

DEVELOPMENT MODEL FOR BUSINESS EXCELLENCE

V.D. Majstorovic and N. Nesic

Laboratory for Production Metrology and TQM
Production Engineering Department, Mechanical Engineering Faculty
Belgrade University, Belgrade, Yugoslavia

Abstract: Top management is faced today with new challenges imposed by the global competition. Business excellence, achieved through the application of TQM concept, is one of possible answers for successes achieved at the global market world. Adapting these axioms the paper describes the development of a TQM-VM model (for business excellence) and its software, that may be used for: (i) the assessment of existing business excellence, and (ii) the design or re-engineering of business systems incorporating business excellence criteria as well. The paper also presents an example of the assessment of a business system according to the first approach.

Keywords: TQM, Business Excellence, Assessment

1 INTRODUCTION

The following facts characterize the changes in the business environment at the national and global level: (i) increasing imposition of the requirement made to organizations' top management to provide attractive quality products, together with effective business results and high business reputation, (ii) effective development of business management infrastructure under decreasing time and physical distances as a result of the progresses in the information and transportation technology, and (iii) increased indefiniteness (frequency) of changes and their accelerated occurrence within political, economic, social and technological processes in the world [2, 5].

The answer to these changes could be the change of the total quality management model or the concept of business excellence. These approaches represent the basic tools for an organization to achieve business success in the transition to the new millennium.

In view of these facts the TQM-VM model was conceived and developed based on the following

principles [1,4], Figure 1: (i) quality driven by customer demands and expectations; this is a strategic concept of an organization oriented towards the fulfillment and predicted expectations of its customers. Such an organization adopts systematic approach in the translation of customer demands into the design and manufacture of high quality products, (ii) the leadership of the management, managers and experts; the organization should build up a leadership system to develop and execute business excellence strategies. The leaders should orient the organization towards the customer, create clear goals and visible values with high expectations; (iii) the motivation of the employees and their satisfaction; success of the organization greatly depends on

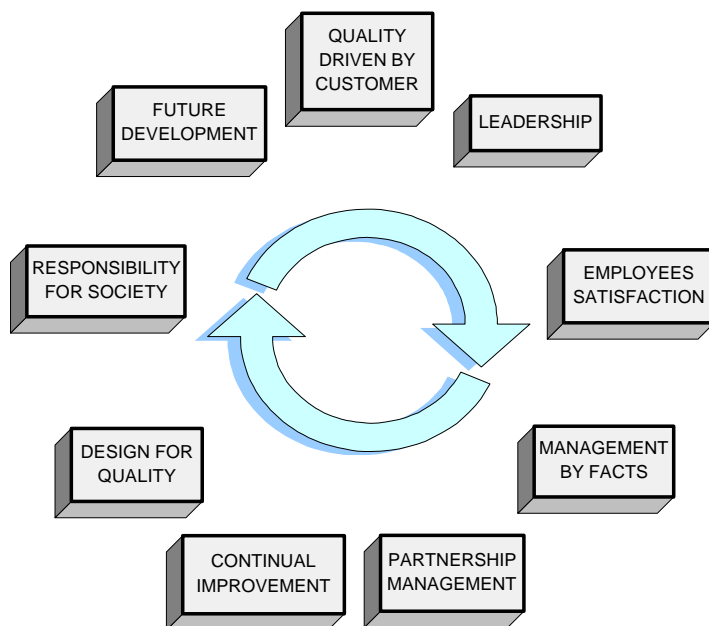


Figure 1. Basic principles for TQM model

the knowledge, know-how and motivation of employees. The satisfaction of employees and their personal development play a key role in organization business success; (iv) fact- based management; modern management is based on follow-up, measuring, analysis and control of business performances. Organization strategy defines the performances to be assessed, and they should offer all data and information about key processes, their results and business results; (v) the development and promotion of partnership relations; the advancement of external and internal partnership oriented towards the accomplishment of defined organization goals; (vi) continuous improvement, innovation and learning; high-quality product based on improvement and innovation of business/manufacturing processes is one of the most important elements of business excellence. With such processes additional (new) values are offered to customers with the achievement of effective business results; (vii) quality of the design and designing for quality; the intuition, imagination and effective use of the knowledge of design engineers with the application of CE, QFD, Taguchi, axiomatic design methods is a basis for a complete approach to the designing for quality. In this way quality prevention is achieved which is built in into the early stages of product's life cycle; (viii) public responsibility of the organization and its determination to achieve business excellence; the organization is building up its

