Research Paper

The Need for Information System Design in Building a House of Quality

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Abstract: *The flow of information is an important quality assurance system of the subsystem. The use of information technology enables fast data transfer, product modeling, electronic data transfer for the demands of the customers / users, as well as fast and efficient production.In this paper, the analysis of the Macedonian companies is being given in terms of the extent to which they use relevant information while conducting the business processes and measures that the top management should undertake in order to improve communication systems.The attempt to answer these questions requires building information system as part of the quality system and as necessity in the process of design and implementation of TQM (Total Quality Management) system. The TQM strategy founded this way denotes integration of information technology with internal standardization, methods and techniques for flawless production, optimized costs, as well as education and motivation of the employees in which team spirit is present.*

Keywords: TQM strategy, information system, internal standardization, SPC (Statistical Proses Control), optimization of costs, education and motivation of the employees.

1. Introduction

The Impact of the Information System on Improving the Quality of Business Processes: Today, the success of business processes cannot be imagined without the use of informational computer systems. Computer systems according to their hardware and software content are basis for rapid transmission of information on the implementation of business processes. These systems are always connected with answers to the questions what, who, how, where, when and connectivity issues - who is responsible for the completion of work in the enterprise.

Through informational computer systems, data on the development of the standardization is being gained, as well as flawless production and cost analysis as the basic pillars of the system of total quality management (TQM). Today, these data are stored in organized forms and packages (database), which are computerized, can be searched and used at any time, applied any job, in order to achieve efficient operation.

All these pointed observations raise the following dilemmas:

- Whether the Macedonian companies documents and information answer the questions of who, why, where, when as well as to whom to hand over information during the implementation of business processes;
- Whether the Macedonian companies have built information system as part of the quality system;
- Whether the Macedonian companies are willing to accept TQM philosophy.

2. Materials and Methods

In this paper an analysis is being given of the situation in the Macedonian companies through one of the criteria for the European Quality Award which is the way companies manage effectively and efficiently with IT resources.

The analysis in this paper is a segment of the general survey of the current situation in Macedonian companies in the field of design and implementation of the quality system, analyzed through the four pillars of the house of quality whose peak is the top management, and is basically the measurement, assessment, analysis and comparison of quality / substandard.

The current situation is analyzed by obtaining European Quality Award criteria: leadership, policy and strategy, management of staff, resources, processes, customer satisfaction / users, staff satisfaction, impact on society, business results. These criteria are being used in order to assess the position of the Macedonian companies if they were to compete for the European Quality Award.

Special attention is given to the collection of input data in the research. Studies have been made with the questionnaire and their own views on the real situation in Macedonian companies. The analysis of the findings was made by mathematical statistical methods applied in the survey which was attended by 151 local companies.

3. Results and Discussion:

One of the criteria for getting the EQA (Europe Quality Award) is the way in which the company runs efficiently and effectively with the information resources.

For this purpose, it was surveyed how prevalent computer programs in the operation of their company and the following data were obtained:

- 22% of the respondents said they started with complete system integration of information technology, but in actual operation that system had worked partially;
- 74% of them are reported to have individual computers in given segments of the company, but they are not connected to the network;
- 4% of them have had a powerful central IT unit, without independent individual computers. The presence of computers in building a complete computer information system in our companies is relatively weak.

Macedonian managers need to understand the necessity of the use of information technology that will enable high-speed data transfer, product modeling, electronic data transfer to the demands of customers, as well as fast and efficient production. Design of information systems in companies means a drastic change in the behavior of employees, radical changes in organizational structure, clearly defining the rights, obligations and responsibilities of each individual, which creates a significant driving force for achieving total quality management system.

For this purpose, it was surveyed in what way the company exercised an effective dialogue with employees, i.e. the way in which communications take place in the company and receive the following information:

•   12% of companies reported established vertical and horizontal communication in their companies that helps managers to assess the effectiveness of their downward communications and allows them to perceive organizational problems;

•   88% reported a formal communication from the top towards the base that shows the inflexible attitude of the top management, without the necessity of effective upward communication. Top management does not feel the need to hear the proposals, suggestions and demands of employees to improve business processes.

