



Investigating the Impact of Leaders' Responsibilities in Reaching Organizational Excellence in the EFQM through the Systems Dynamics Approach

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Abstract

Leadership is one of the most important areas of discussion in providing direction and guidance to organizations. This is where leaders are said to give life to the organization and their decisions, strategies and methods spell success or failure for the entire system. Among the tools suited to the investigation of leaders' behavior and decisions is the System Dynamics methodology, in which it is possible to investigate the decision-making processes and various behaviors of leaders and to have different analyses of these for reaching organizational success. In this article, the System Dynamics approach has been employed in order to investigate the responsibility of leaders in reaching organizational excellence. The model was first designed based on cause-effect relations in the EFQM model; the relationships between the model variables were then compiled. Afterwards, various scenarios for a company in the transportation industry were put to investigation through its self-evaluation results.

Keywords: System dynamics, Leader responsibility, EFQM, Organizational excellence

1. Introduction

There is no debate that the success of any organization is greatly dependent upon the competence of its leaders and similarly, the leaders' capabilities define the success of the organization. A review of leadership literature, by D.V. Day and R. G. Lord concluded that 20 to 45 percent of all organizational performance deviation is related to leadership (Day, Lord, 1988).

Successful leadership has its roots in the highest levels of the organization; this leadership and responsibility must be viewed as a serious and stable obligation (Chopin, 1995). Effective leadership begins with vision and mission. It is developed by compilation of a strategy for applying these tenets. In order to be successful in upgrading the productivity and optimizing business in the organization any approach must begin from the top and initiated from the highest level of leadership (Oakland, 1999). Many diverse studies have been conducted in the various aspects of leadership, and a great number of books authored on the subject are focused on the leadership aspects of mission, vision, goals, motivation, and employee management (Day, Lord, 1988) and (Kouzes, Posner, 2003). Volumes have also been published recently that focus on the interaction between the leaders and clients, partners, and representatives from the society (Segil, Goldsmith, and Belasco, 2003) and (Hampson, 1999).

Today, scientists and intellectuals emphasize the use of TQM as an inclusive solution for increasing the efficiency of organizations. In this framework, which focuses on comprehensive TQM quality management, organizational excellence models have been introduced as tools for instating systems and evaluating how successfully these

establishments are carried out. As extended tools, Organizational Excellence Models provide leaders with a comprehensive attitude and a more precise understanding of all angles of the organizational system to move towards excellence. This is such that the models for national quality awards offer an organized structure for the understanding and utilization of TQM. As an example, the Deming Award model proved that it can be employed as an effective tool for the expansion of quality concepts across Japan. And the use of the self evaluation technique based on the criteria of the Malcolm-Baldrige Award (MBNQA) made it into a powerful tool among American organizations (Hart, 1993) and (Moore, 1995). Another case worthy of mention is the European Organizational Excellence Award model (EEA), which was compiled, based on the Malcolm-Baldrige model by the European Quality Management Foundation, and was put to use by European and non-European countries alike.

The main aim of the EFQM model and the European Organizational Excellence Award, EEA was the promotion of concepts and their institutionalization in organizations in which the model is utilized for the organizational excellence. Although the Deming, Malcolm-Baldrige, and EFQM models are the most famous ones for performance excellence, they have inspired other countries to develop their own specialized models. Generally speaking, the TQM system has been founded on a mental framework and as such, it may well be the case that the prediction of its outcomes would not be possible in complex circumstances. In order to overcome this obstacle, mental models which rely on the Cybernetic Feedback Theory have been suggested in order to create the appropriate structure for hypothesis and computerized simulation (Forrester, 1971). In investigating the complexities of concepts related with TQM, Waldman has suggested the use of system theory in the implementation of this model (Waldman, 1994). Bauer et al. also supports this idea, stating that the use of Dynamic Models for TQM in times of turmoil and disorder is essential (Bauer, Reiner, and Schomshule, 2001). In Iran, from among the available excellence models in the world, the EFQM model has been welcomed and has become the foundation for the instatement of national awards. The EFQM Excellence Model, similar to other quality awards such as the Malcolm-Baldrige National Award in the United States or Deming's Award in Japan, is based on self-evaluation. Self Evaluation is a comprehensive and ordered consideration of organizational activities in comparison with the criterion activities (European Foundation for Quality Management, 2003) and (Van der Wiele, and Brown, 1999). Dynamics is a suitable tool for helping with better understanding the self evaluation process and an aid for decision-making and implementation of various policies for reaching excellence.

In order to investigate the various scenarios for the enhancement of the leaders' responsibilities in reaching effective leadership, the Dynamic System methodology has been used in this article, and to this end the EFQM model is used in order to design the Dynamic Model. Therefore, at first the Dynamic System is designed based on the relationships between the EFQM model criteria; the relationship between the model variables is consequently identified. Here, the data simulation results from self-evaluation of an organization. We have attempted to investigate the various scenarios regarding the upgrading and creation of the leaders' responsibility.

