A New Approach on Software Self-Assessment Tool Based on EFQM Model

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Abstract:

Purpose – The paper introduces a self-assessment software tool for managers. The design of this instrument is based on the EFQM Excellence Model.

Methodology/approach - The methodology determines an overall index, considering the level of fulfillment of each criterion and the “visible” and “invisible” influences between criteria and sub-criteria.

Findings – The designed tool allows highlighting Enablers, Results and inter-relationships, computing each element of the model, identifying influences and determining the global index.

Research limitations/implications – The main issue is to measure the “invisible” influences. We determined the contribution of each sub-criterion on the model criteria fulfillment level. In order to completely validate our model we will apply our tool on further data.

Practical implications – The results of the proposed tool prove its applicability both to profit and CSR oriented companies, or to simulate situations of balance between profit and CSR.

Originality/value – The software tool contains a digraph representation of the EFQM elements and interrelations. It allows to enter a pre-calculated value for each element of the model, for simulation cases, or to access the questionnaire database for evaluation of each criterion fulfillment degree. Furthermore, the application permits the choice of an Influence-Criteria-Pattern that can take into account both global and specific influences.

Key-words: TQM, business excellence, software application

Introduction

The design of our self-assessment software tool for managers is based on the EFQM Excellence Model. Our approach takes into account the internal structure of the EFQM model, the main relations between criteria, interrelationships caused by latent factors and their contribution to an overall index. The EFQM Excellence Model, as a TQM framework, considers that excellence involves satisfying and maintaining a balance between the needs of all the stakeholders, like: employees/people, consumers/customers, partners/suppliers, environment, society, community and so on.

Theoretical background

The EFQM Excellence Model is a practical tool that indicates the status of organizations on the excellence path, helping them to determine key areas for improvement and critical
success factors, encouraging appropriate solutions, considered also as a framework for sharing best practices by enabling an organization to remain relevant, current and vital based on their relationships with all relevant stakeholders.

The model comprises a set of three integrated components: the Fundamental Concepts of Excellence, the Criteria and RADAR, based on the information provided by www.EFQM.org.

In order to create sustainable success for any organization, a number of fundamental concepts are necessary as: Adding Value for Customers; Creating a Sustainable Future, Developing Organizational Capability, Harnessing Creativity & Innovation, Leading with Vision, Inspiration & Integrity, Managing with Agility, Succeeding through the Talent of People, Sustaining Outstanding Results.

The Criteria provide a framework to help organizations to convert the Fundamental Concepts.

RADAR is the logic of the model that provides a structural approach for the purpose of examining the performance of any organization (Moeller, J., J. Breinlinger-O'Reilly and J. Elser, 2000); (Uygur A., Sümerli S., 2013).

The model is now used widely as an organizational framework in Europe and provides a basis for both national and regional quality awards as well. In Romania, according to the research conducted on SME, the EFQM excellence model criteria are met only to a satisfactory degree in the context of increasing the expectations, needs and demands of all stakeholders. So, the poorest fulfillment degrees identified are those related to the criteria: “society results”, “processes, products and services”, “strategy” and “people results”, resulting the need to develop and implement plans in line with the European Union requirements, to facilitate the improvement of a system for the monitoring and assessment of the impact of their processes on the environment and on the community as a whole, coupled with their proactive involvement in addressing community issues (Olaru, M., et al., 2011), (Edelhauser, E., and Lupu-Dima, L., 2012).

Bou-Llusar, J.C. et al. (2008) consider that EFQM captures the main core concepts of TQM containing both a social dimension as well as a technical one. At the Enablers level, the social or soft dimension is represented by the Leadership and People and the technical or hard dimension by Processes, Products & Services and Partnership & Resources while the Strategy connects these two dimensions (Dotchin, J.A. and Oakland, J.S., 1992); (Yong, J., Wilkinson, A., 2001); (Prajogo, D.I.and Sohal, A.S., 2004); (Rahman, S., 2004); (Rahman, S.and Bullock, P., 2005); (Lewis, W.G., Pun, K.F.and Lalla, T.R.M., 2006).

