

## Application of the EFQM Model in the Healthcare Sector: Analysis and Practical Implications

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**Abstract:** In an increasingly complex and relevant context such as the healthcare sector, the adoption of the EFQM Model (European Foundation for Quality Management) emerges as a valid strategy to enhance the quality of services offered and ensure patient satisfaction. This study explores the implementation of the EFQM Model, analyzing a wide range of data collected from hospitals and healthcare facilities. Through a deep analysis, also conducted using Artificial Intelligence (AI) tools, it is examined whether there is a common trend in the adoption and effectiveness of the EFQM model in improving the performance and efficiency of healthcare organizations. The aim of this paper is to understand whether a common pattern exists among various participating structures and to determine the tangible impacts resulting from the implementation of the EFQM Model. Additionally, it seeks to investigate how specific characteristics of the healthcare context, such as procedure complexity, facility size, and service variety, influence the effectiveness of the EFQM Model. The observations gathered through this study provide a useful perspective for healthcare policy makers committed to the continuous improvement of medical services.

**Keywords:** EFQM Model, Healthcare Sector, Quality Improvement, Common Trend, Artificial Intelligence.

### 1. Introduction

The healthcare sector has always held significant importance, providing essential services for personal care. The COVID-19 pandemic has severely tested healthcare organizations, highlighting the importance of having well-organized and efficient structures to address not only daily needs but also to manage emergencies in the best possible way. Having performance benchmarks, leading transformation programs, understanding organizational maturity, managing risks by building resilience, and striving for continuous improvement are just a few of the alternative uses of the EFQM model that have been and continue to be implemented. The use of this tool in the healthcare sector can be extremely important for improving the quality of services offered, aiming to provide patients with the best possible care. For all these reasons, having a systemic approach is crucial for guiding the whole organization toward better results.

The concept of quality has always been considered over time in multiple fields, undergoing various evolutions that have increased its importance. In the current landscape, where innovation and competitiveness are central, the pursuit of quality and excellence has become imperative for all types of organizations. In this context, the EFQM (European Foundation for Quality Management) Model has emerged as a fundamental tool for guiding organizations towards sustainable success through quality and performance management.

In Japan, a philosophy known as TQM (Total Quality Management) was born, (Talha, 2004) and the importance attributed to the concept of Quality led to the creation of

the “Deming Prize” (Baila, 1996), established in 1951 in honor of W. Edwards Deming, a famous statistician and quality guru. Subsequently, the United States developed its award (Wan, 2021), known as the MBNQA (Malcolm Baldrige National Quality Award), and finally, Europe caught up with the development of the EFQM model. During the creation period of the EFQM model, attention in Europe was focused on the ISO 9001 (Boiral, 2012), a family of standards focused on system quality rather than product quality. The ISO 9001 standards were first issued in 1987 as a copy of BS5750 (Patel, 1994) and were linked to the concept of “quality assurance”. Over time, several modifications were made and in 2015, a risk-based approach was introduced. Europe attached great importance to this standard, exponentially increasing the number of certifications. For this reason, there were numerous studies and research conducted on this family of standards, generating controversies. According to some, it is only regulatory pressure and customer requirements, while according to others, there is a real commitment by the organizations (Anderson, 1999). The question that many have asked is whether the ISO 9001 standard can indeed be a first step for organizations towards TQM. Gotzamani, Katerina D., and George D. Tsiotras have pondered this dilemma, providing some critical answers (Gotzamani, 2001). The EFQM model represents a further step beyond the ISO 9001 standard, where the concept of excellence becomes central. The key concept is “do things right” and “do the right things”, only in this way the company will reach the excellence. Excellent organizations base their mission and vision on a stakeholder-oriented strategy. Policies, programs,

objectives, and processes are created to implement the strategy (KalDer, 2006), (KalDer, 2010).

