhaps also complex, for the management of organizations: no organizational aspects should be neglected and the development of all aspects should be interrelated in order to give the greatest effect on organizational performance.

Strengths and limitations

This study is the first to consider the long-term contribution of applying the EFQM Model as a framework for TQM in healthcare. To our knowledge there were only a few studies with a longitudinal design but these were based on single cases (Nabitz *et al.*, 2006; Vallejo *et al.*, 2007). A longitudinal design is required in order to identify any causal relationships between variables. Second, this study is the first that examines continuous QI through a feedback loop of organizational performance, an essential part of the philosophy behind TQM. Third, this study takes account of all the relationships in the model and not single isolated relationships. This is important because the management of all organizational input is assumed to have an accelerating effect on organizational performance.

Despite these strengths, we acknowledge several limitations to this study. First, organizational performance was measured by taking the respondents' perceptions of the result criteria and not the actual objective performance. This means that QI activities may have been overestimated in the current study. However, the range of scores and persistent improvements in scores over time suggests that respondents filled out the questionnaire honestly. In the time lag model, the scores on the result criteria were linked to the scores on the enabler criteria of the previous measurement which meant that in many cases this was a different respondent and thereby eliminating possible socially desirable reporting. Ideally, more objective measurements of outcomes would be taken into account (such as standardized patient mortality rates), but these were not available for the total duration of the study. Second, the statistical power to generalize findings is limited. Sampling in this study was restricted by the number of hospitals in the Netherlands. Due to hospital mergers, the total number of hospitals decreased. For the most part, this problem was overcome by the longitudinal design of the study and the multi-level analyses resulting in a greater total study sample and hence more power. However, generalizations to wider healthcare settings, other countries, or even other sectors need to be drawn with caution. Third, the reliability of the measurement scale for the result criteria professionals was inadequate. This might be due to the fact that the items that were used capture on the one hand values of healthcare professionals (such as satisfaction) and on the other hand the way in which healthcare professionals are being evaluated (e.g. motivation and flexibility). Furthermore, the result criteria Professionals as measured in this research does not refer to all employees, but specifically to healthcare professionals such as physicians and nurses. The items used in this study did not seem to capture the underlying intended construct and therefore the findings related to this measurement scale should be interpreted with caution.

Directions for future research

Future research should try to replicate the findings of our study to strengthen the evidence that the EFQM Model can be used by hospitals and other healthcare institutions to guide TQM activities. Related to this, future research should base its studies on longitudinal data with multiple measurements. As Doeleman *et al.* (2014) pointed out, a longitudinal design with a control group is preferable. However, in practice a controlled setting in which it is possible to account for moderating influences is difficult to achieve (Doeleman *et al.*, 2014). Furthermore, the majority of research to date on the relationship between applying the EFQM Model and TQM was carried out in educational settings and results of these studies showed similar patterns of results (Calvo-Mora *et al.*, 2005, 2006). Our research was carried out in a specific subsector of healthcare and future research could expand to other fields in healthcare such as long-term care. In long-term care there is a specific focus on customer needs, which would make an interesting setting to research a customer-driven model such as TQM.

References

- Bou-Llusar, J.C., Escrig-Tena, A.B., Roca-Puig, V. and Beltrán-Martín, I. (2005), "To what extent do enablers explain results in the EFQM excellence model? An empirical study", *International Journal of Quality & Reliability Management*, Vol. 22 No. 4, pp. 337-353.
- Bou-Llusar, J.C., Escrig-Tena, A.B., Roca-Puig, V. and Beltrán-Martín, I. (2009), "An empirical assessment of the EFQM excellence model: evaluation as a TQM framework relative to the MBNQA model", *Journal of Operations Management*, Vol. 27 No. 1, pp. 1-22.