Introducing the Organizational Excellence Model

The EFQM Organizational Excellence Model represents all constant features that an organization aiming at excellence must possess. It was introduced as the primary framework for the evaluation and improvement of organizations in 1991 by the European Quality Management Foundation. The EFQM Organizational Excellence Model is based on eight fundamental Excellence Model concepts, which have been derived from pivotal ideas in superior companies and organizations in the twentieth century. EFQM believes that reaching excellence requires promotion and establishment of these concepts:

- Results orientation
- Customer focus
- Leadership and Constancy of Purpose
- Management by Processes and Facts
- People Development and Involvement
- Continuous innovation, learning, and improvement
- Partnership Development
- Corporate Social Responsibility

A non-prescriptive framework, the EFQM Excellence Model is based on 9 criteria (EFQM, 2003). These are, in turn, divided into two groups: Enablers and Results. Figure 1 shows the EFQM along with the advantages of each of the main criteria. Each of the model criteria consists of many sub-criterion totaling 32 sub-criteria. Here we shall introduce each of these models.

Figure 1 here

1. Leadership Criteria

- 1a. Leaders develop the mission, vision, values, and morality of the organization and themselves act as role models for the culture of excellence.
- 1b. Leaders personally ensure the creation, development, and application of management systems and their continuous improvement.
- 1c. Leaders interact with customers, partners, and representatives of the society.
- 1d. Leaders reinforce the culture of excellence among the employees.
- 1e. Leaders identify and champion organizational changes.

2. Policy and Strategy

- 2a. Policy and Strategy are based on the present and future needs and expectations of stakeholders.
- 2b. Policy and Strategy are based on information from performance measurement, research, learning and external related activities
- 2c. Policy and Strategy are developed, reviewed and updated.
- 2d. Policy and Strategy are communicated and deployed through a framework of key processes.

3. People

- 3a. People resources are planned, managed and improved.
- 3b. People's knowledge and competencies are identified, developed and sustained.
- 3c. People are involved and empowered.
- 3d. People and the organization have a dialogue.
- 3e. People are rewarded, recognized and cared for.

4. Partnerships and Resources

- 4a. External partnerships are managed.
- 4b. Financial resources are managed.
- 4c. Buildings, equipment, and material are managed
- 4d. Technology is managed.
- 4e. Information and knowledge are managed.

5. Processes

- 5a. Processes are systematically designed and managed.
- 5b. Processes are improved, as needed, using innovation in order to fully satisfy and generate increasing value for customers and other stakeholders.
- 5c. Products and services are designed and developed based on customer needs and expectations.
- 5d. Products and services are produced, delivered, and serviced.
- 5e. Customer relations are managed and enhanced.

6. Customer Results

Excellent organizations comprehensively measure and achieve outstanding results with respect to their customers

- 6a. Perception Measures.
- 6b. Performance indicators.

7. People Results

Excellent organizations comprehensively measure and achieve outstanding results with respect to their people.

- 7a. Perception Measures.
- 7b. Performance Indicators.

8. Society Results

Excellent organizations comprehensively measure and achieve outstanding results with respect to society.

- 8a. Perception Measures.
- 8b. Performance Indicators.

9. Key Performance Results

Excellent organizations comprehensively measure and achieve outstanding results with respect to the key elements of their policy and strategy.

9a. Key Performance Outcomes.

9b. Key Performance Indicators.

System Dynamics Methodology

System Dynamics is a method for understanding the behavior of complex systems through simulation and is used for representing system behavior vis-à-vis different strategies and policies in order to use in the decision-making process. This methodology was born 35 years ago when Forrester wrote his first book (1971), titled "Industrial Dynamics" which focused on issues emergent from industrial applications (Forrester, 1985). The primary works considered managerial issues such as production and occupation instabilities, shortage or contradiction in union growth, and the reduction of market share. In a short time, this method was used in a broader range of issues, from research management and project development to the concept of exponential growth in a finite world and the reduction in natural resources. The primary designation, Industrial Dynamics, gave way to a more general one: System Dynamics. The focus of Dynamic System Studies is not on systems but rather on problems. (Forrester, 1985) Through the Dynamic System approach, problems have at least two characteristics. First, they are dynamic; for example, they deal with values that are variable in different time intervals. It is possible to show them in charts based on time variation. The fluctuation of occupation levels in an industry, the reduction of city taxations based on the quality of life, the excess of expenses in a building project, expansion of governments, cancer, etc. are examples of problems that fall within the realm of System Dynamics. The first step in learning the System Dynamics approach is attaining skill in describing the dynamics of the problem (Richardson, Pugh, 1981). The second characteristic of problems in System Dynamics is the use of the "Feedback" concept. A good example of the feedback system is that of CNC machines or close-circuit control systems. All human systems are primarily feedback systems (Whiteley, 1991).

- **Cause and Effect Diagrams**

System Dynamics focuses on the structure and behavior of systems including reciprocal feedback links. The cause and effect diagram is a simple tool which helps the model-maker in making the real world system both conceptual and pictorial. In a cause and effect diagram, arrows show the direction of effect and the positive and negative signs show the type of effect. If change in one variable causes change in the other in the same direction when compared to the initial value we say that the relationship between the two variables is positive. If change in the second variable is opposite to the change direction in the first variable it is said to be negative.

- **Positive Feedback Loop**

When a feedback link related to a variable causes increase in the main deviation, the feedback link is said to be positive. In a positive feedback link by having constant feedback to self, a variable re-energizes its increase or decrease. The expected behavior of a positive feedback link is an exponential increase or an exponential decrease

- **Negative Feedback Loop**

When a feedback loop causes change in the value of a variable in the opposite direction to the main deviation, the feedback loop is said to be negative. The negative feedback loop is identified by behavior converging toward the goal. The expected behavior in a negative feedback link is an asymptotic approach to the goal (Goodman, 1983).