In companies which have established quality system there are procedures and guidelines for the implementation of business processes. Job descriptions and duties are documents by which the top management communicates with employees. Organizational culture as a system of values and beliefs through downward communication is transmitted to employees, and upward communication top management wants to hear the voice of the employees, i.e. to get the source, as well as processeded and synthesized performance data. The horizontal communication allows the exchange of information between employees, at the same level in the hierarchy and is a necessity for coordinating business processes.

The data show differences among different companies, after the way they collaborate with employees and how they collaborate within them. Most of the formal communications appear from the top towards the bottom in construction, agriculture, forestry and fisheries, as well as the service branches.

There is a big difference between running companies with private capital and state how they perform both internal and external communication. In many of the private companies (almost 60%) there is better communication, more efficient problem solving, as well as overcoming conflicts. State firms findings contradict communication because the underperforming employees are not ready to cooperate, and conflicts are difficult to be exceeded. All this leads to a partial loyalty by the employees to the company due to a lack of effort by managers in order to build a clear, consistent and honest relationship with the employees and have a professional attitude towards work, which is the basis for establishing trust in the business relationships.

In order to build a good quality assurance system and subsystem information, it is necessary to have motivation as a common term for all internal factors that consolidate the intellectual and physical energy, initiate and organize individual activities, direct the behavior of employees and provide the direction, intensity and duration.

A good quality assurance system provides an answer to the questions how the employees are being involved in business processes, in which way they are authorized to perform organizational functions and in which way their results are being recognized. Companies aspiring to TQM have awareness of the need to improve business processes, management encourages generation of new ideas, take actions for codification or transferring of ideas from the minds of the employees in an explicit form as well as their implementation.

For this purpose, it was surveyed how employees are encouraged to improve business processes by managers and the following data were obtained:

- 19% of respondents believe that their companies employees' make suggestions for improvement and ideas are being implemented either through adjustments to standard operating procedures (SOP) or without an adequate procedure;
- in 73% of cases, problems have been discussed, but the proposals are not put on paper (or registered, but not implemented), which means that in 73% of cases, the ideas have not been implemented. It shows that the analyzed organizations have a large number of unused ideas;
- only 8% of respondents claim that they do not discuss this topic, i.e. the ideas remain in the minds of the employees, based upon the fact that they do not want or are afraid to voice the problems before the others. In these companies there is a problem with sharing knowledge within them.

The reasons should be sought in organizational culture, because there is no sharing of knowledge if there is no trust between employees.

If we analyze the surveyed companies by industries, the largest percentage of suggestions for improvement of business processes are being found in the manufacturing industry and services, and the lowest percentage of companies dealing with accommodation and food service activities, transport and storage and construction.

- From 11 - 37% is the range of companies in which employees make suggestions for improvement and their implementation;
- From 56 - 83% is the range of companies in which employees make suggestions for improvement, but they remain on the table, without any possibility for analysis, adoption or implementation;
- From 3 - 17% is the range of companies that do not discuss about the issues, there is no room for improvement and there is no possibility for a storm of opinions. This shows that there is no trust the companies, there is no sharing of knowledge, because many of the ideas remain in the minds of the employees.

Participation of employees in all functions of an organization is very important and the creative energy of our people who have entered the work in case of mobilization should be also taken into account. What the developing countries are facing, among which we find our country to, is the proses to find and identify those parts of their own tradition, history and culture that can be used in construction management.

Need to Design Information System in the Building of the House of Quality: The application of the new TQM strategy in Macedonian companies design means good documented quality system which covers all business processes of the company and is a necessary basis for the successful application of SPC and effective teamwork, which otherwise could not be set in case of poor system quality. This way ensures that the views of top management contained in the policy of quality are being carried out, hence creating a climate and informational base that can develop teamwork.

Building an information system as part of the system is needed in the process of design and implementation of the integrated methodology of TQM system. Transmission of information should be fast and efficient. By application of computer technology used in order to automate the processes, the transmission and application are under control. Databases allow employees a quick access to all the information in order to achieve flexibility and economy in operation.

By integrating and processing data, companies can act preventively in the management of business processes. IT technology will not only allow use of a database, but also the application of methods and techniques for flawless operations, as well as methods for support and evaluation of the results, in order to get real data, at the right time and place, as well as fast processing, real evaluation and under taking of corrective measures. The use of e-communication will allow fast and easy connection, simplified coordination between the team members and staff, as well as other benefits (fast delivery, as well as feedback from customers / users).