- Boulter, L., Bendell, T. and Dahlgaard, J. (2013), "Total quality beyond North America: a comparative analysis of the performance of European excellence award winners", *International Journal of Operations & Production Management*, Vol. 33 No. 2, pp. 197-215.
- Calvo-Mora, A., Leal, A. and Roldán, J.L. (2005), "Relationships between the EFQM model criteria: a study in Spanish universities", *Total Quality Management & Business Excellence*, Vol. 16 No. 6, pp. 741-770.
- Calvo-Mora, A., Leal, A. and Roldán, J.L. (2006), "Using enablers of the EFQM model to manage institutions of higher education", *Quality Assurance in Education*, Vol. 14 No. 2, pp. 99-122.
- Calvo-Mora, A., Picón, A., Ruiz, C. and Cauzo, L. (2013), "The relationships between soft-hard TQM factors and key business results", *International Journal of Operations & Production Management*, Vol. 34 No. 1, pp. 115-143.
- Calvo-Mora, A., Picón-Berjoyo, A., Ruiz-Moreno, C. and Cauzo-Bottala, L. (2015), "Contextual and mediation analysis between TQM critical factors and organisational results in the EFQM excellence model framework", *International Journal of Production Research*, Vol. 53 No. 7, pp. 2186-2201.
- Curkovic, S., Melnyk, S., Calantone, R. and Handfield, R. (2000), "Validating the Malcolm Baldrige National Quality Award framework through structural equation modelling", *International Journal of Production Research*, Vol. 38 No. 4, pp. 765-791.
- De Blok, C., Koster, E., Schilp, J. and Wagner, C. (2013), "Implementatie VMS Veiligheidsprogramma: evaluatieonderzoek in Nederlandse ziekenhuizen", NIVEL, Utrecht.
- Doeleman, H.J., Ten Have, S. and Ahaus, C.T.B. (2014), "Empirical evidence on applying the European Foundation for Quality Management Excellence Model, a literature review", *Total Quality Management & Business Excellence*, Vol. 25 Nos 5-6, pp. 439-460.
- Dückers, M.L.A. (2009), *Changing Hospital Care: Evaluation of a Multi-Layered Organisational Development and Quality Improvement Programme*, Utrecht University, Utrecht.
- EFQM (2013), "The EFQM excellence model", available at: www.efqm.org
- Esildsen, J.K. and Kanji, G. (1998), "Identifying the vital few using the European Foundation for Quality Management Model", *Total Quality Management*, Vol. 9 Nos 4-5, pp. 92-94.
- Esildsen, J.K. and Dahlgaard, J.J. (2000), "A causal model for employee satisfaction", *Total Quality Management*, Vol. 11 No. 8, pp. 1081-1094.
- Flynn, B.B., Sakakibara, S. and Schroeder, R.G. (1995a), "Relationship between JIT and TQM: practices and performance", *Academy of Management Journal*, Vol. 38 No. 5, pp. 1325-1360.
- Flynn, B.B., Schroeder, R.G. and Sakakibara, S. (1994), "A framework for quality management research and an associated measurement instrument", *Journal of Operations Management*, Vol. 11 No. 4, pp. 339-366.
- Flynn, B.B., Schroeder, R.G. and Sakakibara, S. (1995b), "The impact of quality management practices on performance and competitive advantage", *Decision Sciences*, Vol. 26 No. 5, pp. 659-691.
- Fu, S.-L., Chou, S.-Y., CHEN, C.-K. and Wang, C.-W. (2015), "Assessment and cultivation of total quality management organisational culture – an empirical investigation", *Total Quality Management & Business Excellence*, Vol. 26 Nos 1-2, pp. 123-139.
- Gómez, J.G., Martínez Costa, M. and Martínez Lorente, A.R. (2015), "An in-depth review of the internal relationships of the EFQM model", *The TQM Journal*, Vol. 27 No. 5, pp. 486-502.
- Hackman, J.R. and Wageman, R. (1995), "Total quality management: empirical, conceptual, and practical issues", *Administrative Science Quarterly*, Vol. 40 No. 2, pp. 309-342.