The Details of the Dynamic System Modeling Structure

The above described cause and effect diagram presents the primary view to the problem and is mainly intended for the purpose of creating connections between the model-maker and the policy-maker. The formulation of the system operation model is based on structural details which are essentially clearer; for example policy-making variables or rates, the state variables, the auxiliary variables, or the information flows and delays. In this way, the flow diagrams provide more detailed and lucid views of the model structure (Richardson, Pugh, 1981).

The System Dynamics Model includes the stability variables, the auxiliary variables, the constant values, the rate variables, and the initial values. The cumulative values of the state variables are completely different in concept from the flows affecting them. Forrester (1985) considers the condition variables to act as storage inside the system. These variables can be the material available at hand, the material in the building process, the factory environment or the number of employees. The state variables (levels) are the current values of that set of variables which result from accumulating the differences between the incoming flows and the outgoing ones. The state variables display a snapshot of the system state and cannot change in a single moment as integration requires time to take place. State variables (levels) gain meaning in the systems of information networks, in the same way that they exist in the physical systems.

The instantaneous flows that cause reductions or increases in the variable values are called rate values. In other words, the rate variables consist of instantaneous flows that exist among state variables. In a feedback loop it is also required to

describe the variables that are dependent on the values of state and rate variables. These are known as auxiliary variables. Also, all mentioned variables can be dependent on constant values. These constants are used in the model, but their value does not change during the simulation.

The Stages for the Dynamic Modeling of the System

Systems Dynamics is a methodology for the study and management of complex systems which have feedback. These systems can be present in various domains such as: business, economy, environment, energy management, urban issues, and other social and human areas. Logical steps in the modeling of the dynamic system are as follows: (Spencer, 1966) and (Roberts, 1978)

- *Definition of problems that need to be solved and the results that needs to be achieved.*
- *Analysis of the problem with the help of cause-and-effect diagrams.*
- *Formulation of the model structure.*
- *Collection of information, initial values and the basic data needed for constructing the model of the existing data in reality and/or discussion with the conductors or designers who have the knowledge and experience of the system under study. – The initial values, the state values, the constant values, and the data related to the policies can be considered among these.*
- *Investigation of model validity under certain conditions to ensure model validity.*
- *Using the model for testing various policies for reaching the most suitable results.*

System Dynamics Model for Organizational Excellence – EFQM

The purpose of Dynamic System modeling is to establish the relation between the various variables which make up the system and are used to analyze decision-making policies in the realm under study. The cause-and-effect diagram is an essential tool which helps in modeling the real world in the form of feedback links. Therefore, identifying the key problem variables before the development of a cause-and-effect graph is of great importance. They key variables are divided into three categories of enablers, results, and other variables.

Model Variables

As was mentioned, from among the famous models for organizational excellence, the European Model for Organizational Excellence has gained more attention. In Iran as well, this model is the basis and the foundation for all national awards. Therefore, the dynamic model variables are defined based on the criteria of the EFQM Model and these variables are divided into three categories: Enablers, Results, and Other Variables.

Excellence= Enablers + Results

The Enabling Variables are Leadership, Policy and Strategy, People, Partnerships & Resources, Processes. Results Variables are Customer results, people results, society, results, key performance results.

And other Variables include: Leadership goal, policy & strategy goal, people goal, partnerships and resources goal, processes goal, Customer results goal, people results goal, society results goal, key performance results goal, Leadership gap, policy & strategy gap, people gap, partnerships & resources gap, processes gap, Customer results gap, people results gap, society results gap, key performance results gap, Customer results rate, people results rate, society results rate, key performance results, goal rate.

The Cause-and-Effect Graph and the Process of Organizational Excellence Modeling

The Cause-and-Effect diagram of the EFQM Model shows the relation between the variables defined above. There are expanded cause and effect relations between the criteria and the sub-criteria of the EFQM Model, which can be described as follows:

- *The relationship between the Enabler and the Result domains and vice-versa.*
- *The relationship among the main criteria*
- *The relationship among the sub-criteria of the model*
- *The relationship between the sub-criteria of the model with the main model criteria.*

Due to the expanded relations defined above, in this article the relationship between the model fields and the main model criteria are used in drawing the model. This is described as follows:

It is believed in the EFQM that reaching excellent results regarding customers, people, society, and operations, requires effective leadership, which itself begins with putting together the vision and the mission, and is expanded with the compilation of the strategy for actualizing it. Therefore, the leadership and organization guideline criteria are related with all model criteria. An organization can attain excellent results regarding people only when it elects suitable approaches in the field of managing human resources; for this reason the employees' criteria are related to the

employees' results. Achieving excellent results in the field of customers requires the utilization of suitable approaches in the processes criteria such as design and expansion of products, delivery of products and services, and management of relations with customers. Therefore, the customer result criteria are related to the processes criteria. An organization can reach Excellent results in the area of society only when it has the appropriate approach in the criteria of companies and resources, such as technology management, management of foreign companies, management of equipment, buildings, materials, plus the criteria for employees including equal opportunity for hiring. Reaching excellent results in the field of key operation results requires reaching excellence in customer results, employee results, and society results. Therefore, the criteria of key operation results are in relation with customer result criteria, employee results, and society results. Based on the systems dynamic methodology, the cause-and-effect diagram was drawn based on the EFQM Model criteria. Then, with the help of the Vensim software the stock and flow profile was drawn, which can be seen in tables 2 and 3.