New solutions for the management of business processes should be in electronic form and in regulated environments, because they are the only practical way to achieve efficiency and conformity simultaneously.

Such a system supports the design and implementation of the TQM system ISO 9001:2008 standard, completely done in electronic form for all business processes in the company - from creation, review, approval and publication of the system's documentation as well as the records and processes which take place in the company without having to publish any document in writing. Such system should support a well-designed subsystem of a flawless operations, a subsystem's costs of analysis as well as the employees' education and motivation. Thus, a certified environment for total management of business processes, is being creating, fully constructing in an electronic form.

Performance of a company will depend upon how much it used relevant information while conducting business processes. The high productivity in the developed companies is result of use of the modern technology, as well as the modern concept of organization and management. Having built information system which in itself contains all subsystems, presents a guarantee of success of the company's performance at the European market, where the precondition is high quality at optimal costs. This means that a well-constructed information system leads to a situation where the company optimizes the performance, hence achieving maximum effects. Thus the information system should be brought into the highest optimized state of the performance.

In order to design the information system, the following is found to be necessary:

- input data (data which describes the quality requirements and the necessary actions to achieve a given goal);
- output data (results and evidence).

In order this system to operate successfully, the following is factors are required:

- an independent status of the database and the ability to dynamically delete and add new data in the database;
- flexible structure of the database (to have easy access to data; any data consists of an identification tag and tags the content of the data);
- a series of computer commands that will allow the transfer of information from one work unit or service to another (from one location to another) or from one computer program to another;
- the possibility of supervision and user interaction with the database management system;
- a series of commands for forming printed reports for the required content of the database;
- encrypted system users, in order to protect the information from possible intrusion, disruption or disposal of data;
- registered users who drew or brought all the data for control.

Communication between top management, managers of all levels and employees should provide a new desktop environment, in order to improve of business performance. Achieving effective dialogue

with employees can only be realize through building and effective communication system. The effectiveness of the dialogue depends on the willingness of the company to involve employees in decision-making on all issues. Communications must be developed within the company from top to bottom and vice versa, as well as lateral communication.

The structure of the communication system must be clear, defined and available to all who are interested in using various communication media (regular or formal meetings with employees, internal magazines, professional newsletters, employees' survey, electronic communication, etc.). Direct communication with employees at their workplace is especially important for those who want to see the managers and elaborate their ideas personally to them. While building the canals of communication one must take into account that there are two way channel and that every employee at opportunity to establish a return to the higher levels. The effectiveness of communication should be regularly evaluated and improved through reviews conducted by top management of the company.

Quality system for the design of the information can apply the QC-CE-Pyramid model, according to which the system should be done by Deming's PDCA circle and the Ishikawa access: who, what, where, who, fits into the company's pyramid hierarchy.

By QC-CE-Pyramid model can standardize all business processes in the company through the standard operating procedures in the form of flow charts. Standard Operating Procedure begins with the planned activity and input information about the initial state. It continues with business processes and activities of each stage, out which it receives output information that is an input for the next operation. Finally, the end business process ends in the form of a report on the quality, figure 1.
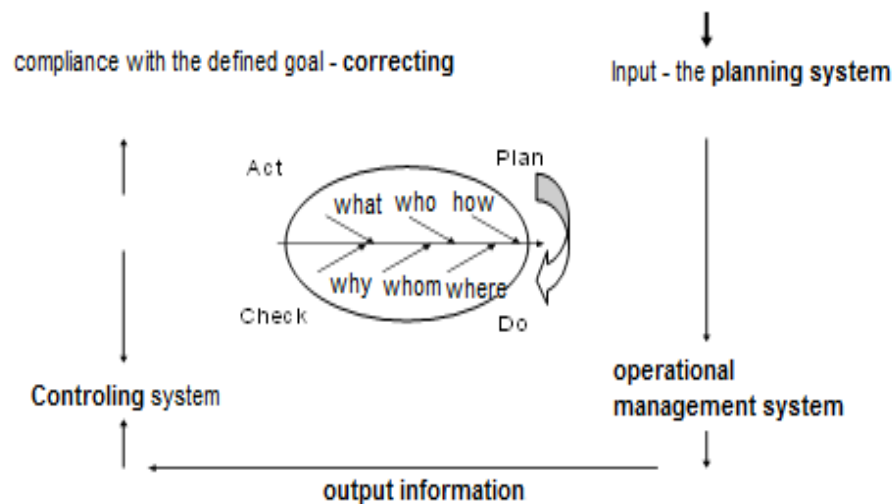

