# Soft-Hard TQM factors and key business results.

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*Abstract:* - The purpose of this paper is to investigate, firstly, the existence of soft and hard TQM factors in the EFQM excellence model and, secondly, their impact on key business results .The EFQM model has been used as a framework model as it is the TQM implementation referent that is most widespread and accepted in the specialized literature. The methodology used is factorial analysis to determine the existence of the soft and hard TQM factors in the EFQM model and regression analysis to establish the impact of the factors identified on the business' key results. A sample of 116 firms have been subjected to complete assessment processes (self-assessment and external assessment) according to the EFQM model. The article suggests that (1) the factorial analysis groups together the EFQM's five facilitating agents' criteria in three factors: soft factors, the strategic management of partnership and resources and processes management; (2) the regression techniques point out the influence of the hard factors (the strategic management of partnership and resources, and processes management) on the key business results and it is noted that the influence of the soft factors on the results is produced through the mediation of the hard factors of TQM.

*Key-Words:* - TQM, soft factors, hard factors, EFQM, key results, performance.

## 1 Introduction

Much research has clearly shown how the principles and practices of total quality management (TQM) can be a reference for organizations to improve their management and business results. These principles and practices have been named the key TQM factors and are frequently classified as soft or hard factors [7, 37, 33]. However, as Black & Porter [6] point out, the distinctions between soft and hard factors are in many instances difficult to determine.

It should be stressed that a framework, or reference model, is needed to implement TQM and put it into practice. In this sense, excellence models offer the appropriate framework for the implementation of TQM [23, 17, 30, 11, 32].

The most widespread excellence models are the Deming Price in Japan, the Malcolm Baldrige National Quality Award (MBNQA) in the U.S.A., the European Foundation for Quality Management (EFQM) in Europe, the Ibero-American Management Excellence Model in Latin America and the Australian Quality Award in Oceania. These models have very similar concepts and evaluation criteria [4]. Their main differences are to be found in the considerations that they grant to the criteria in the evaluation areas or in the application framework. This is because each model tries to adapt itself to the special features of each socio-cultural and economic reference context [44].

The research that has studied the EFQM model has centered on its internal structure [10, 9] or on the benefits for organizations that arise from applying the TQM principles and practices that the model includes [17, 8]. However, there is little research that tries to go more deeply into which are the key factors that influence business results to a greater extent.

In this context, the aims of this work are: (1) to identify the soft and hard factors of the TQM that are found in the EFQM model, and (2) to determine which of them influence the key business results more.

To achieve its aims this work begins with a review of the literature on TQM critical factors and the EFQM model. It then sets out the research model (EFQM model) and the hypotheses. To verify the hypotheses, exploratory factorial analysis and regression analysis

are used, with a sample of 116 private firms that have submitted themselves to assessment processes approved by experts in EFQM model.

# 2 Literature review

## 2.1 EFQM Excellence model

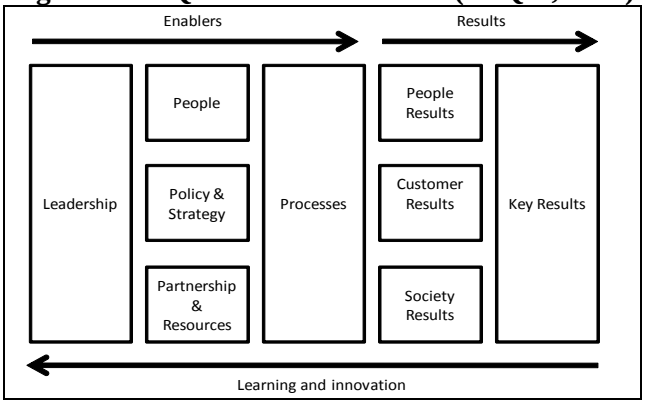
The EFQM Excellence Model is now the most widely used organizational framework in Europe and it has become the basis for the majority of national and regional Quality Awards [31]. The EFQM presents a non-prescriptive framework that analyses the relations between what an organization does and the results that it is able to attain. It is assumed that there are different approaches to achieving excellence [23]. The EFQM Excellence Model is not a standard, it does not tell you what to do.

The aim of the EFQM model is to support organizations in the achieving of business excellence through continuous improvement, learning, innovation and the deployment of key processes. Furthermore, it is a basis for the use of a language and a way of thinking that is common in European organizations.