The Results can be expressed in intangible or less tangible terms concerning the employee motivation, perception and perspective of the customers, satisfying the society, or about tangible and economic terms concerning the quality of raw materials, the sales per employee, profitability, and so on.

A thorough and comprehensive analyze was undertaken by Bou-Llusar, J.C. et al. (2008) generating opportunities for developing the EFQM Excellence Model based on the two dimensions. From a methodological point of view, it was adopted a global approach to analyzing the internal structure of the EFQM Excellence Model that combines the factorial and causal approaches adopted in previous studies, also the interrelationships between the criteria are explained by the latent factors enabler and result excellence, which measure the degree of excellence reached by an organization in the management of the enabler and result criteria respectively.

Thus, we can identify, at the model level, the criteria that contain elements of CSR (Corporate Social Responsibility), namely that encourage the positive impact the organization's activities have on the environment, employees, customers, society, all
belonging to the social dimension. There are also criteria in the model containing items related to the levels of profit, process efficiencies, belonging to the technical dimension.

The model can be used in order to find the balance needed to run the activities of the organization considering the two dimensions presented above.

**The research methodology**

We propose an approach on the EFQM model that takes into account the “visible” relationships between criteria, and also the “invisible” relationships between sub-criteria, which we call influences.

The methodology related to the proposed designed tool involves the computing of an overall index, which is determined considering the level of fulfillment of each criterion and the influences between criteria.

The software tool is an information system with a SQL database, created in Visual Basic.NET. The graphical user interface contains a digraph representation of the 5 Enablers and 4 Results and all the existing interrelations between them. The software allows the user to enter a pre-calculated value for each element of the model, mainly for purposes associated to simulation cases. It also allows access to the questionnaire database for the evaluation of each criterion fulfillment degree.

Furthermore, the application permits the choice of an Influence Criteria Pattern that can take into account the interrelationships or influences both global and specific. All these lead to the overall index value.

The software self-assessment tool based on EFQM has a friendly intuitive interface that allows highlighting Enablers, Results and the relationships between them as a digraph, (figure 1) computing of each element of the model (figure 2), identifying influences and determining the global index, using the following relation:

\[
\text{index} = \frac{\sum_{j=1}^{9} p(j) \cdot \sum_{i=1}^{9} h(i,j) \cdot H(i)}{\sum_{j=1}^{9} p(j) \cdot \sum_{i=1}^{9} h(i,j)} \times 100
\]

**Insert figure 1 here**

**Figure 1.** The digraph representation of the Enablers, Results and the relationships

The nodes of the digraph from figure 1 are Enablers (1=Leadership, 2=Strategy, 3=People, 4=Partnerships & Resources, 5=Processes, Products and Services) and Results (6=Customer Results, 7=People Results, 8=Society Results, 9=Key Results) and the arcs are the relationships between them.

As example of influences we present in figure 2 a subgroup from the digraph corresponding to the Leadership criterion. The arcs, noted \( h_{ij} \), for this case represent the relationships taken into account between Leadership and all the other criteria. The values from the arcs appear in the digraph adjacencies matrix displayed on the user interface.

**Insert figure 2 here**

**Figure 2.** The digraph representation of the subgroup Leadership
The global index interpretation is useful for managers who apply the EFQM model for quality improvement in their business. In the context of TQM, the managers need to focus on both dimensions (namely social and technical) considered drivers of performance. By this index the managers have a measure of their actions and how they can improve both dimensions keeping a balance. There can also be estimated the orientation towards profit or CSR contained in this index.

**Software Self-assessment Tool Development. Main Results**

This section presents the results of developing the self-assessment software tool based on EFQM (figure 3), considering all the interrelations between the elements of the model.