| TQM model award | Deming's awards (Deming's TQM model) | MBNQA model (award) | EFQM new model (award) | TQM-VM model (YU award for TQM) |
|---------------------------------------|---|--|---|--|
| Characteristics | | | | |
| Possible award winners | <ul style="list-style-type: none"> - individual - application (company, organization, sector/shop) - factory - foreign organization | <ul style="list-style-type: none"> - company - education organization - small organizations | <ul style="list-style-type: none"> - company - company divisions - small and middle organizations - public organization | <ul style="list-style-type: none"> - production organizations - service organizations - small organizations |
| Award structure | For company: <ul style="list-style-type: none"> - 10 criteria - 72 subcriteria | For company: <ul style="list-style-type: none"> - 7 criteria | <ul style="list-style-type: none"> - 9 criteria | <ul style="list-style-type: none"> - 10 criteria - 35 subcriteria - 201 elements (demands) - 527 questions - 2675 corrective action |
| Basic criterion | Business results | Business results | Organization performances | Business performances based on quality |
| Model starting elements | <ul style="list-style-type: none"> - policy and goals of the organization quality - TQC diagnosis | Strategic and action plans oriented towards market and customers | <ul style="list-style-type: none"> - strategy for business excellence | <ul style="list-style-type: none"> - achievement of organization business excellence |
| Year of establishment/ revision | 1951/1992 | 1987/1998 | 1992/1999 | 1999* |
| Basic tools for continous advancement | <ul style="list-style-type: none"> - policy deployment - Hoshin planning | <ul style="list-style-type: none"> - leadership - process management | <ul style="list-style-type: none"> - self-assessment | <ul style="list-style-type: none"> - self-assessment |
| Specific feature of award winners | <ul style="list-style-type: none"> - department for TQM promotion in the organization - production organizations | <ul style="list-style-type: none"> - quality leaders in the USA | <ul style="list-style-type: none"> - continuous development of all functions | <ul style="list-style-type: none"> - TQM department - quality leaders in Yugoslavia |

*) This award model was designed in the year quoted

Figure 2. Basic characteristics of some TQM models (awards)

business excellence also through the respect of moral and ethical principles. One of the basic standards that have to be satisfied in this context are ISO 14000, and (ix) future development; this business excellence model is particularly turned towards the future, relevant both for the customers and groups of interest (employees, owners, suppliers and the society). The prediction and management of changes in this field include customer expectations, new business opportunities, technological development, new markets and customers, the expectations of customers and groups of interest, the development of competition.

The above principles represented a theoretical framework for the design and development of the TQM-VM model.

2 TQM-VM MODEL

The starting elements for the research and development of this model were the following: (i) state-of-art of the TQM model development in the world, and (ii) quality improvement level achieved in our country. On the basis of these facts the model with the following basic features was designed: (i) its key features make it closest to the new EFQM business excellence model, offering to our organizations implementing it the possibility to participate in the competition for this European award, (ii) it is so designed and developed that it could be used as a self-assessment tool, enabling continuous improvement primarily of organization product quality that is model basic intention, and (iii) its orientation towards the achievement of business excellence based, however, on product quality. Figure 2 shows basic characteristics of the best known TQM models, as well as the model presented in this paper [1-4].