The objective of the following study is to conduct an in-depth analysis on a sample of healthcare facilities to understand if there is a common trend in the adoption and effectiveness of the EFQM model within organizations considered. We will seek to highlight if there are relevant results among the various participating, employing also Artificial Intelligence techniques to facilitate our analysis. Moreover, the research will be conducted using statistical analysis.

## 2.Literature review

In recent decades, the European Foundation for Quality Management (EFQM) has been a fundamental reference point for organizations pursuing Excellence in performance and Quality Management. In the healthcare context, the implementation of the EFQM model has emerged as a key strategy to improve the quality of care, optimize resources, and promote a patient-oriented organizational culture. This literature review section will explore the application of the EFQM model in medical services, examining studies and practical experiences that have highlighted the benefits, challenges and best practices associated with this approach. Over time, many researchers have studied the relationship between quality improvement and improvements in clinical outcomes, patient and physician satisfaction, and concurrent cost reduction (Kenagy, 1999). In the study conducted by (DM, 1989), it became evident that quality improvement is a pivotal objective within the nuanced landscape of healthcare, with active staff engagement emerging as a critical determinant. For this reason, many healthcare facilities have implemented a quality management system to improve efficiency and services.

In the study by Moller J, Sonntag HG (Moller J, 1998), four leading German healthcare organizations were evaluated, which began assessing and documenting their progress relative to the EFQM model for organizational excellence. The study conducted by Yousefinezhadi, Taraneh et al. (Yousefinezhadi, 2015) offers a systematic review about the application of the EFQM model compared to the ISO 9001 family of standards. They examined the databases of PubMed, Embase through Scopus, and Cochrane Library, Elsevier and Springer until 2013. The result showed that the use of the EFQM model and ISO 9001 in hospitals was associated with improvement, but solid empirical evidence of high quality is lacking.

There are also more recent reviews, such as that of Kamal and Eman (Kamal, 2023), where a bibliographic search was conducted using the PubMed, SCOPUS, and CINAHL databases. This study revealed an impact on performance improvement. However, long-term continuity is key to achieving change.

The EFQM model has played a significant role in guiding organizations toward excellence in performance and quality management, particularly within the healthcare sector. Through the implementation of the EFQM model,

healthcare organizations have aimed to enhance the quality of care, optimize resources, and foster a patient-centered organizational culture.

## 3.EFQM model

The EFQM model comprises three main components: Direction (why), Execution (how), and Results (what). Direction encompasses purpose, vision, strategy, culture, and leadership. Execution involves engaging stakeholders, creating sustainable value, and driving performance and transformation. Results encompass stakeholder perceptions, strategic, and operational performance. The organizational context or ecosystem significantly influences the organization, shaping its direction, execution, and results. Excellent organizations establish a clear purpose, vision, and strategy. Culture and leadership must align with the strategy to ensure its effectiveness. Purpose serves as a bold statement of the organization's reason for existence and its business focus, emphasizing its outward impact. Organizational culture represents the shared values and practices within the organization, while organizational leadership focuses on guiding the entire organization rather than individual roles. Engaging stakeholders is central to the model, necessitating different approaches based on stakeholder categories. To create sustainable value, organizations must design, communicate, produce, and deliver value while ensuring an overall positive experience. Successful organizations must concurrently manage current operations and navigate continuous internal and external changes to sustain success. Driving both performance and transformation entails preparing for the future while ensuring current operational success. Elements such as innovation, technology, data, information, knowledge, and resource utilization are important for achieving performance and transformation. An excellent organization evaluates its success in implementing its strategy to meet stakeholder needs and uses past and present performance analyses to predict future outcomes. Stakeholder perception results are crucial for guiding strategy implementation and overall performance improvement, enabling organizations to anticipate the impact on stakeholder perceptions and future strategic goals. Excellence Model is based on the idea that customer satisfaction, employee and positive impact on society together contribute to excellent business results (Westlund, 2001).

### Radar

The radar is the assessment tool used in the model, and there are 3 types aimed at evaluating: Direction, Implementation, and Results. To apply Radar logic, an organization must (McCarthy, 2002):

- Determine the **Results** it is aiming to achieve as part of its strategy.
- Have in place a number of **Approaches** that will deliver the required results, both now and in the future.
- **Deploy** these approaches appropriately.

