

Project Management and the Aspects of Quality Management – An Integrative Approach

Summary

The work considers integrative methodological aspects of Project Management and Quality Management. Starting from the conception goals and functionalities of the cited syntagmas, their interdependent conditionality and functionalities are analyzed. The importance of quality in Project Management as a basic integrative component exerts influence on developing the concept 'Project Quality Management'. The authors' intention is to point to, by the analysis of key components of the cited concept, the advantages that provide this concept to the organization in developing and implementing the project and attaining the integral quality as a strategic goal. The special emphasis is placed on Quality Management because no process in the organization can be considered successful without quality testing of every single task. Every project represents the process of realization of numerous in advance determined activities satisfying all the aspects of quality.

Key words

Project management, quality management, project quality management.

1. Introductory Considerations

The approach to managing the organization means some quality as a constant category included and that it participates in every business process. The domain of quality in no case represents a business innovation; however, it definitively gets a new dimension by directing the organizations at Business Process Reengineering (BPR). The concept of reengineering is often seen as a synonym complementary to the approach to Quality Management System (QMS) and especially Total Quality Systems (TQS). It is mostly because of the mutual approach in increasing efficiency of the process, but with different methodologies, techniques and the tools used. Workflow technologies are also seen as both integrative BPR and QMS components. Their complex goal enables work execution tracking, which is very important from the standpoint of quality management.

On the other side, focusing on the resources of the organization for realizing the set goals, an increasingly intensive application of Project Management (PM) is obvious. The efficiency of Project Management is based on powerful resources owned by the organization for advancing planning capabilities, implementation and control its own activities and the way of using the aggregate resources of the organization. One of the essential characteristics influencing the expansive application and growth of project management is the progress in the field of Information Technologies (IT). Contemporary technological accomplishments have changed the way of product creating and designing, which resulted, among other things, in an increasing need of the wide range of more

complex and sophisticated products and services designed to the consumers' wishes. Connecting relations and interdependent conditionality of the cited concepts from the standpoint of strategic visions and goals of the organization, there is a question if and in which extent Quality Management is part of Project Management, or PM is part of QM.

The answer can be affirmative in both cases, depending on the perspective of perceiving these two methodological approaches.

2. Project Management and Quality Management

The function of quality system that is becoming a more and more important segment is defined by the organization as their policy that is generally outlined and based on determined international standards as the framework, forming it according to its strategy and specific needs. Regarding to the general model of Quality Management System includes all the relevant activities in the field of management, the organizations, depending on the specificities of their business, can develop and control some processes to different levels of detailing.

In accordance with the cited approach, Project Management can be designated, from the perspective of quality, as an important part of Quality Management, taking into consideration that the great majority of key Quality Initiatives is realized through the projects for quality improvements (for example, *Six Sigma* rule). The application of tools and techniques for Quality Management represents an irreplaceable support, but we must not neglect,

in the process of application, very important aspects of Project Management. Here, we think primarily on the appropriate organization of activity sets in controlling project workflow, budget planning and attaining functional efficiency. Controlling technology workflow is important because it supplies an adding quality in updating and controlling all the individual process activities, pointing to the problems of slowdown and possible malfunctions in realizing operative tasks.

If we watch the second perspective, QM is part of Project Management, than we should point to some noticed problems. The use of available tools and techniques typical to Quality Management has not given expected representative results in applying to Project Management. The simplified application of QM resources oriented to measuring and improving business processes with a great number of repeating in order to improve future performances on the base of existing ones, turned out to be inadequate. The characteristic of a number of projects are repeating processes with a great number of variations with the framework of these processes (service activity, for example) that should be continually improved in every iteration. The integration of efficient resources of quality systems in the concept of project management requires an attentive choice and adaptation to the needs of project design in order to provide its successful implementation.