The criteria that the model proposes represent the elements that indicate the degree of progression which a specific organization follows in order to achieve excellence. These criteria, or dimensions, are set in five key implementation factors or facilitating agents (what the organization "does and how it does it"). The four remaining dimensions reflect the results that the organization attains (Figure 1). These concern their clients, employees, society and other key results (EFQM, 2003).

The logic of the model is based on the fact that the obtaining of excellent results in the four former management areas (customers, employees, society and strategy) are directly related to the leadership capacity, the strategy quality and its deployment through people, partners, resources and processes (EFQM, 2003).

**Figure 1: EFQM Excellence Model (EFQM, 2003)**




As can be noted in Figure 1, the direction of the arrows shows the model's dynamic nature. It indicates that activities such as innovation, learning or creativity boost and empower the impact that the model's agents have on the results. This refers to the system's continuous improvement in the search for excellence.

For all of these reasons, the EFQM model presents a complete, operative and useful framework as a reference for the effective implementation of the TQM philosophy in any type of organization [39]. This is done by including general principles (fundamental concepts of excellence) concerning which the key factors of the model's implementation and the results (criteria) that we must expect from the model's correct implementation are upheld [18]. There is also a series of management tools [43] that the organizations can use as a reference according to their needs (indicative elements).

The EFQM model's internal structure reflects the integral character of the TQM's initiatives and considers the interrelationships both in the agent criteria and the criteria results. The correlations that exist between the agent criteria allow a correct design, implementation and development of them that leads to the optimization of the results [9].

Thus, the key implementation factors cover people, processes, structures and means that the organization can use to manage quality [44]. These activities are not independent, that is to say, they must be applied jointly and coordinately with the aim of achieving excellent results [10, 19].

Finally, the model presents a systemic nature as it spans management activities that refer to an organization's main inputs (material resources of different types, people, objects or values); processes (management strategies and practices) and outputs (products , services or results). Nor is the influence of environmental factors forgotten, such as customers, competitors, suppliers, the sector, the operations area or the organization's social impact [16, 42].

## 2.2 Soft and hard TQM factors

In the last two decades there has been a growing interest in TQM as a strategy able to offer firms a competitive advantage and it continues to have a profound impact on business strategies today. This fact has led to numerous contributions about the concept, the dimensions and the impact of TQM on results.

TQM is an integral management philosophy that is characterized by establishing principles or basic concepts and practices that lay the foundation for a continuous management improvement. This is done in

such a way that the firm increases its possibilities of survival. In the medium and long term it will be able to achieve an improvement in its results and performance.

Researchers have classified TQM's principles and practices into two large groups: the social aspects or soft factors and the technical aspects or hard factors [37, 33].

The difference between both groups of factors is at times difficult to determine [6]. There is not a clear consensus concerning their content. This is due to some factors being regarded as soft by some authors and hard by others. Likewise, specific aspects can contain both soft and hard aspects [44].

Soft factors of TQM are related to behavioral aspects and generally deal with human resource aspects [33, 21]. Aspects that are specifically included within this group are leadership, human resources, customer focus, top management commitment, employee involvement, workforce commitment, shared vision, personnel training, employee empowerment, corporate quality culture, and teamwork [6, 37, 33, 21].

Hard factors of TQM are concerned with strategy, systems, management tools and processes that are necessary to support the implementation of soft factors [7, 21, 44]. In most cases, they deal with benchmarking, flexibility, quality systems, quality assurance, use just-in-time, zero defect, continuous improvement and innovation, strategic quality management, information and performance measurement, process management, process improvement, strategic planning, process control, product or service design [6, 26, 28, 37, 33, 21, 44].

If we analyze the different works relating to the critical factors, we find two major perspectives. On the one hand, there are works which classify the "soft" factors as social and behavioral aspects and "hard" factors as aspects related to the technical part of the quality management system (QMS) [7, 41, 26, 36].

A second trend considers the "soft" factors as those that represent the general principles and that must direct the TQM, and the "hard" factors as those represented by the techniques of tools that support decision making, guide the implementation of the TQM principles in practise and facilitate the system's continuous improvement [27, 29, 33, 21].