- Assess and Refine the deployed approaches to learn and improve.

In this section, we will not focus on the detailed presentation of this tool to make room for the presentation of the case study. However, there are several interesting studies on the subject (Bukvič, 2023), (Bolboli, 2015), (Westlund, 2001).

### 4.EFQM in healthcare sector

The healthcare sector is characterized by a complex network of organizations, including hospitals, clinics, outpatient facilities, and long-term care services. The primary goal of these organizations is to provide high-quality care that is safe, effective, and patient-centered. However, the sector faces unique challenges related to resource constraints, increasing demand for services, and the need to adapt to rapid changes in clinical practice and medical technologies. One of the strengths of the EFQM model lies in its broad applicability, as it can be implemented in any type of organization. While originally developed for the for-profit sector, the EFQM model is now also applied in non-profit sectors such as healthcare (Nabitz, 2000), (Moeller, 2001).

In a context where resources are limited and demand is high, adopting the EFQM model can provide healthcare entities with the necessary tools to optimize operational efficiency, improve patient satisfaction, and achieve better clinical outcomes. However, implementing this model requires a targeted approach that takes into account the specificities and unique needs of healthcare organizations. Just like any other organization, healthcare entities must address key concepts such as leadership, policy, and strategy. However, this alone is not sufficient. Indeed, only through a holistic approach based on all criteria of the model, healthcare organizations can improve their performance levels by meeting or exceeding the expectations of key stakeholders (EFQM, 2003). In this specific context, this translates to an enhancement in the care provided and the ability to expand healthcare offerings. Many of the main controversies in this sector concern cost management and competition among different providers, which has led to the use of a formal approach to evaluating the organization itself. However, in many cases, healthcare facilities rather than strictly applying the EFQM model, prefer to experiment and implement their own tools in line.

### 5.Case study

The aim of the case study is to assess the outcomes achieved by healthcare facilities by identifying any common features among them. Utilizing the dataset, assessment documents will be analyzed using various techniques, including Artificial Intelligence.

In particular, the dataset used was provided by Healthcare Research and contains the assessment documents about 63 public and private healthcare facilities. The

organizations started to apply the EFQM model by conducting a self-assessment and identifying strengths and weaknesses for each criterion, which were reported in the management documents. The management documents contain a detailed analysis that reflects the organization's adherence to the EFQM model criteria.

This led them to the feedback report, which includes the information shown below. From these results, a list of strengths and areas for improvement is generated.

The facilities were selected for the study because they are part of the healthcare sector and all are in Europe, specifically in Spain.

#### PURPOSE, VISION & STRATEGY:

- 1.1: Define purpose and strategy;
- 1.2: Identify and understand stakeholders needs;
- 1.3: Understand the ecosystem, one's own capabilities and the main challenges;
- 1.4 Develop the strategy;
- 1.5: Define and implement a governance and performance management system;

#### ORGANISATIONAL CULTURE & LEADERSHIP:

- 2.1: Steer the Organisation's Culture & Nurture Values
- 2.2: Create the Conditions for Realising Change
- 2.3: Enable Creativity & Innovation
- 2.4: Unite Behind & Engage in Purpose, Vision & Strategy

#### ENGAGING STAKEHOLDERS:

- 3.1: Customers - Build Sustainable Relationships
- 3.2: People – Attract, Engage, Develop & Retain
- 3.3: Business & Governing Stakeholders – Secure & Sustain Ongoing Support
- 3.4: Society - Contribute to Development, Well-Being & Prosperity
- 3.5: Partners & Suppliers – Build Relationships & Ensure Support for Creating Sustainable Value

#### CREATING SUSTAINABLE VALUE:

- 4.1: Design the Value & How it is Created
- 4.2: Communicate & Sell the Value
- 4.3: Deliver the Value
- 4.4: Define & Implement the Overall Experience