A qualitatively built project means the necessity of integration of Project Management and Quality Management. In this way the united functionality transforms into a new concept – Project Quality Management. The advantages that characterize PM and QM united in Project Quality management, supported by tools and techniques, should provide attaining aims of the organization, i.e. expected and desirable satisfaction of consumers and profit for the organization. One of nine fields of knowledge with the framework of classification “Project Management Body of Knowledge (PMBOK) is Project Management, qualifying this concept for discussing in detail.

2.1. Definitions and Concepts

To define quality is not very easy. There are numerous definitions with similar meanings, as well as with obvious differences in understanding and in a precise determination of this concept. We shall give some of them, to our opinion, relevant definitions. ANSI/ASOQ Standard defines quality as “Entirety of characteristics of products and services providing formulated or expected needs”. The International Standards Organization: “The whole

characteristics of entities giving the capabilities to satisfy defined or indicated needs”. The European Organization for Quality Control: “The entirety of characteristics of products or services that have the capabilities to satisfy some needs”. “The level at which the set of typical characteristics satisfy requirements”. (These definitions are not literally cited).

The main purpose of Project Quality Management is to satisfy the needs because of which it is being done. The use of project management enables realization or exceeding the needs and expectations of stakeholders. The project team must develop good relations with stakeholders, especially with the main user of the project who understands well the importance of quality. At the end, the opinion of users will be the final decision if quality is acceptable. Many technical projects were not successful because the project teams paid attention and efforts on written requirements exclusively, the main product that should be produced, ignoring other stakeholders and expectations from the project.

Quality, therefore, must be recognized, from the point of importance, at the same level as the scope of the project, time and costs. If the stakeholders are not satisfied with the quality of project management or the results of the project, the project team will have to adapt the scope, time and costs in order to satisfy the stakeholders’ needs and expectations. To satisfy the stakeholder, the project team must develop good relations with them and understand their determined or understandable and reasonable needs.

Contemporary Quality Management requires meeting the consumer’s needs, preferring prevention to inspection, and recognizing responsibility management in attaining quality. We shall cite the key attitudes of experts for whom we can say that they are founders of contemporary approach to quality system. Quality Management to the concept of Juran includes quality dissemination through the organization based on the three key and mutually connected aspects: planning, control and improving. Providing quality as a permanent process, according to Deming, is attained through some phases: quality increase, cost reduction, production increase, winning the market and providing job. The founder of the concept ‘ Total Quality Control (TQC) is Feingbaum with his book “Total Quality Control: Engineering and Management”, placing emphasis on product quality, not on the production speed. Contemporary technologies, by their tools, provide support to the cited factors of suc-

cessful business with an appropriate integration and implementation into the integral information system of the organization.

3. Quality Management

The quality of products and services primarily depends on the quality of accompanying processes where they appear. It just confirms that quality grows into the philosophy of business organization by advancing productivity, flexibility, performances and advancing human resources. Attaining quality is a dominant category with the aim of permanent advancing so it requires the control and evaluation of attained goals, i.e. management.

The project manager has the final responsibility in project quality management, and quality management has the equal priority with costs and the time plan of the project performance. A direct quality measurement, however, can be the responsibility of a special quality department or the project manager's assistant who is responsible for quality. Some empirical experiences say that management costs with the work intensive projects amounts to 12-15% of aggregate project labor costs, and approximately 20-30% of labor costs relates to quality control. That means that about 20-30 of project labor costs relates to quality management.

The significant aspects of quality management, from the perspective of the project manager, existing as a support to every project includes:

- Policy of quality – It is a document usually created by the experts for quality. It has complete support of the top management. The policy should define the goals of quality, level of qualitative acceptability for the organization and the responsibility of the staff being in charge of carrying out policy and quality. The policy of quality can be defined as good if: (a) It defines the principle of 'what', and not 'how'. (b) It enables an explanation to the environment how the organization looks at quality. (c) It promotes a consistency of the organization through the project. (d) It can enable special guides to the important questions of quality. (e) It enables changes for policy updating.
- Goals of quality are part of the organizational policy of quality including specific goals and the time framework for their performance. They must be carefully chosen. Well-chosen goals should: (a) identify goals and standards, (b) enable multifunctional and be preventively oriented, (c) define data collect-

ing and using in the cycle of permanent advancing, (d) define planning for establishing and keeping permanent advancing, and (e) include quality revision.