Formulating the Model structure

In order to describe the relations between the variables and to investigate the various scenarios, the self-evaluation results a company was used in the transportation industry. This was done by the means of self-evaluation techniques, questionnaire, and workshop. The results are provided in table 1:

Table 1 here

The excellence criterion is gained from the total of enabler criteria and the results of the EFQM Model. One of the presuppositions in this model is that having the appropriate enabler can lead us to excellent results. In other words, reaching excellent results is possible through focusing on and improvement of criteria of leadership, guidelines and strategies, people, partnerships, resources, and processes. Furthermore, leadership is a motivator for other enabler criteria in such way that the leaders of an organization are the most important element in the organization reaching success (Deming, 1993).

(1) $Leadership(t) = \text{integral}(\text{leadership rate} + \text{leadership}(t-1))$

(2) $Leadership\ rate = \text{leadership} * f_1 + \text{Customer results gap} * f_6 + \text{people results gap} * f_7 + \text{societ results gap} * f_8 + \text{key performance results gap} * f_9$

(3) $Leadership_{geol} = 100$

$leadership_{gap}(t) = leadership_{geol} - leadership(t)$ $leadership(t) = 25$

$Criterion\ deficiency\ rate\ as\ identified\ by\ the\ decision-maker = f_i$

Similar to the above description, the rest of the variable equations are explained. Reaching excellence in results is not possible unless leaders clarify the vision, mission, and the goals; encourage their people to reach these goals and have appropriate interaction with partners and the representatives from the society. Therefore, the criterion for leadership is in direct relationship with the enabler criteria and the results criteria.

Figure 2 here

Figure 3 here

Suggested Strategies

In this section, the strategies for creating and upgrading leaders' responsibilities and attaining organizational excellence have been described. Each of these strategies results in the improvement of the criteria based on the relations described. Following is the description of each of the introduced strategies.

1. Compilation of the Mission and the Vision and the Distribution of the Organizational Beliefs and Values by the Leaders

As is mentioned in (1a), according to the first criterion of the EFQM Model, leaders should provide the values and beliefs through the compilation of a clear mission and vision statement; a vision that explains what the organization wants and what it aims to achieve specifically in relation to the fundamental concepts. The purpose of the organization should be stable and define the line of responsibility from the top.

2. Compilation of the Strategies and the Operational Activities.

For the organization to reach its visions, it is required that strategies for work and business, and operational plans for their actualization are prepared. This means that the organizations require effective leadership. Such leaders compile the organizational guidelines and strategies for the purpose of accomplishing their mission, view, and values. (1b, 2c). The compilation of these strategies is based on the needs and the current and future expectations of the organization's stakeholders (2a). Moreover, it is also based on the evaluation of activity, research, and learning (2b). Finally, the compiled strategies are communicated and deployed in the organization through leadership of organizational and framework change. (1e, 2d).

3. Empowering and Encouraging People for Participation by the Leaders.

The existence of a close relationship with employees is a necessity for effective leadership, as seen in (1d) in the model. The leaders must encourage the culture of excellence among the employees. In order to fulfill this they should expand effective communication from top to bottom and throughout the It is seen that applying the described strategies in the field of leadership has resulted in the improvement of criteria and effectiveness on other criteria.

Figure 4 here

Figure 5 here

Applying the strategy of compiling guidelines, organizational strategies and operational strategies has resulted in the improvement of the guideline and strategy criterion, and influence on other criteria. Organization in order to convey the vision, the mission, and strategies for people and to maintain interaction with them. They should also develop the competencies, skills and activities needed by the employees, encourage, and reward them in order to facilitate their empowerment and participation in activities contributing to the improvement of the organization.

4. Expansion of the Leaders' Interaction with Customers, Partners, and Society Representatives.

As described in sub-criterion (1c), the leaders' key attitude toward the administration of the organization should be centered on the customer and the expansion of partnerships. Leaders accordingly consider it effective to know who their customers are, and what needs and expectations from the organization they have, and to know to what degree these expectations have been fulfilled. Moreover, the leaders consider it effective to identify the existing opportunities for key partnerships and to organize, stabilize and update them and make partners aware of the needs of the organization and customers in order to create more added value. Finally, by encouraging, supporting and participating in activities aiming at the improvement of environmental conditions, respect for law, and organizational participation in the society, they increase their social responsibilities.

What follows is a study of the results of different strategies, with the help of the simulation done with the Vensim software.

Table 2 here

Figure 6 here

Applying the strategy of people empowerment and participation by leader's results in the improvement of the people criterion and influence on other people criteria.

Figure 7 here

The strategy of interaction among the leaders, partners and the representatives of society results in the improvement of criteria of partnerships and resources and influence on the Society Results and Key Performance Results.

Figure 8 here

Implementing the strategy of leader interaction with customers' results in the improvement of the criterion of processes and influence on the Customers Result.

Figure 9 here

Applying the strategy and improvement of processes standard results in the improvement of this standard.

Figure 10 here

Improvement in the criterion of people with respect to the influence of applying strategies has resulted in improvement in the people results.