#### DRIVING PERFORMANCE & TRANSFORMATION:

- 5.1: Drive Performance & Manage Risk
- 5.2: Transform the Organisation for the Future
- 5.3: Drive Innovation & Utilise Technology
- 5.4: Leverage Data, Information & Knowledge
- 5.5: Manage Assets & Resources

#### STAKEHOLDER PERCEPTIONS:

- 6.1: Customer Perception Results
- 6.2: People Perception Results
- 6.3: Business & Governing Stakeholder Perception Results
- 6.4: Society Perception Results
- 6.5: Partner & Supplier Perception Results

**STRATEGIC & OPERATIONAL PERFORMANCE:**  
 All criteria have an associated weight of 1, except for “creating sustainable value”, “stakeholder perceptions” and “strategic & operational performance” which have a weight of 2.

### 5.1 Methodology

The analysis methodology followed several steps:

**Descriptive Analysis:** a descriptive analysis was conducted to evaluate the average scores of the sample across different criteria, assessing the variation between the maximum and minimum values for each criterion and identifying significantly relevant differences between the various classes to pinpoint those that perform best and worst.

**Comparative Analysis:** subsequently, a comparative study with other research was conducted, specifically comparing the scores obtained by European healthcare organizations over time.

**Principal Component Analysis (PCA):** this analysis was utilized to reduce dimensionality, transforming a set of correlated variables into a smaller set of uncorrelated and more significant variables for clustering.

**Clustering:** following the PCA, clustering was performed to highlight groups with similar performance and identify any common patterns.

**Regression:** A regression analysis was conducted to predict patient perception based on other variables. This criterion was chosen as the dependent variable because, in healthcare settings, the central focus is on patient care and satisfaction. Identifying which factors among the various EFQM criteria significantly impact patients’ satisfaction is extremely important in this kind context. This can help organizations focus their efforts and resources on areas that most improve patient perception and experience.

**Natural Language Processing Analysis:** large language model and Transformer architecture (BERT) were used for natural language processing analysis, seeking common patterns.

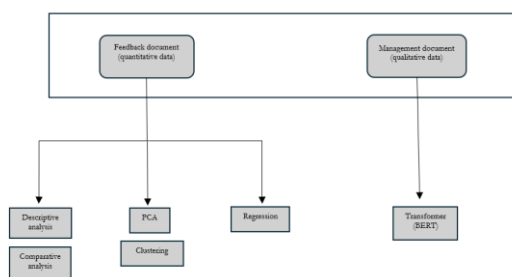


Figure 1: Methodology of analysis

## 6. Results

### 6.1 Descriptive analysis

The graphs depict the average scores obtained by the examined organizations for each criterion. Specifically, more than 50% of the organizations achieved a total score below 550 out of 1000 possible points. The scores across different criteria show similar variability, with a sample standard deviation for each class ranging from 10.7 to 12.7. While the average results for each criterion do not show significant deviations, the lowest value was obtained in the stakeholder perceptions category, at 43.35, whereas the highest value was in the “creating sustainable value” criterion, with an average score of 52.46.

A low score in the stakeholder perceptions category provides a crucial opportunity for improvement, as this criterion focuses on outcomes derived from Key Stakeholders’ feedback regarding their personal experiences with the organization. In addition to perceptions that Key Stakeholders may have from direct interactions with the organization, other perceptions can arise based on the organization’s reputation, including its environmental and social impact.

Later, we will investigate through regression analysis which are the key criteria impacting stakeholder perceptions, in order to indirectly influence these and improve it. An excellent organization recognizes that the needs of Key Stakeholders can evolve over time and that it is important to gather and analyze feedback to improve or change its products, services, or solutions.

Conversely, a higher value was observed in creating sustainable value; a clear definition of the organization’s purpose, enriched by its strategy, determines for whom the organization is tasked with creating Sustainable Value. In most cases, appropriately segmented customers are the target group for Sustainable Value Creation; in this case, it concerns patients, hence it’s important for them to have positive perceptions.