2.1 Basic structure of the TQM-VM model

TQM-VM model structure was based on previous analyses. Its structure is shown in Figure 3 [1]. It is connected in the following way: main criterion–subcriterion–requirement–question–corrective actions. In this way a direct connection along the line TQM requirement-business excellence element is established. The model thus enables design, development and self-assessment.

According to its structure the definition of the model is as follows:
Organization leadership executes the policy and strategy of quality, with participation of all employees. Through effective management of resource system it effects customer satisfaction, develops partnership relationships and social responsibility, oriented towards business excellence, with consistent improvement of quality of all process based on self-assessment resulting in products of world class quality.

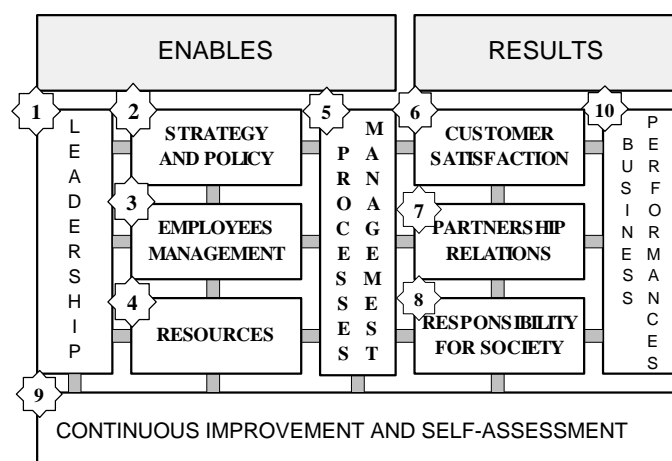


Figure 3. Structure of TQM-VM model

Its basic framework comes out of this definition and presented model structure and it includes: (i) top management leadership, that is the creator and executor of all strategic activities leading the organization towards business excellence, (ii) the essence of each organization is to achieve customer satisfaction with its products and services, (iii) the organization builds up, develops and improves its business excellence on long-term, middle-term and operational policy, vision and mission, (vi) the organization should pay special attention to its resource management (employees, information, finances), (v) business excellence is achieved with consistent development and improvement of relationships with the groups of interest (customers, employees, suppliers, owners, society), (vi) the organization on the road to business excellence should fortify its fundamental strengths (technology, vitality, capability for changes), flexibility and reputation (image) and (vii) the building of a business excellence organization is achieved with these characteristics (management and leadership at all levels, learning and education of employees, innovative work and continuous improvement of business/manufacturing processes, flexible response to environment and interest groups demands, quick response to market demands and creativity in the development, placing and marketing of new products).

3 TQM-VM MODEL SOFTWARE STRUCTURE

The most important feature of the new generation of TQM models is the possibility of organization self-assessment. The self-assessment procedure could be long and tedious, due to the large number of questions (i.e., 535 in TQM-VM model) and the multitude of facts that have to be simultaneously kept in mind. The idea behind the designing of this software was to computerize all this work and help the user have all essential information on one place during the assessment.

From the software designing aspect it may be said that the TQM-VM model consists of three key levels (Figure 4): (i) criteria level, (ii) subcriteria level, and (iii) self-assessment question level, which are also developed software structure levels, noting that the third software level, in addition to self-assessment questions, contains preventive and correction actions as well.

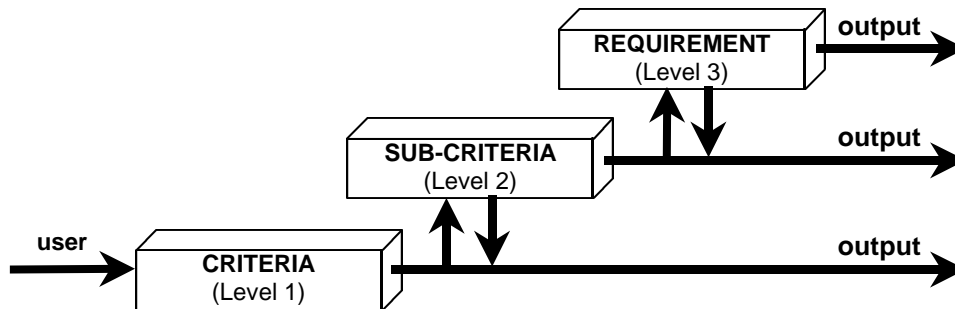


Figure 4. Software levels for TQM-VM model

By starting the program the user opens the first level - criteria level showing schematic structure of the TQM-VM model. Each of criteria is represented by one command button. Clicking on the button of corresponding criteria opens the second level – subcriteria level for selected criterion.