Figure 11 here

There was improvement in the criterion of people, partnerships and resources. The effect of strategies on these criteria has resulted in improvement of society results.

Figure 12 here

Improvement in customer results, society results, and people result has caused improvement of the criterion.

Figure 13 here

Conclusion

The main purpose of compiling a System dynamics model based on the EFQM is investigating the accomplishment of Organizational Excellence in organizations so that it is possible to predict the level of organizational excellence achieved by defining and implementing various strategies in the fields of improvement that result from self-evaluation. In this article, the effect of higher leaders' responsibility on attaining organizational excellence has been investigated. The explained leadership strategies show that enhancement of leadership criteria consequently impacts other enabler

criteria and with respect to the cause-and-effect relation between the enabling field and the results of the EFQM, improvement in the Enabler criteria result in the improvement of the Results criteria.

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Table 1. The results of initial self-evaluation and the level of goal for criteria

Criteria	Initial Value	Goals
Leadership	25	100
Policy & Strategy	15	80
People	25	90
Partnership & Resources	35	90
Processes	35	140
TOTAL ENABLERS	135	500
Customer Results	30	200
People Results	30	90
Society Results	20	60
Key Performance	30	150
TOTAL RESULTS	110	500
TOTAL	245	1000

Table 2. Results of the Model Simulation

Year	leadership	policy & strategy	people	partnerships	processes	total enablers	customer results	people results	society results	key performance	total result	total score
0	25	15	25	35	35	135	30	30	20	30	110	245
1	45	27	40	42	56	210	65	42	25	49	181	391
2	61	37	53	50	74	275	94	51	30	66	241	516
3	72	46	63	56	88	325	117	60	34	80	291	616
4	80	53	70	62	99	364	136	66	37	92	331	695
5	86	58	76	68	108	396	151	71	40	102	364	760
6	90	63	80	74	116	423	163	75	43	111	392	815
7	93	69	83	79	122	446	173	79	45	118	415	861
8	94	70	86	83	127	460	181	82	47	124	434	894
9	95	72	88	87	131	473	187	84	49	129	449	922
10	96	74	90	89	134	483	192	86	51	133	462	945