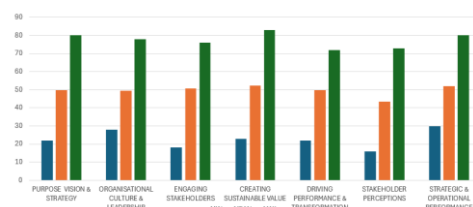


Figure 2: min, mean and max (not weighted)

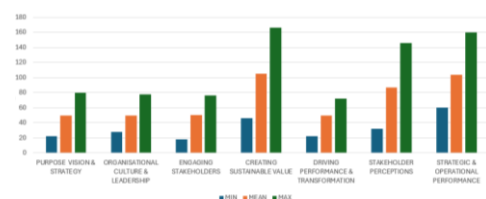


Figure 3: min, mean and max (not weighted)

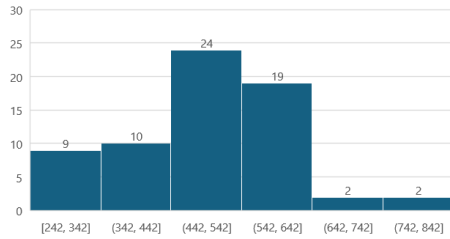


Figure 4: range of total points

## 6.2 Comparative analysis

Comparing the results obtained from the analysed healthcare facilities with other healthcare facilities reported in studies conducted over time, it has emerged that the EFQM model has had a significant but variable impact. Specifically, in the healthcare sector, the EFQM model has gradually gained traction, showing a trend of improvement in assessment scores over the years.

The study of Nabitz (U Nabitz, 2000) shows the results of the Jellinek Centre in Amsterdam, where the assessment scores were converted into an overall score of 510 on a scale ranging from 0 to 1000. Whenever the points are between 450 and 650, the EFQM approach organization is proposed to the jury for consideration for the Dutch Prize.

The research conducted by Sonntag (Sonntag, 2001), out of 17 analyzed facilities in the European context, none exceeded a total score of 450 points, with average scores being lower.

The study of Favaretti (C Favaretti, 2015) about Trento healthcare in Italy, was conducted from 2001 to 2008 and reported positive self-assessments scores over time. In 2001, the average score obtained for all criteria was 290 (on a 0-1,000 scale), such a rating was similar to self-assessed scores elsewhere in Europe. The 2003 and 2005 self-assessments revealed an average 470 score. The 2007 assessment led to a 590-point rating for nine criteria and a score lower than 550 was achieved only for three criteria. Subsequently, the score was 610 points in 2008.

More recent studies, such as “Use of the EFQM Excellence Model to Improve Hospital Pharmacy Performance” conducted by (Carmen Guadalupe Rodríguez-González a, 2020) show scores for each criterion never exceeding 60, but nevertheless a growth trend over the years. The external assessment scores exceeded 300 points in 2010, 400 points in 2013, and 500 points in 2017. Scores for all of the criteria progressively improved, particularly in ‘people’.

## 6.3 PCA and Clustering analysis

The Principal Component Analysis (PCA) (Maćkiewicz, 1993) is conducted as a precursor to the clustering process. Subsequently, clusters were formed using PC1 from a prior PCA, which was conducted on the first 6

variables (main criteria except stakeholder perceptions) and stakeholder perceptions as the second variable.

The choice to use stakeholder perceptions as the second principal component is motivated by the fact that the healthcare facilities under study showed a lower score in this criterion. Since these are organizations focused on patient care, it was decided to assign greater importance to this criterion in the research.

To determine the ideal number of clusters, the Elbow Method (Marutho, 2018), was used, which suggested a number of groups equal to 3. Following the PCA and the Elbow Method, the clusters depicted in Figure 5 were obtained.