At the second software level (Figure 5) the user is offered the following options: (i) the acquaintance with TQM model elements, (ii) generation of recommendations for preventive actions, (iii) self-assessment of quality level, and (iv) generation of recommendations for corrective actions. In designing the software the aim was to offer the user all information essential for the provision of quality according to the TQM-VM model in one place. Subcriteria instructions are given in a form of the so called tabs. With the activation of a tab for corresponding subcriteria, in addition to the listing of definitions of that element, the access to the modules for preventive actions, self-assessment and corrective actions is made possible by pressing command buttons placed right to the tabs.

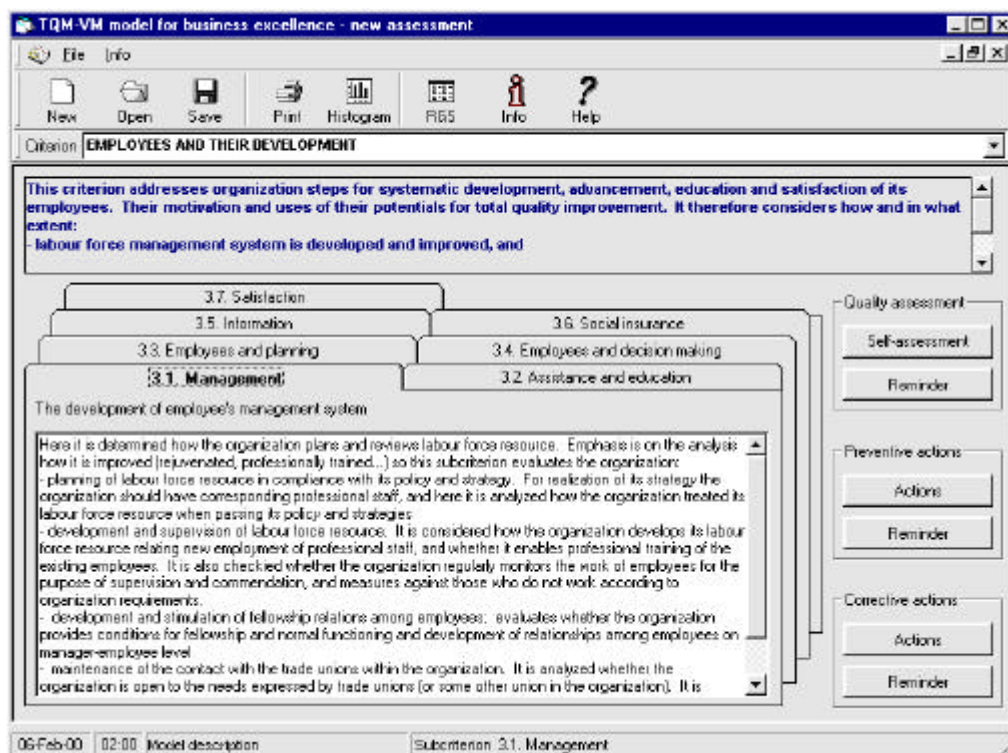


Figure 5. Software basic options

With such a design solution the following is achieved: (i) the user may be reminded, at any moment during the self-assessment process, of the requirements TQM-VM model contains within each corresponding subcriteria, without need to use any additional references or other means; and (ii) the user may, in a simple way, compare the achieved level of quality in his organization with a desired one, as well as to obtain all necessary information that will bring closer his organization to business excellence level.