- Heras-Saizarbitoria, I., Marimon, F. and Casadesús, M. (2012), "An empirical study of the relationships within the categories of the EFQM model", *Total Quality Management & Business Excellence*, Vol. 23 Nos 5-6, pp. 523-540.
- Hietschold, N., Reinhardt, R. and Gurtner, S. (2014), "Measuring critical success factors of TQM implementation successfully – a systematic literature review", *International Journal of Production Research*, Vol. 52 No. 21, pp. 6254-6272.
- Jayaram, J., Ahire, S.L. and Dreyfus, P. (2010), "Contingency relationships of firm size, TQM duration, unionization, and industry context on TQM implementation – a focus on total effects", *Journal of Operations Management*, Vol. 28 No. 4, pp. 345-356.
- Kaynak, H. (2003), "The relationship between total quality management practices and their effects on firm performance", *Journal of Operations Management*, Vol. 21 No. 4, pp. 405-435.
- Lee, S.M., Rho, B.H. and Lee, S.G. (2003), "Impact of Malcolm Baldrige National Quality Award criteria on organizational quality performance", *International Journal of Production Research*, Vol. 41 No. 9, pp. 2003-2020.
- Moeller, J. (2001), "The EFQM excellence model. German experiences with the EFQM approach in health care", *International Journal for Quality in Health Care*, Vol. 13 No. 1, pp. 45-49.
- Nabitz, U., Klazinga, N. and Walburg, J.A.N. (2000), "The EFQM excellence model: European and Dutch experiences with the EFQM approach in health care", *International Journal for Quality in Health Care*, Vol. 12 No. 3, pp. 191-202.
- Nabitz, U., Schramade, M. and Schippers, G. (2006), "Evaluating treatment process redesign by applying the EFQM excellence model", *International Journal for Quality in Health Care*, Vol. 18 No. 5, pp. 336-345.
- Nabitz, U.W. and Klazinga, N.S. (1999), "EFQM approach and the Dutch quality award", *International Journal of Health Care Quality Assurance*, Vol. 12 No. 2, pp. 65-71.
- Naylor, G. (1999), "Using the business excellence model to develop a strategy for a healthcare organisation", *International Journal of Health Care Quality Assurance*, Vol. 12 No. 2, pp. 37-45.
- Nicolay, C.R., Purkayastha, S., Greenhalgh, A., Benn, J., Chaturvedi, S., Phillips, N. and Darzi, A. (2012), "Systematic review of the application of quality improvement methodologies from the manufacturing industry to surgical healthcare", *British Journal of Surgery*, Vol. 99 No. 9, pp. 324-335.
- Oakland, J.S. and Oakland, S. (1998), "The links between people management, customer satisfaction and business results", *Total Quality Management*, Vol. 9 Nos 4-5, pp. 185-190.
- Øvretveit, J. (2000), "Total quality management in European healthcare", *International Journal of Health Care Quality Assurance*, Vol. 13 No. 2, pp. 74-80.
- Powell, T.C. (1995), "Total quality management as competitive advantage: a review and empirical study", *Strategic Management Journal*, Vol. 16 No. 1, pp. 15-37.
- Prabhu, V., Appleby, A., Yarrow, D. and Mitchell, E. (2000), "The impact of ISO 9000 and TQM on best practice/performance", *The TQM Magazine*, Vol. 12 No. 2, pp. 84-92.
- Prajogo, D.I. and Sohal, A.S. (2006), "The relationship between organization strategy, total quality management (TQM), and organization performance – the mediating role of TQM", *European Journal of Operational Research*, Vol. 168 No. 1, pp. 35-50.
- Raudenbush, S.W. (2003), "The quantitative assessment of neighborhood social environments", *Neighborhoods and Health*, pp. 112-131.
- Raudenbush, S.W. and Sampson, R.J. (1999), "Ecometrics: toward a science of assessing ecological settings, with application to the systematic social observation of neighborhoods", *Sociological Methodology*, Vol. 29 No. 1, pp. 1-41.