**Insert figure 3 here**

Figure 3. Self-assessment software tool: user interface

Next, we will present the main steps in using the software tool on an example.

We can choose the so-called classic case of application of the model, where there are not highlighted any influences or invisible relationships between criteria (No Influences). In this case the global index is computed based on the level of fulfillment of each criterion and their weights considered in the EFQM model (figure 4).

**Insert figure 4 here**

Figure 4. No Influences case

If we want to quantify the influences between criteria, we can use a Predefined Influences pattern (with the possibility to Maximize Influences or Minimize Influences). The user interface shows the influences between Enablers (both criteria and sub-criteria), between Enablers and Results and also between Results (both criteria and sub-criteria). In this case, the global index is calculated based on the level of fulfillment of each criterion, their weight considered in the EFQM model, and taking into account the influences between criteria, presented in the adjacencies matrix, as presented in figure 5.

**Insert figure 5 here**

Figure 5. Predefined Influences case

The software tool contains two alternatives to deal with the criteria, as shown in figure 6 for Leadership criterion. One is to use external evaluation questioners and input the resulted values for each criteria (Input Value %) and the other is to use the internal embedded questioners to evaluate each criteria (Apply Questioner). We will present in figure 7 the latter version for the same criterion.

**Insert figure 6 here**

Figure 6. Leadership criterion evaluation alternatives

**Insert figure 7 here**

Figure 7. Leadership criterion evaluation questioner

Some results of applying the software tool are presented in figure 8 and figure 9. In figure 8 there can be seen a “No Influences” case and in figure 9 a “Predefined Influences” case. There can be observed in both figures the computed global index. We simulated the case of decreasing the fulfillment level for the Leadership criterion (from figure 4) from 86% to 80%.
Discussion and conclusions

The proposed model can be a useful tool for managers, enabling a global index computing as a measure of the organization’s performance. We emphasized the influences that may occur between the criteria and sub-criteria of the EFQM model. Highlighting these influences lead to improvement solutions, acting on the fulfillment level of certain criteria by which they influence other criteria. We can simulate cases of increase of fulfillment level of certain criteria, which can generate various interpretations of the “invisible” influences.

We applied first the proposed model on the classical case, without taking into account the influences, obtaining a global index of 80.75% corresponding to a fulfillment level of the Leadership criterion of 86%. For the same level of fulfillment of the mentioned criterion, the influences were calculated at 0.40%. If we lower the level of fulfillment of the criterion to 80% (by 6%) we obtained a value of 0.28% influences. If we increase the fulfillment level to 95% (by 9%) the influences increase to 0.59%. So, influences increase with the degree of fulfillment of the criteria.

For simulation we chose among the Results, a CSR oriented element, i.e. Society Results, belonging to the social dimension or soft part, and a profit-oriented element, i.e. Key Results, belonging to the technical dimension or hard part.

An increase of fulfillment level of the Society Results criterion from 77% to 82% (by 5%) revealed an increase in the overall index of 0.50% for the case without influences and 0.33% extra as a measure of influence.

An increase of fulfillment level of Key Results criterion from 80% to 85% (by 5%) revealed an increase in the overall index of 0.50% for the case without influences and 0.1% extra as a measure of influence.

We can conclude that the current form of the model, with predefined influences, and for the case of the considered sample organization, the social dimension (orientation towards CSR) is better represented than the technical dimension (orientation towards profit). Our tool can be adapted and used by managers to determine the balance between the two dimensions depending on the specific of the organization and the pre-formulated priorities.

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Figure 1. The digraph representation of the Enablers, Results and the relationships

Figure 2. The digraph representation of the subgroup Leadership

Figure 3. Self-assessment software tool: user interface
Figure 4. No Influences case

Figure 5. Predefined Influences case

Figure 6. Self-assessment software tool: Leadership criterion
Figure 7. Self-assessment software tool: questioner

Figure 8. Global index for “No Influences” case
Figure 9. Global index for “Predefined Influences” case