The subsystem of the program for preventive actions has the task to offer the user the information about the activities, which have to be undertaken in the organization to coordinate its work with TQM-VM model requirements. This module is particularly interesting for users who have not as yet routed their way to the business excellence and have not undertaken any activities in this direction. Preventive actions are defined in a form of recommendations, at the subcriterion level.

The self-assessment module is the most important software subsystem enabling the user to use the following self-assessment method advantages: (i) if a sincere and objective answer is given to 535 questions-requirements prescribed by the TQM-VM model, the user gets a comprehensive report on the extent of compliance of his organization with business excellence principles, and, if desired, may also get instructions concerning necessary corrective actions for all those shortcomings discovered during the self-assessment process; (ii) nobody has to learn about positive or negative results obtained by self-assessment, except internal assessment team, so that the competition will not get acquainted with weak spots of the organization, and eventually misuse them; (iii) this software offers the option of saving, so practically infinite number of assessments may be saved and the organization may follow up its progress after certain time intervals; and (iv) the software gives assessment results both on the global and on the subcriterion level, so that the organization may analyze which wholes and functions adopt faster excellence principles, and strive to coordinate this process.

The form with self-assessment questions is shown in Figure 6. To each question one of five offered percentage answers may be given. The user checks correct answer by a single mouse click at the corresponding option-circle. Having answered all 535 self-assessment questions the conditions are created for generation of the report on achieved quality level. The software enables making and printing of three types of reports: (i) general, (ii) in detail, and (iii) a histogram. General reports give data on weighty coefficients, the maximum and assessed number of points and the achieved quality level for each of criteria, as well as sum values of all mentioned magnitudes. In detail report gives data on weighty coefficient, maximum and assessed number of points and achieved level of quality for each of subcriteria, as well as sum values of all mentioned magnitudes. The histogram is a comparative graphical representation of maximum and achieved number of points according to each criterion.

| Question | (%) | 0 | 0-25 | 25-50 | 50-75 | 75-100 |
|--|----------------------------------|----------------------------------|----------------------------------|----------------------------------|-----------------------|-----------------------|
| Question No.1: Does top management have clearly defined quality-oriented business strategy (vision)? | <input checked="" type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Question No.2: Is the way for the execution of business strategy-mission clearly defined? | <input type="radio"/> | <input checked="" type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Question No. 3: Are the needs and expectations of all groups of interest (employees, customers, suppliers, shareholders, society) taken in consideration by strategies made? | <input type="radio"/> | <input type="radio"/> | <input checked="" type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Question No. 4: Is the business strategy subordinated to the execution of high business performances? | <input type="radio"/> | <input checked="" type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Question No.5: Did top management define quality execution policy and strategy? | <input type="radio"/> | <input type="radio"/> | <input checked="" type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Question No. 6: Did top management document the vision, mission and quality policy? | <input type="radio"/> | <input checked="" type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Question No. 7: Are quality goals clearly defined in quality policy? | <input type="radio"/> | <input type="radio"/> | <input checked="" type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Question No. 8: Does top management comply (and apply) with the organization expectations and with defined quality policy? | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input checked="" type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Question No. 9: Does top management work on its education and does it support the education and training of its employees? | <input checked="" type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Question No. 10: Does management maintain communication (two-way) with all employees? | <input type="radio"/> | <input checked="" type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

Figure 6. Self-assessment questions form

Corrective actions are a set of recommendations directing the user which activities should be undertaken for improvement of achieved level of quality. Corrective actions are generated at subcriteria level. It was envisaged to prescribe a corresponding corrective measure for each of 2675 possible answers to questions, called from pertinent table in the data base subject to the combination of answers.