- Quality control is a term for activities and techniques of the process for creating specific quality characteristics. These activities include a continual process of supervision, identification and elimination of problem causes, as well as the use of statistical control processes for reducing deviations and for increasing efficiency processes. Quality control certifies the attaining the quality goals in the organization. Already cited PMBOK considers quality control as a technical aspect of quality management. A good quality system will: (a) selects what should control, (b) defines standards that will enable the base for decision-making regarding possible corrective action, (c) compares results of realization with the standards of quality, (d) works to harmonize noncompliant processes and materials with standards, on the base of collected information, (e) controls and adjusts measuring instruments, and (e) includes detailed documentation for all the processes.
- Control auditing is an independent evaluation of performance by the skilled staff. It provides the harmony of requirements regarding to the project quality and established policies and quality procedures. A good quality auditing will insure that: (a) planned project quality will be realized, (b) products are good and suitable for use, (c) regulations are satisfied, (d) data collecting and distribution system are precise and adequate, (e) in case of needs, appropriate activities will be undertaken, and (f) possibility of advancing will be identified.
- The project manager and the project team members dividing project goals into an organizational and technical structure of the project create quality plan. The project manager will document and implement so divided actions into sequences that will satisfy the user's requirements and expectations. A good quality plan will: (a) identify all the organizational internal and external users, (b) determine process forming in order to produce all the characteristics the user wanted, (c) enable the client to come earlier to the process, (d) enable the organization to react to changing the user's needs and requirements, and (e) prove that the processes

function and the goals of quality will be realized.

Project Quality Management includes three main processes:

- Quality planning includes the identification of quality standards relevant for the project and the way to satisfy them. The incorporation of quality standards into the process of project forming is a key part of quality planning. These standards will be defined depending on the project nature and the classifying the activities.
- Providing quality includes periodical evaluations of the whole project performance with a view of satisfying relevant standards of quality project. The process of providing quality means taking responsibility for quality both in the course of the project and at the end of the project. The higher management levels must take a leading role in promoting the importance of the staff role in the process of providing quality.
- Quality control includes supervising specific results done with a view of advancing the total quality. This process is connected very often with technical tools and techniques of quality management as Pareto diagrams, graphs of quality controls, and similar. We shall discuss these techniques in this chapter.

4. Planning and Quality Providing

Planning implies the capability for predicting situations and preparing actions that will result in the set project results. In the process of planning the project quality, it is very important to identify relevant quality standards for every individual product and to form quality into the product of the project and process included in project management.

The qualitative technique helping in identifying variables that have the strongest influence overall result of the process is tailored by experiments. To understand which variables exert influence on the result is a very important part of quality planning.

Planning also includes keeping activities for quality providing in the form that is understandable and complete. In planning project quality, it is very important to describe significant factors that directly contribute to meeting the user's requirements. Organizational policies connected to quality, special attitudes in the project related to product quality and description, and connected standards are important inputs for quality planning. The main output of this process is the plan of quality man-

agement and the control list that should provide quality during its all life cycle. It is also important to admit that it is sometimes very difficult to define performance dimensions. We shall cite some of requirements connected with quality:

- Functionality represents the level of performance expected from the system. Characteristics are special users' requirements and it is important to say that it is essential to identify clearly the requirements that the system must satisfy and to determine which functions are optional.
- Products of the system represent the result of the project.
- Performances say about how good product or service the user intends to use.
- Reliability is a capability of the product or service for performance under normal conditions without unacceptable failures.