In this sense, the EFQM model's characteristics, as well as the content and meaning of the facilitating agents that represent the way of managing the organization, make these adjust better to the first of the classifications of the TQM's "soft" and "hard" factors. That is to say, that which distinguishes between social and behavioral aspects compared to the technical factors of the QMS.

### 2.3 Soft, hard factors and performance

The application of the key or critical TQM factors cannot be carried out separately. These are related to each other and produce synergies between each other that reflect the TQM initiatives' global character. This holistic character spreads to the foreseeable results. That is to say, when defining the TQM practices, what the aims and the needs of the different groups of interest are must be taken into account.

The literature suggests that the optimum management of the key TQM factors will lead to an improvement in the results. To appreciate the effects of TQM on the results, the management system must be mature and consolidated. That is to say, the effects of TQM on the results is produced and appreciated in the medium and long term.

Although there are studies that analyze the influence of TQM on results [14, 3], few centre on pointing out the role of soft and hard aspects of TQM on results or performance. In general, the literature indicates that the soft factors of TQM are the strongest predictors of organizational performance [28]. Most works are centered on the study of this relationship. Abdullah et al. [1], for example, analyzed the influence of some soft factors on organizational performance. The influence of three of them turned out to be important: management commitment, customer focus and employee involvement.

Rahman & Bullock [37] found a positive influence of some hard TQM elements on performance: use just-in-time, processes management, technology utilization and continuous improvement. Moreover, these authors point out that there is not a direct impact of the soft and hard factors on performance. Rather, there is also an indirect influence of the soft TQM elements on performance through the hard TQM elements. In any case, as Rahman & Bullock indicate [37], the soft TQM elements must support the influence of the hard aspects on performance.

From what has been put forward, we can state that:

*H1: Soft factors are positively related to the organization's key results.*

*H2: Hard factors are positively related to the organization's key results.*

## 3 Methodology and analysis of results

### 3.1 Sample

The data has been obtained from the assessment process of 116 private Spanish firms from the year 2003 to 2009 (Table 1). There are both small and medium-sized firms (SMEs) and large firms. For this purpose, and according to the European Commission's definition, an SME is considered to be one that employs less than 250 people and whose annual turnover does not exceed 50 million euros or whose annual balance sheet is not over 43 million euros. Different sectors and activities were also found in the sample (services, manufacturing industry, consulting, education, transport, aeronautics, chemical, building and installations, information technologies, water, energy and mines, metal and mechanical, agro-alimentary, among others). This assessment was carried out through the 2003 EFQM model and the RADAR (Results, Approach, Deployment, Assessment and Review) logic -the scoring method when using the Excellence Model.

**Table 1: Sample characteristic.**

| | | Frequency | Percentage |
|---|---|---|---|
| Company size | Small and medium | 56 | 48.3 |
| | Large | 60 | 51.7 |
| | Total | 116 | 100 |
| Type of business | Services | 55 | 47.41 |
| | Manufacturing | 51 | 43.97 |
| | Agriculture | 10 | 8.62 |
| | Total | 116 | 100 |

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### 3.2 Measures

The measures used to obtain the data are the 5 criteria that make up the facilitating agents of the EFQM model and their 19 subcriteria. The measures of the model's key performance results and indicators have been used to measure the results (criteria 9).

**Table 2: Measures**.

| **Latent variable→ EFQM model criteria** | **Measures → Subcriteria** |
|---|---|
| 1. Leadership | 1a. The leaders develop the mission, vision, values and ethical principles and act as a reference model of an excellence culture<br>1b. The leaders personally involve themselves to guarantee the development, introduction and continuous improvement of the organization management system<br>1c. The leaders interact with clients, partners and representatives of society<br>1d. The leaders reinforce an excellence culture among the people of the organization<br>1e. The leaders define and boost change in the organization |
| 2. Policy and Strategy | 2a. Policy and strategy is based on the current and future needs and expectations of the groups of interest<br>2b. Policy and strategy is based on the information of the indicators of performance, research, learning and external activities<br>2c. Policy and strategy is developed, reviewed and updated<br>2d. Policy and strategy is communicated and deployed via a scheme of key resources |
| 3. People | 3a. Planning, management and improvement of human resources<br>3b. Identification, development and maintenance of the people's knowledge and capacities.<br>3c. Involvement and assuming responsibilities by people in the organization<br>3d. Existence of a dialogue |