Figure 1: Use QC-CE-Pyramid model in quality building information system

Moreover, the result of vertical, horizontal and diagonal connectivity between employees is being archived, according to the structure of the pyramid. Thus, ensuring quality in the company is followed by the information in accordance with the SOP. In this way, improving its efficiency and effectiveness in terms of the flow of information on the quality and the establishment of a more efficient system control. Through quality QC-CE model define the obligations and responsibilities of all employees. Thus, rules of behavior are being created in order to achieve good interpersonal relationships, figure 2.
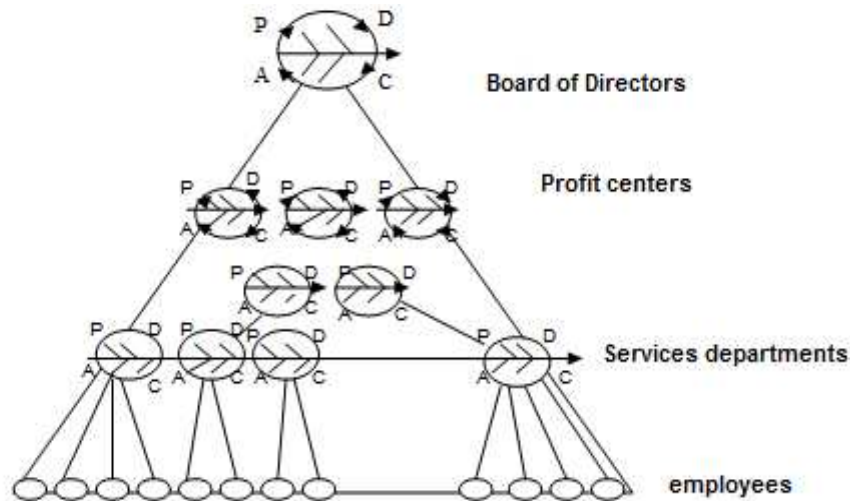
Figure 2: QC-CE pyramid model for total quality management

The subsystem should determine the quality information feedback mechanism, in order to undertake corrective links according to the Deming's round circle which continues to fluctuate.

4. Conclusions

The benefits of applying QC-CE-Pyramid model in quality building information system can be achieved:

- through QC-CE pyramid model, which can standardize all business processes in the company through the standard operating procedures in the form of current maps;
- by practicing vertical, horizontal, and diagonal connectivity between employees according to the structure of the pyramid. Thus, the ensurance of the quality of the company is followed by a flow of information, in accordance with standard operating procedures;
- when the quality system defines the obligations and responsibilities of all the staff; through this mode of transmission of information a complete quality care can be provided.

References

[1]   V. Chepujnoska, E. Mitreva and G.J. Chepujnoski, QC-CE- PYRAMID model in the designing of the information system within a company, *Macedonian Journal of Chemistry and Chemical Engineering*, 27(2) (2008), 163-168.
[2]   C. Lazarevska, Optimization of the quality costs in the production of confectionery, *Master Thesis*, TMF, Skopje, 2007.
[3]   V. Majstorović, A contribution to the digital quality concept research: Keynote paper, *International Journal Total Quality Management & Excellence*, 33(3) (2005), UDK 658.5 YU ISSN 1452-0699, Belgrade.
[4]   D. Bogićević, ISO 9000- Prva milja u TQM maratonu, *TQM*, 24(3-4) (1996), 26-31.
[5]   G.K. Kanji, An innovative approach to make ISO 9000 standards more effective, *Total Quality Management*, 9(1) (1998b), 67-78.
[6]   K.J. Zink and R. Schildknecht, Total quality konzepte– Entwicklungslinien und uberblick, (total quality concepts – Developments and survey), in K.J. Zink, (ed.), Qualität Als Managementaufgabe (Second Edition), Landsberg, Verlag Moderne, 1992.
[7]   K. Thompson and P. McParland, Software process maturity (SPM) and the information systems developer, *Information and SW Technology*, 35(6/7) (1993), 331-338.