Project managers and their teams must discuss all their attitudes in determining the project quality goals. The main user of the project also must take part in defining the most critical needs for quality and constantly notes to the project team about these needs and expectations. Project managers have the final responsibility for quality management in their projects.

Quality providing includes all the activities connected with the satisfaction of relevant quality standards for the project. The second goal of quality providing is a continual quality advancement. The higher management levels may have the greatest influence on project quality carrying out the job of quality providing.

Some techniques used in planning project quality can also be used in quality providing. Besides, the technique for product design by testing can also advance product quality. Benchmarking can be used for generating ideas for quality advancing by comparing specific project practice or product characteristics with those from other projects or outside the home office. Ishikawa or fish bone graphs can help in providing and advancing quality finding out the causes of quality problems.

One of the main techniques for providing quality is quality revision that represents a structural review of activities in quality management in order to use the previously acquired knowledge for advancing the performance of current or future projects. Quality revision can be done without previously determined sequence of developing these activities. The people from the home organization can do it or some experts from different fields.

Although one of the main goals of quality control is quality advancement, the main products of this process are accepting decisions, repeated work and process updating.

5. Tools and Techniques for Providing Quality

Statistical methods have been used in business, industry and science last years. With the availability of advanced automated systems for collecting, making tables and analyzing data, practical use of these quantitative methods have been increasing more and more. Besides, literature points to the fact that they give the foundation for objective decision-making based on quantitative facts. These changes enable certain benefits: (a) advancement of information processes, (b) better communications, (c) talks on the base of facts, (d) consensus for actions, and (e) information for the process of changes.

Statistical patterns and standard deviations are a key concept in quality management. The project team members who pay their attention to quality control must know statistics very well; the other team members have to know only key concepts. The standard deviation is a key concept for understanding the graph of quality control.

The statistical sample includes the choice of part of the entirety being important for auditing. Suppose that the company wants to develop an electronic system for data handling with the invoices from all their suppliers. We can also suppose that the total number of invoices in the last year was about fifty thousands, and the number of suppliers was two thousands. The process of auditing two thousand invoices would be very expensive and it would last long. If the people working on developing the system use statistical techniques, they may find out that the analysis only one hundred invoices enable a good example of data types that should be built into the system. The number of samples depends on the level of representativeness we want to realize.

The second key concept in statistics connected with quality control is the standard deviation. It a measure of deviation from the arithmetic mean and it means that a small standard deviation points to the fact that there is bigger accumulation about the mean value, and the bigger standard deviation means the bigger data dispersion. Quality control with this technique is based on the normal distribution where 63% of the basic set is placed within the framework of one standard deviation, 95% within the framework of two standard deviations, and

99.7% within the framework of three deviations. As there is positive and negative value, then there are two, four or six standard deviations.

The standard deviation is important in quality control because it is a key factor in defining the acceptable number of defective units. Some companies as Motorola, General Electric and Polaroid defined high quality standards using the so-called rule **6 Sigma** (because sigma is a sign for the standard deviation). This means that 99.7% of products must be without any defect in manufacture. In the 3M Company they say that the initiative 6sigma has significantly improved productivity and monetary flow increasing.

Control graphs show data that illustrate results of the process for some time. The main purpose of control graphs is to prevent defects instead of discovering defects and rejecting products with defect. Besides, it is helpful in evaluating if the process is under control or not. When the process is under control, all the deviations in results are under the influence of creating accidental events. When the process is out of control, deviations are the result of the process caused by the events that are not accidental. In that case, it is necessary to identify causes of these events and adapt the process in order to eliminate the frequency of defects. Control graphs are often used for controlling mass production, but they can also be used for controlling the volume and frequency of changing the requirements, errors in documents, costs and time terms, as well as other items connected to project quality management.

Testing as a form of quality control can be applied in many fields and it is often considered that it should be applied at the end of the project developing cycle. Instead, it is necessary to put great effort into testing in planning, analyzing and designing during every phase of the life cycle, not only just before delivery to the user.