| | |
|---|---|
| | between the people and the organization<br>3e. Rewards, recognition and attention to the people of the organization |
| 4. Partnership and Resources | 4a. Management of the external alliances<br>4b. Management of the economic resources<br>4c. Management of the buildings, equipment and materials<br>4d. Management of technology<br>4e. Management of information and knowledge |
| 5. Processes | 5a. Systemic design and management of the processes<br>5b. Introduction of the necessary improvements via innovation, in order to fully satisfy the customers and other interest groups, increasingly generating a greater value<br>5c. Design and development of the products and services based on the needs and expectations of the customers<br>5d. Production, distribution and attention service of the products and services<br>5e. Management and improvement of the relationships with customers |
| 9. Key Results | 9a. Key performance outcomes<br>9b. Key performance indicators |

### 3.3 Data analysis and results

A series of analyses was carried out with the facilitating elements' set of subcriteria in order to identify the soft and hard factors of the TQM that are in the EFQM model. Next, their influence on the key results was analyzed in order to verify the hypotheses proposed.

Firstly, an exploratory factorial analysis (EFA) was carried out. As a prior step, we checked the normality of the data, the existence of a certain degree of multicollinearity and the correlation of the measurements [25]. The Kaiser-Meyer-Olkin (KMO) sampling adequacy measure for this analysis was 0.942, which is a good level. Likewise, the results obtained in Bartlett's sphericity test ($\chi^2$= 2650.792; df= 276, p-value= 0.00) indicated the factorial model's adequacy. The main components and the Varimax rotation extraction methods were used. Thus, the EFA worked out that there were 3 factors that explain 72.327% of the total variance.

As is shown in Table 3, all the factorial loadings are significant (>|0.50|). Therefore, all the variables explain more than 25% of the variance of each corresponding factor [15]. This is why, based on this analysis, it was not necessary to remove any subcriteria.

Secondly, we worked out the reliability of each of the three factors obtained in the previous analysis. To do so, we opted for an internal consistency measurement - the Cronbach alpha coefficient analysis. This evaluates the thoroughness with which the indicators of the same concept (factor) are being measured. The values attained in each of the factors are very close to 1 (see Table 3). This indicates that the new variables created are reliable measurements [35].

**Table 3: Factorial Analysis.**

| Subcriteria | Factor 1: Soft Factor TQM (SOFT) | Factor 2: Strategic Management of Partnership and Resources (SMPR) | Factor 3: Processes Management (PM) |
|---|---|---|---|
| 1a | 0.803 | | |
| 1b | 0.737 | | |
| 1c | 0.607 | | |
| 1d | 0.798 | | |
| 1e | 0.524 | | |
| 2a | 0.510 | | |
| 2b | | 0.605 | |
| 2c | | 0.543 | |
| 2d | 0.615 | | |
| 3a | 0.761 | | |
| 3b | 0.756 | | |
| 3c | 0.836 | | |
| 3d | 0.712 | | |

| | | | |
|---|---|---|---|
| 3e | 0.599 | | |
| 4a | | 0.708 | |
| 4b | | 0.627 | |
| 4c | | 0.550 | |
| 4d | | 0.631 | |
| 4e | | 0.748 | |
| 5a | | | 0.849 |
| 5b | | | 0.769 |
| 5c | | | 0.761 |
| 5d | | | 0.668 |
| 5e | | | 0.662 |
| **Alpha coefficients** | 0.962 | 0.913 | 0.916 |

In addition to checking the reliability of each factor, it is necessary to analyze the content validity and construct validity. The content validity is shown by the broad acceptance of the EFQM model as a reference for the implementation and evaluation of TQM in organizations [7, 30]. Moreover, the factors identified correspond to the soft (Soft Factor TQM) and hard factors (Strategic Management of Partnership and Resources; Processes Management) recognized in the literature. Thirdly, to check the construct's validity, each factor was subjected to an individual analysis of its main components. As Nunnally [35] or Black & Porter [7] suggested, if each factor was valid as a construct, then its set of variables would form a single factor once again (unifactorial determination). It was proved that the three factors were unifactorial and that the sample for each unifactorial determination is appropriate, as is seen in Table 4.