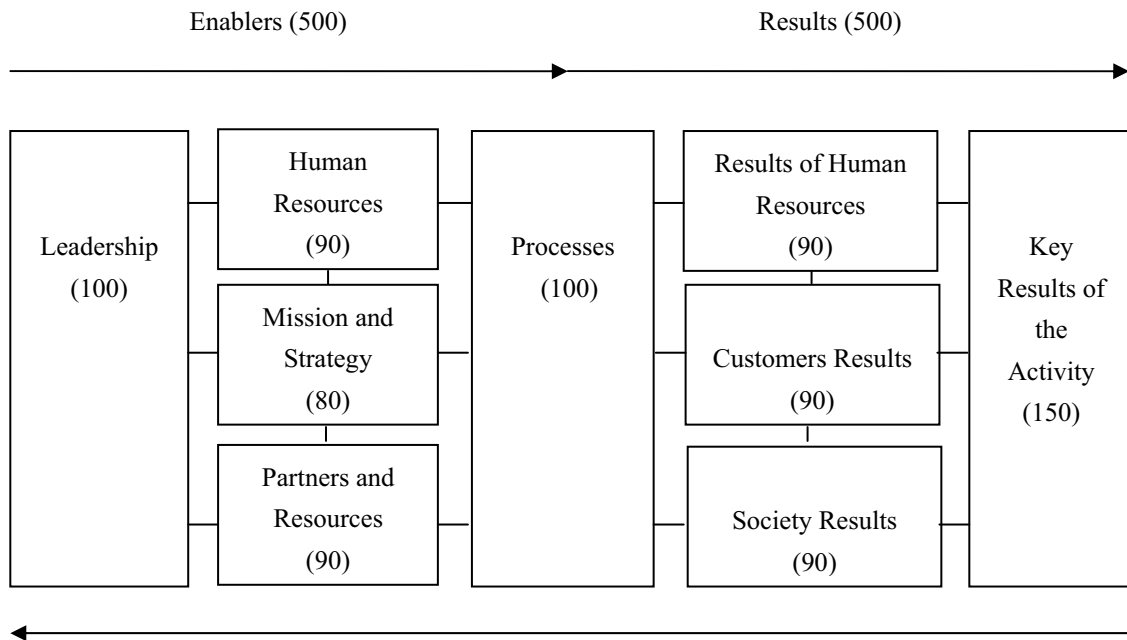


Figure 1. The EFQM model

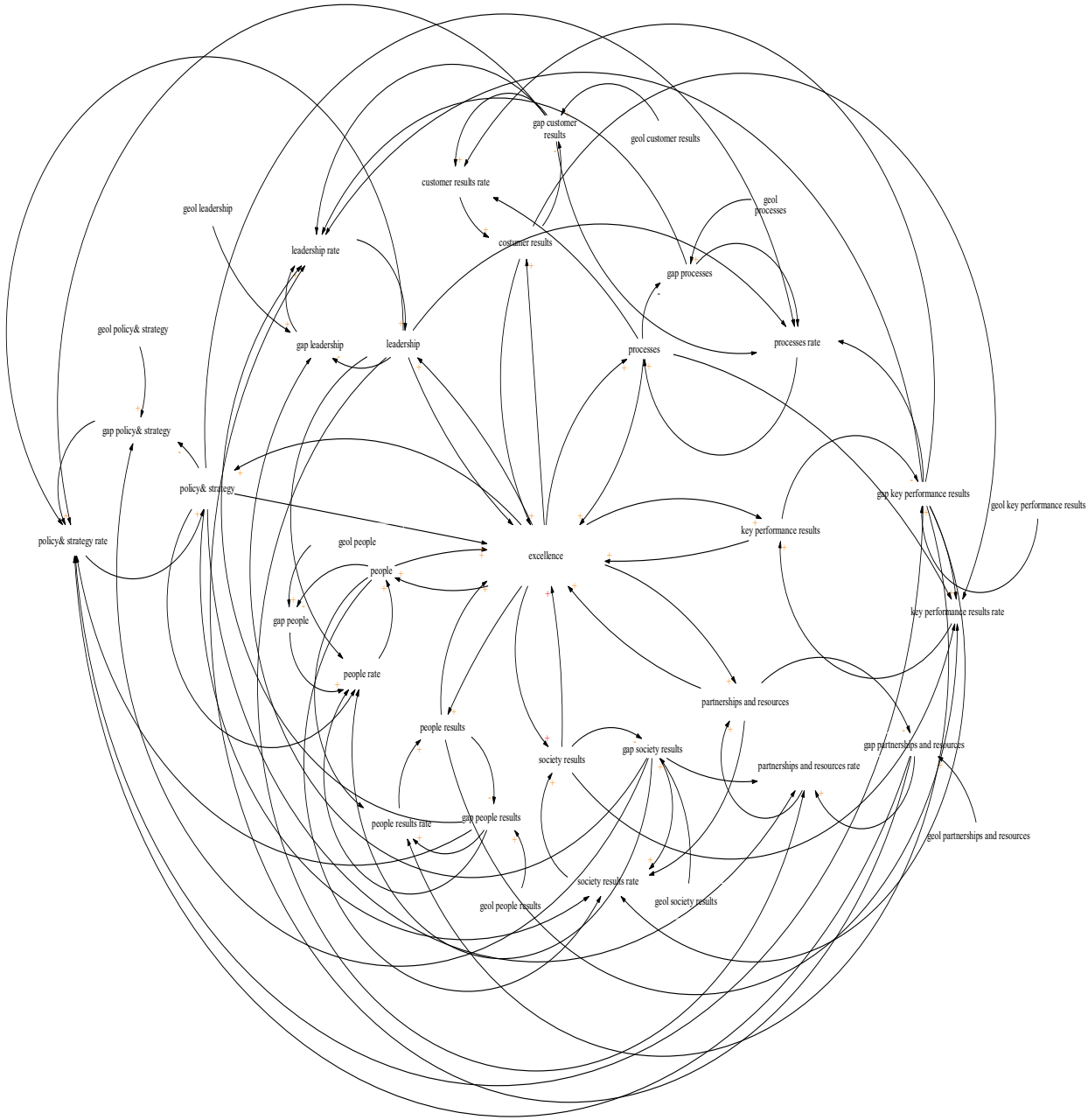


Figure 2. Cause-and-Effect diagram based on the EFQM Model

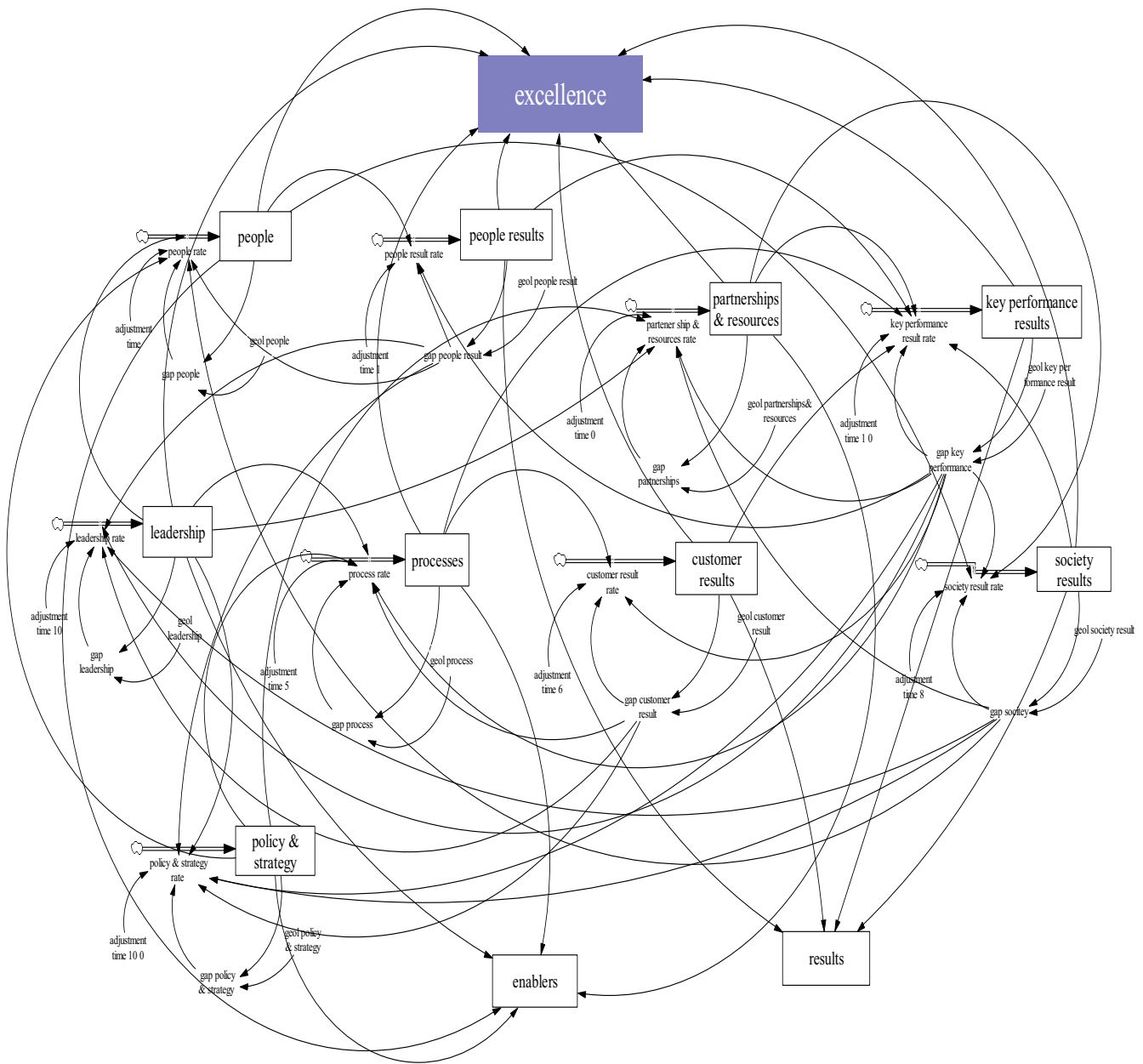


Figure 3. Stock and flow diagram based on the EFQM Model

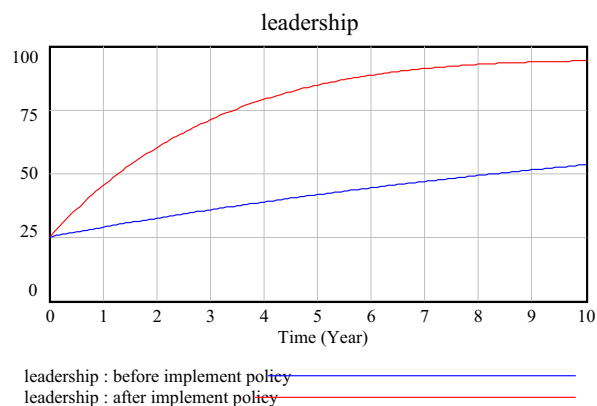


Figure 4. The effect of applying the strategies on Leadership criteria.