6. Costs of Quality Control

Verification of the fact that a product or service satisfies requirements of measuring causes the costs of quality. Two groups of costs make the aggregate costs of quality: appropriate and inappropriate costs. The first group of costs includes all that is necessary for production or to provide service to the user, all that is in accordance with his/her expectations or it is good for use. In this group, we can also include staff training, verification, testing, maintenance, calibration and auditing. The second group, generally speaking, includes all the costs that are the consequence of inappropriate

quality, waste, repeating work, repairs in warranty period, and so on.

Categories of costs connected to quality are:

Preventive costs. They appear in the previous activities because of the orientation to meeting the user's expectations in the first attempt without defects. This group includes planning costs and project performance, as training, studies connected to quality, as well as auditing of supplies and negotiators.

Costs of evaluation. These are costs connected to product evaluation or the process with a view of establishing the level of the user's satisfaction. Activities as inspection and product testing, maintenance of the equipments for inspection and testing (sometimes they can be enormous costs needed for building and maintenance so only several countries in the world have it, for example, the tunnel for aerodynamic testing, and so on), processing and record keeping the results of inspection make the costs of evaluation.

Internal costs of failures. These are costs connected to the correctly identified defects before the user receives the product. Items as waste and repeated work are costs directly connected to delay in payment, inventory costs, costs of engineering changes connected to correcting error design, early defects in production, and correction of documentation makes costs of evaluation.

External costs of failure. These costs are connected to all the defects that are not discovered and eliminated before delivery to the user. Items as warranty costs, service staff training, complaints, and so on, make external costs of failure.

Costs of equipments for testing and measuring. They are capital costs of the equipments used for prevention and the actions of evaluation.

7. Project Management Maturity Model

The maturity model (MM) can represent the base for realizing *superbness (fineness, excellence, perfection)* in project management (all the organizations tend to it, using its methodologies and techniques). This model consists of five levels. Every level represents different level in MM management in the organization.

Level 1. General language. At this level, organizations recognize and understand the importance of MM and the need of understanding and elementary knowledge in this field, together with the appropriate language – terminology.

Level 2. General processes. At this level, organizations recognize general processes that have to be

defined and developed so the success in one project could be repeated in other projects.

Level 3. United methodology. At this level, the organization finds out about synergistic effects of combining all the corporative methodologies in one united methodology, where the center is MM. Synergistic effects will enable an easier process of control if it is the unified methodology.

Level 4. Benchmarking. It realizes that the processes of advancement necessary for keeping competitive capabilities. Benchmarking must be performed as a continual activity. It is very important to make decision to which organization benchmarking is oriented and to which its segment are oriented.

Level 5. Continual advancement. Organizations evaluate information collected during the process of benchmarking and make decision if information is enough qualitative to improve the united methodology.

Although there is an overlap of phases and it is evident, there are some limitations in these overlaps. Therefore, for example, in case of overlap in Levels 1 and 2, it cannot happen that Level 2 finishes before Level 1 is completed.

8. Concluding Remarks

Considering the key aspects of Project Quality Management, the activities of planning and management, as especially important for carrying out the project output that will provide to meet the expectations of consumers, must be also considered. It is obvious that for realizing a successful project it is necessary to integrate all the aspects of quality into all the activities developing continually. First, it is a reliable plan of quality including the definitions of goals, way of attaining goals, risks and an adequate approach to goals with an obligatory set of high standards. Then, quality management follows that understands the integration of qualities into the whole project, application of methods and technologies, as well as the project team that understands its roles. The activity of quality metric, measurement and controls includes mapping the metric of quality for defining goals and application of standard quality tools for measuring, anticipating and result control. Continual quality improvement is an activity, which obligatory follows the cited set of activities. It usually starts with considering the project approach, searching for better processes and planning the project that will, improved, be suitable for new requirements.

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