**Table 4: Unifactorial tests.**

| Factor | KMO | Variance Explained (%) |
|---|---|---|
| SOFT | 0.941 | 70.5 |
| SMPR | 0.913 | 66 |
| PM | 0.863 | 75.5 |

The KMO value is close to 1 for the three factors. This demonstrates the suitability of the sample for each unifactorial determination. Moreover, the percentage of explained variance is high (>66%) for each of the factors analyzed.

To test the validity of the three new constructs created, as well as determining the unifactorial nature of each factor, it is necessary to carry out a confirmatory factorial analysis (CFA). This is characterized by considering the measurement of errors in its analysis. We use a variances-based structural equations model (i.e., Partial Least Squares-PLS) [38] to do this CFA. The use of PLS is justified by the following reasons: (1) this study is oriented toward the prediction of the dependent variable [13]. (2) The sample (n = 116) is small and, according to Reinartz et al. [38], PLS should be applied given the number of observations being lower than 250. (3) Finally, the use of secondary data in this study makes the utilizing of PLS advisable [22]. These arguments have led to the application of PLS becoming widespread in quality management research [10, 24]. This study uses PLS-Graph software [12].

This technique allows us to verify the convergent and discriminant validity of each of the three new constructs. The convergent validity aims to ensure that the items that make up a scale, and that measure a concept, really measure it. Therefore, it is important for the items of the same scale to be strongly correlated. The degree of internal consistency of each factor is thus proved (Cronbach's alpha, shown in Table 3). The convergent validity is measured via the quantity of variance that the items obtain from the latent construct which they represent. This measurement is analyzed by PLS through the average variance extracted (AVE). Its value must be greater than 0.5 [40]. This gives the quantity of variance due to measurement error that a construct obtains from its indicators. As can be observed in Table 5, all the constructs have a value above 0.55. It is therefore accepted that the constructs have this property. Once the convergent validity has been verified, it is necessary to study the discriminant validity. To do so, we analyze the standardized correlations matrix (see Table 5) between the different factors or latent variables. This is done to verify that the variables are not explaining redundant information. Moreover, we analyze the degree of discrimination between each pair of constructs considering the variance extracted. To confirm discriminant validity, AVE should be greater than the variance shared between the construct and other constructs in the model (that is, the squared correlation of each pair of constructs) [5]. These values appear in Table 5, where the diagonal elements

correspond to the AVE. The remaining elements are the squared correlations between the constructs.

**Table 5. Discriminant validity coefficients for TQM factors.**

| | SOFT | SMPR | PM |
|---|---|---|---|
| SOFT | **0.7047** | | |
| SMPR | 0.6889 | **0.6926** | |
| PM | 0.5505 | 0.6336 | **0.7552** |

The results obtained in the previous analyses lead us to confirm that the three new variables created (Soft Factor TQM, Strategic Management of Partnership and Resources; and Processes Management) represent valid and reliable measurements and that, furthermore, they group together different aspects of organizations' quality management.

Lastly, to confirm the hypotheses proposed, we use lineal regression analysis. To do so, each of the three TQM factors was represented as a variable resulting from the EFA's factorial scores. In the case of the construct "key results", this was represented as a variable ensuing from the average score of the construct's indicators [34].

In the lineal regression model proposed, we analyze the degree of significance of the effects of the three independent variables (Soft Factor TQM, Strategic Management of Partnership and Resources; and Processes Management) on the dependent variable (Key Results). As a previous step, we analyze the multicollinearity between the independent variables. Multicollinearity refers to high correlations among the independent variables. Occurrences of this effect violate some of the basic assumptions for regression analyses. Thus, it is necessary to investigate multiple correlations among more than three variables. Two of the most widely used measures for assessing multicollinearity are the 'Tolerance' and the 'Variance Inflation Factor' (VIF). A low tolerance value means a high degree of multicollinearity among the corresponding variables. On the contrary, the VIF is the inverse (reciprocal) of the tolerance, so large VIF value indicates a high degree of multicollinearity [3]. The multicollinearity is statistically significant when the tolerance value is less than 0.10 or the VIF value is more than 10 [25].