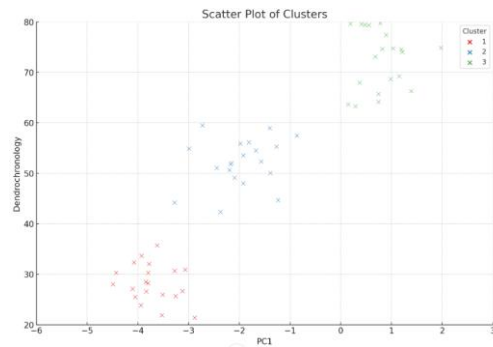


Figure 5: results of cluster analysis

Through the subsequent natural language analysis, the documents provided by healthcare organizations were analyzed to identify any patterns among the clusters.

## 6.4 Regression

It is employed regression analysis to explore the factors influencing stakeholders’ perceptions, in particular patient satisfaction within healthcare organizations. The model yielded valuable insights into how various aspects of organizational excellence impact patient perceptions.

Our findings indicate that several key factors significantly influence patient satisfaction scores. Notably, creating conditions to achieve change positively impacts stakeholder perception (p-value 0.02). This demonstrates that organizational culture and good leadership are important factors that affect not only patient perception but also beyond. Having these factors is therefore not only important for good organizational management but also has a direct impact on patient perceptions.

Strategic and operational performance also positively influences patient perception (p-value 0.05). The organization uses these results to monitor, understand, and improve its overall performance and to predict the impact that such performance will have on both the perceptions of Key Stakeholders and its future strategic ambitions.

It is therefore important to understand the links between the perceptions of Key Stakeholders and current performance, aiming to predict with a high degree of certainty how future performance will evolve, considering

the present and future needs and expectations of its Key Stakeholders.

Creating conditions to achieve change is another factor that positively impacts stakeholder perception (p-value 0.012). It is essential for improving stakeholder perception of results. Visionary leadership and a culture of innovation are crucial for promoting effective change. Flexible structures and processes enable the organization to quickly adapt to new demands. During global events such as the SARS COVID-19 pandemic, this was extremely evident. This approach increases trust, improves reputation and fosters stakeholder engagement.

The results indicate that the model has good predictive ability, with a strong correlation between the predicted and actual variables and low mean absolute error and root mean squared error. However, it is important to note that the relative error and root relative squared error are relatively high, which may indicate that the model is not always accurate in its predictions.

### 6.5 Natural Language Processing

During the analysis of qualitative data no predominance has emerged regarding public or private entities within the various clusters or between each cluster. Additionally, no particular prevalence has emerged in terms of specific services offered, such as psychiatric care, rehabilitation services, pharma, hospital or general clinics in clusters 2 and 3. As for cluster 1, one of the emerging features concerns the pharmaceutical sector, highlighting a predominance of structures specialized in this area within the group.

As for clusters 2 and 3, rather similar themes have emerged concerning innovation, management, and administration, with a high frequency. The findings suggest that through continuous innovation, but especially through proper management and administration policies, it is easier for healthcare organizations to maintain high standards and stakeholder satisfaction.

The structures demonstrate a strong strategic clarity and customer orientation, with competent and committed personnel. However, they share the need to increase agility, improve the use of information and data, systematize innovation, and more effectively measure improvement actions and sustainability.

### 7. Conclusion

In conclusion, this case study aimed to assess the outcomes achieved by healthcare facilities through a comprehensive analysis of assessment documents, employing various techniques including Artificial Intelligence. The absence of predominance in public or private entities within clusters suggests a diverse representation across healthcare sectors. Moreover, the emergence of similar themes regarding innovation and management in clusters 2 and 3 underscores the importance of continuous improvement strategies. In

addition, performing well in the other criteria previously mentioned also entails high stakeholder satisfaction.

Moving forward, future research could delve deeper into understanding the predictive capacity of stakeholder perceptions based on other criteria, leveraging advanced Machine Learning algorithms. Despite the promising results indicating strong predictive ability, further refinement of the model is necessary to enhance accuracy and reliability. Additionally, exploring the implications of these findings on organizational strategies for maintaining high standards and stakeholder satisfaction would be valuable for healthcare management and policy development.

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