- Rusjan, B. (2005), "Usefulness of the EFQM excellence model: theoretical explanation of some conceptual and methodological issues", *Total Quality Management and Business Excellence*, Vol. 16 No. 3, pp. 363-380.
- Samson, D. and Terziovski, M. (1999), "The relationship between total quality management practices and operational performance", *Journal of Operations Management*, Vol. 17 No. 4, pp. 393-409.
- Shaw, C.D. (2000), "External quality mechanisms for health care: summary of the ExPeRT project on visitatie, accreditation, EFQM and ISO assessment in European Union countries", *International Journal for Quality in Health Care*, Vol. 12 No. 3, pp. 169-175.
- Shortell, S.M., Jones, R.H., Rademaker, A.W., Gillies, R.R., Dranove, D.S., Hughes, E.F.X., Budetti, P.P., Reynolds, K.S.E. and Huang, C.-F. (2000), "Assessing the impact of total quality management and organizational culture on multiple outcomes of care for coronary artery bypass graft surgery patients", *Medical Care*, Vol. 38 No. 2, pp. 207-217.
- Sousa, R. and Voss, C.A. (2002), "Quality management re-visited: a reflective review and agenda for future research", *Journal of Operations Management*, Vol. 20 No. 1, pp. 91-109.
- Spector, P.E. (1992), *Summated Rating Scale Construction: An Introduction*, Sage.
- Striem, J., Øvretveit, J. and Brommels, M. (2003), "Is health care a special challenge to quality management? Insights from the Danderyd hospital case", *Quality Management in Healthcare*, Vol. 12 No. 4, pp. 250-258.
- Suárez, E., Roldán, J.L. and Calvo-Mora, A. (2014), "A structural analysis of the EFQM model: an assessment of the mediating role of process management", *Journal of Business Economics and Management*, Vol. 15 No. 5, pp. 862-885.
- Sun, H. (1999), "Diffusion and contribution of total quality management: an empirical study in Norway", *Total Quality Management*, Vol. 10 No. 6, pp. 901-914.
- Talib, F., Rahman, Z. and Azam, M. (2011), "Best practices of total quality management implementation in health care settings", *Health Marketing Quarterly*, Vol. 28 No. 3, pp. 232-252.
- Terziovski, M., Samson, D. and Dow, D. (1997), "The business value of quality management systems certification – evidence from Australia and New Zealand", *Journal of Operations Management*, Vol. 15 No. 1, pp. 1-18.
- Twisk, J.W.R. (2006), *Applied Multilevel Analysis: A Practical Guide*, Cambridge University Press, Cambridge.
- Vallejo, P., Ruiz-Sancho, A., Domínguez, M., Ayuso, M.J., Méndez, L., Romo, J., Ontoria, L., Rodríguez, P., Serriñá, C. and Arango, C. (2007), "Improving quality at the hospital psychiatric ward level through the use of the EFQM model", *International Journal for Quality in Health Care*, Vol. 19 No. 2, pp. 74-79.
- Van Der Wiele, A., Williams, A.R.T. and Dale, B.G. (2000), "ISO 9000 series registration to business excellence: the migratory path", *Business Process Management Journal*, Vol. 6 No. 5, pp. 417-427.
- Van Rooyen, M.J., Grabowski, J.G., Ghidorzi, A.J., Dey, C. and Strange, G.R. (1999), "The perceived effectiveness of total quality management as a tool for quality improvement in emergency medicine", *Academic Emergency Medicine*, Vol. 6 No. 8, pp. 811-816.
- Van Schoten, S.M., Groenewegen, P.P. and Wagner, C. (2013), "De ontwikkeling van kwaliteitssystemen in Nederlandse ziekenhuizen tussen 1995 en 2011", *Tijdschrift voor gezondheidswetenschappen*, Vol. 91 No. 8, pp. 489-496.
- Wagner, C., De Bakker, D.H. and Groenewegen, P.P. (1999), "A measuring instrument for evaluation of quality systems", *International Journal for Quality in Health Care*, Vol. 11 No. 2, pp. 119-130.
- Wruck, K.H. and Jensen, M.C. (1994), "Science, specific knowledge, and total quality management", *Journal of Accounting and Economics*, Vol. 18 No. 3, pp. 247-287.

Appendix. Questionnaire

This appendix contains the items that were used to measure the various enabler criteria and result criteria of the EFQM Model.