**Table 6. Regression coefficients for TQM factors.**

| | **Unstandardized Coefficients** | **Standard Error** | **Standardized Coefficients** | **t** | **Sig.** | **95% Confidence Interval for ß** | | **Colinearity** | **VIF** |
|---|---|---|---|---|---|---|---|---|---|
| | **ß** | | **ß** | | | **Lower Bound** | **Upper Bound** | **Tolerance** | |
| (Constant) | 26.172 | 0.945 | | 27.702 | 0.000 | 24.300 | 28.044 | | |
| Soft Factor TQM | 0.666 | 1.719 | 0.053 | 0.387 | 0.699 | -2.740 | 4.072 | 0.305 | 3.281 |
| Strategic Management of Partnership and Resources | 3.379 | 1.911 | 0.281 | 1.988 | 0.049 | 0.408 | 7.166 | 0.246 | 4.057 |
| Processes Management | 3.865 | 1.601 | 0.310 | 2.414 | 0.017 | 0.693 | 7.037 | 0.351 | 2.846 |
| | | | | | | | | | |
| $R^2$ | 0.353 | | | | | | | | |
| Adjusted $R^2$ | 0.335 | | | | | | | | |
| F-value | 20.350 ($p<0.001$) | | | | | | | | |
| Durbin-Watson | 2.079 | | | | | | | | |

Table 6 shows tolerance values that are not less than the cut-off level, 0.10 and the VIF values for the three independent variables not exceed 5. This means that there is not collinearity between the variables [2].

Likewise, through the Durbin-Watson statistic we checked that the remainders are not correlated. They present a value close to 2. In Table 6 we show the results of the regression analysis.

The values obtained show that the variables that represent the hard factors of the TQM – that is, Strategic Management of Partnership and Resources (SMPR); and Processes management (PM) – have a direct, positive and significant influence on the key results. This is why we find a complete empirical confirmation for hypothesis 2. Furthermore, it must be pointed out that the relation between Processes management (PM) and Key Results is the strongest of all. Hence, this factor is postulated as one of the main precedents.

We do not, however, find a significant direct relationship between the TQM's soft factor and the key results. This leads us to reject hypothesis1. Due to these results, we consider that the relationship between these two variables could be carried out indirectly.

# 4 Conclusions

The factors resulting from the EFA contain the soft and hard elements of the TQM identified in the literature. Factor 1 (SOFT) includes leadership and management commitment, human resources [37, 33, 21] and two elements of strategy related to including stakeholders in the formulating of strategy (2a) and the communication and deployment of strategy through stakeholders (2b). These aspects are considered as soft by authors such as Black & Porter [6]. Factors 2 and 3 include hard aspects of TQM [33, 21, 44]. Specifically, factor 2 (SMPR) has elements related to the formulating and reviewing of strategy based on information, indicators and organizational learning, as well as factors concerning external alliances (suppliers or partners) and resources management. Factor 3 (PM) encompasses the management of the organization's key processes. This is an element concerning which there is a strong consensus when qualifying it as a hard factor of TQM [6, 37, 33, 44].

With respect to the verifying of the hypotheses, there is confirmation of the hypothesis that relates the hard factors of TQM with the organization's key results (H2). On the contrary, we do not find a confirmation of H1. This may be due to the type of measurement that has been used (key results), which includes objective measurements of profitability, market share, sales, expenditures, etc. These measurements are strongly related to the implementation of strategy, resources management and the carrying out of the organization's key operative processes, and less so with the type of leadership or the way of managing human resources [8, 10].

The results allow us to point out that to set up effective TQM initiatives it is indispensable to have a culture, human resources and management (soft factors) involved with and committed to quality. Yet for the effects on the business' key results to be significant, the soft factors must be integrated in a management system that includes resources, tools and management techniques (hard factors). The most influential factors are specifically strategy and processes.

The main implications for management are the following. Generally, the applying of the critical factors and fundamental concepts of the TQM cannot be carried out separately. These are related between each other and produce synergies that reflect the global character of the TQM's initiatives. This holistic character also spreads to the foreseeable results. That is to say, when defining the TQM's practices, it must be taken into account what the aims and needs of the different stakeholders are.

Finally, these results lead us to consider that the influence of the soft factors of TQM on the firm's key results is produced indirectly through the organization's policies, strategies resources and processes. This is exactly as was noted in the structure of the EFQM model or as has been shown in works such as those of Rahman & Bullock [37] or Calvo-Mora et al. [10].

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