4 AN EXAMPLE OF ORGANIZATION ASSESSMENT

The organization "Milan Blagojevic" from Smederevo was selected to test the software. The organization is a well-known manufacturer in the field of metal processing with a certified quality system, according to the ISO 9001 standards. The following results were obtained (level of fulfill of TQM model requirements in % of the maximum number of points envisaged for a criterion in question):

(i) Leadership (59.5%), (ii) Policy and strategy (55.8%), (iii) Employees and their development (35.1%), (iv) Resources (61.3%), (v) Process management (67.1%), (vi) Customer satisfaction (77.27%), (vii) Partnership relationships (89.7%), (viii) Social responsibility (67.0%), (ix) Continuous improvement and self-assessment (62.5%), (x) Business performances (57.5%). The total level achieved by this organization, according to the TQM-VM model criteria was 64.0%.

Graphic representation of results obtained (histogram) is shown in Figure 7.

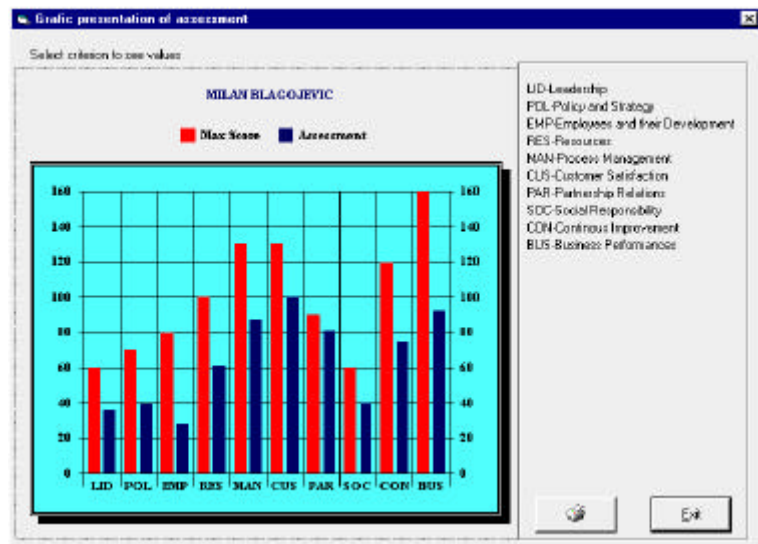


Figure 7. Screen histogram

5 CONCLUSION

The present model for the assessment of business excellence of a manufacturing system may be used for quality improvement in these systems. Its knowledge base contains 2675 corrective actions, representing an imposing range of knowledge, applicable for quality improvement in the metal processing industry factories. At the present stage of development this model, with its knowledge base (of corrective and preventive actions) may be used for the assessment and quality improvement in manufacturing organizations. It may be also used for the simulation (with smaller software addition) of TQM model for virtual factories.

The future development of this model will include also future development (addition) of questions, corrective and preventive actions for servicing organizations (schools, health).

REFERENCES

- [1] V. Majstoroviæ, *Model of Total Quality Management* (in Serbian), Mechanical Engineering Faculty, Belgrade, 1999, 130 p.
- [2] Y. Iizuka, *Japanese Model for Business Excellence*, JUSE, Tokyo, 1999, 28 p.
- [3] N.N., *Assessment of Business Excellence*, British Quality Foundation, London, 1998, 60 p.
- [4] N.N., *Criteria for Performance Excellence and Total Quality Management Improvement*, Brussels, 1999, 45 p.
- [5] S. Lu, M. Shpitalni, *Virtual and Augmented Reality Technologies for Product Realization*, Annals of the CIRP, Vol. 48/2, 1999, pp.471-496.

AUTHORS: Univ. Prof. Dr. Vidosav MAJSTOROVIAE and Dipl.-Ing. Nenad NEŠIAE, Laboratory for Production Metrology and TQM, Production Engineering Department, Mechanical Engineering Faculty, Belgrade University, 27 mart 80, 11000 Belgrade, Yugoslavia, Phone +381 11 33-70-341, Fax +381 11 33-70-364, E-mail: majnem@eunet.yu, majstorov@cent.mas.bg.ac.yu, nnesic@eunet.yu