[8]   E. Mitreva and V. Chepujnoska, Quality projection of the manufactural processes regarding the environment protection, *Seeu Review*, Tetovo, 4(1) (2008), 93-107.

[9]   E. Mitreva and V. Chepujnoska, Application of the concept of total quality management in information management of an enterprise, *Economic Development*, 9(3) (2007), 129-143.

[10]   E. Mitreva and V. Chepujnoska, Quality projection of the manufactural processes regarding the environment protection, *Seeu Review*, Tetovo, 4(1) (2008), 93-107.

[11]   E. Mitreva and V. Prodanoska, Providing quality of the business processes through motivation and establishing an efficient communication with the employees, *Economic Development*, 3(3) (2009), 139-155.

[12]   E. Mitreva, Methodology for improvement of business processes, *Central and Eastern European Online Library*, 3(3) (2009), 177-190.

[13]   EFQM, Common interest day workshops, *Management of Innovation*, *Quality Link*, 9(51) (1997), 7-11, http://www.efqm.org/ (accessed March 2013).

[14]   E.J. Ross, Total Quality Management, Florida Atlantic University, 1994.

[15]   E.W. Deming, Kako Izaći iz Krize, PS Grmeč, Beograd, 1996.

[16]   M.J. Juran and F. Gryna, Quality Planning and Analysis (Third Edition), Mc, Inc., Graw-Hill, Tampa, 1993.

[17]   J.V. Saraph, P.G. Benson and R.G. Schroeder, An instrument for measuring the critical factors of quality management, *Decision Sciences*, 20(4) (1989), 810-829.

[18]   National Institute of Standards and Technology, National Quality Award Criteria, U.S., Department of Commerce, National Institute of Standards and Technology, 1999.

[19]   T.H. Davenport, Process Innovation, Reengineering Work Through Information Technology, Harvard Business Shool, Boston, Massachusetts, 1993.

[20]   B.P. Bloomfield, R. Coombs, D. Knights and D. Littler, The problematic of information technology and organisation, In Information Technology and Organisations: Strategies, Networks and Integration, Oxford University Press, 1997.

[21]   J.S. Oakland and L. Porter, Cases in Total Quality Management, Butterworth Heinemann, Oxford, 1994.

[22]   E. Mitreva, V. Chepujnoska and V. Prodanovska, TQM strategy in the designion of an quality system in the agribusiness, *International Conference*, Tsenov Academy of Economics, Svishtov, Bulgaria, 4-6 Novembar, (2009).

[23]   E. Mitreva and V. Prodanovska, Creating an innovative environment in total quality management system within companies, *Pieb*, *Prague Development Center*, 3(2009), 86-88.

[24]   E. Mitreva, Integral Methodology for Designing and Implementing a TQM System within Companies, Bigos, Skopje, 2010.

[25]   G.K. Kanji, An innovative approach to make ISO 9000 standards more effective, *Total Quality Management*, 9(1) (1998b), 67-78.

[26]   J.S. Oakland, Total Quality Management*: Text with Cases (3rd Edition), Elsevier Butterworth-Heinemann, Oxford, Burlington, 2003.

[27]   M. Hammer and J. Champy, Reengineering the Corporation: A Manifesto for Business Revolution, Harper Collins Publishers Inc., Ny., 2001.

[28]   M.J. Juran, Made in U.S.A.: A renaissance in quality, *Harvard Business Review*, 71(4) (1993), 42-50.

[29]   P. James, Total Quality Management: An Introductory Text, Prentice-Hall, Englewood cliffs, Nj, (1996).

[30]   V. Chepujnoska, Quality Management: Theory, Science and Practice, Faculty of Metallurgy Publishers Inc., Skopje, 2009.

[31]   V. Chepujnoska and E. Mitreva, Methodology for optimization of the quality costs, *Economic Development*, Skopje, 10(1) (2008), 45-57.

[32]   W.E. Deming, How to Go Out of the Crises, PS Grmeč, Beograd, 1996.