EFQM
Model as
a framework
for TQM

921

Item	1995	2000	2005	2007	2011
<i>Enabler criteria</i>					
Leadership					
Management indicate what is expected from staff with regard to quality policy of the hospital	X	X	X	X	X
Management assess whether staff adhere to agreements made with regard to the quality policy of the hospital	X	X	X	X	X
Management monitor the execution of unit working plans	X	X	X	X	X
Policy and strategy					
Quality policy document: a description of the aims of quality assurance, the desired level of care delivery and the ways of the organization for achieving these goals	X	X	X	X	X
Quality action plan for the entire organization: written document with measures for implementation and planning of action to realize quality goals	X	X	X	X	X
Annual quality report, or quality section in the annual general report: a justification and the results of all activities that have been carried out within the framework of quality policy	X	X	X	X	X
Written description of the mission: the basic principles and vision of the organization	X	X	X	X	X
Quality manual: a description of all quality management procedures and of the people responsible for maintaining them	X	X	X	X	X
Product descriptions: detailed description of the care for various patient populations	X	X	X	X	X
Quality action plan for some departments	X	X	X	X	X
Quality action plan for every department	X	X	X	X	X
Written safety management plan					X
Human resources					
Professionals are encouraged to develop in their profession	X	X	X	X	X
Staff receive systematic feedback on the results of the treatment of patients	X	X	X	X	X
Professionals are encouraged to report incidents and adverse events			X	X	X
New staff are trained in quality improvement methods	X	X	X	X	X
New staff are trained in adherence to guidelines/protocols			X	X	X
Training/education of staff	X	X	X	X	X
Training/education of management	X	X	X	X	X
Staff can participate in quality improvement activities during working hours	X	X	X	X	X
Staff receive systematic feedback on adherence to guidelines/protocols			X	X	X
Staff receive systematic feedback on incident reports			X	X	X
Selection of new staff with a positive attitude to quality improvement	X	X	X	X	X
Resources					
A specific internal budget is reserved for quality improvement	X	X	X		X
One or more steering groups or quality committees have been established	X	X	X		X

Table AI.
Items used per year
of measurement

(continued)

Item	1995	2000	2005	2007	2011
One or more quality and safety officers/coordinators have been appointed	X	X	X		X
Support by (external) consultants	X	X	X		X
Process control					
Prophylactic use of antibiotics		X	X	X	X
Preoperative screening			X	X	X
Blood transfusion policy			X	X	X
Prevention of central line infection			X	X	X
Prevention of pressure ulcers			X	X	X
Prevention of falls					X
Prevention of medication errors					X
Standards for specific treatments/interventions	X	X	X	X	X
Standards for patient education	X	X	X	X	X
Standards for the use of medical aids (e.g. crutches, bandages, etc.)	X	X	X	X	X
Standards for critical moments in service provision	X	X	X	X	X
Standards for specific target groups and diagnoses	X	X	X	X	X
Standards for patient routing from intake to discharge	X	X	X	X	X
Standards for cooperation with other organizations	X	X	X	X	X
<i>Results criteria (perceived)</i>					
Professionals					
Increased staff satisfaction	X	X	X	X	X
More motivation among staff	X	X	X	X	X
Staff have opportunities to develop further			X	X	X
A culture of continuous learning has emerged			X	X	X
More flexibility among staff	X	X	X	X	X
Customers (patients)					
Increased patient satisfaction		X	X	X	X
Improved patient orientation	X	X	X	X	X
Society					
Improved public relations of the unit/hospital	X	X	X	X	X
Increased satisfaction of referring professionals	X	X	X	X	X
Improved competitive position			X	X	X
Results (clinical outcomes and costs)					
Cost savings in own hospital	X	X	X	X	X
Cost savings not in own hospital		X	X	X	X
Increasing productivity		X	X	X	X
Better risk management					X
Improved care processes		X	X	X	X
Improvements in patient safety			X	X	X
Improved clinical outcomes		X	X	X	X
Hospital more manageable	X	X	X	X	X

Table AI.

Note: X, this item was asked in the questionnaire in that particular year

Corresponding author

Steffie van Schoten can be contacted at: s.vanschoten@nivel.nl

For instructions on how to order reprints of this article, please visit our website:

www.emeraldgroupublishing.com/licensing/reprints.htm

Or contact us for further details: permissions@emeraldinsight.com