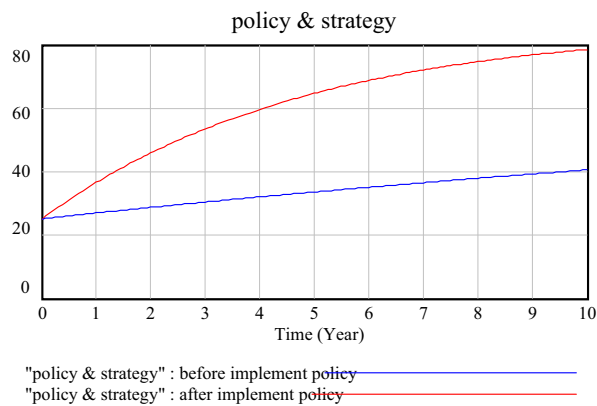


Figure 5. The effect of applying the organizational guideline and strategy

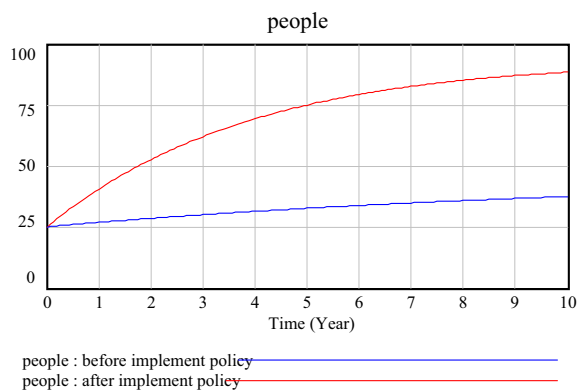


Figure 6. The effect of strategies on the people criterion

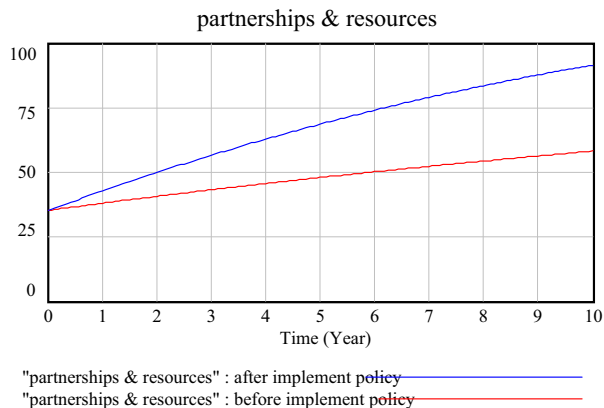


Figure 7. The effect of applying strategies on companies and organizations

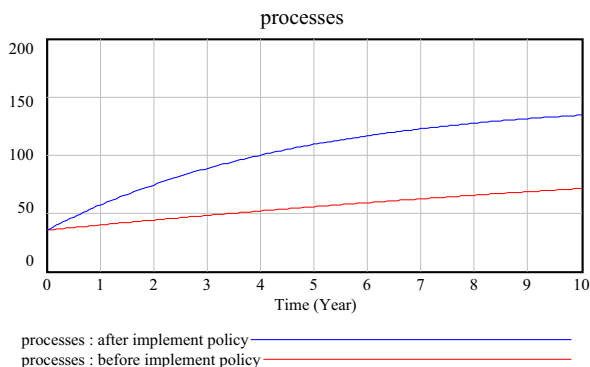


Figure 8. The effect of applying the strategies on the criteria of guideline and strategy

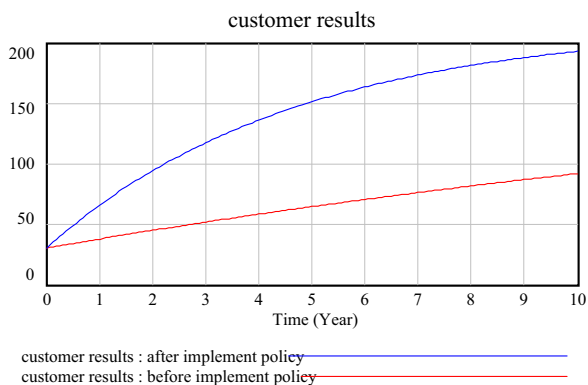


Figure 9. The effect of applying the strategies on the standard of Customer Results

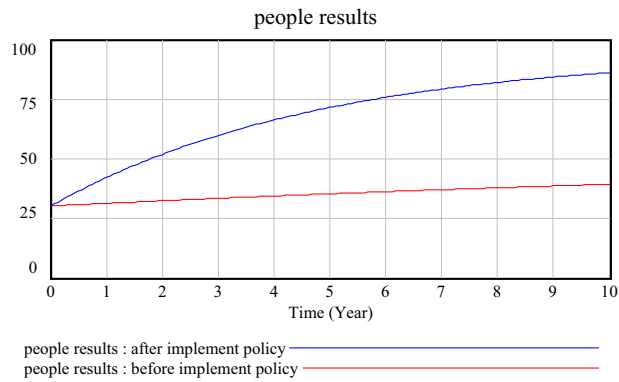


Figure 10. The effect of applying the strategies on the criterion of People Results

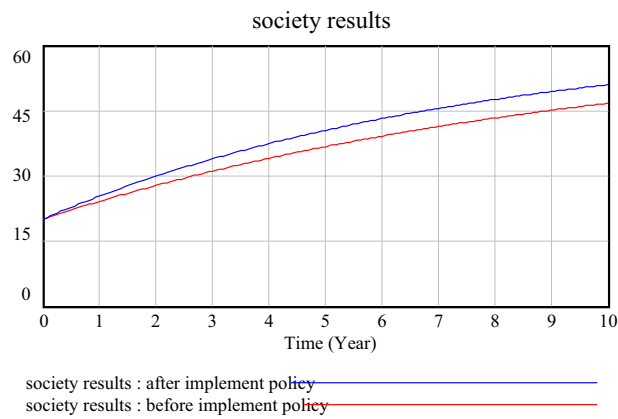


Figure 11. The effect of applying the strategies on the criterion of society results

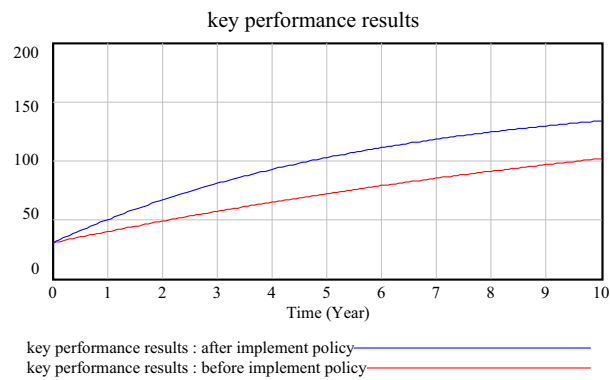


Figure 12. The effect of applying the strategies on the of key operation results

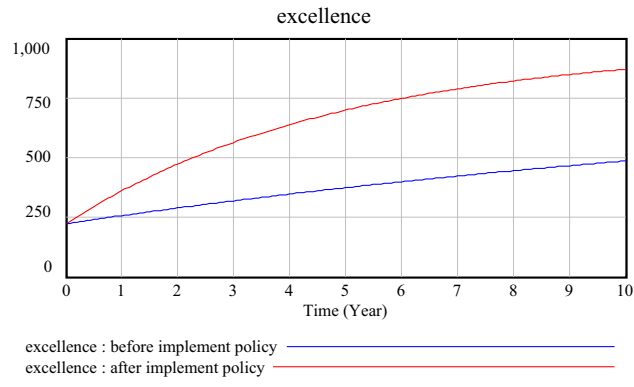


Figure 13. The effect of applying strategies in the area of leadership on attaining organizational excellence