Management of process control in innovative projects

Chapter 12
Quality management of the innovative project

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01

The concept of quality in the context of project management

The project manager and the project management team are responsible for determining and ensuring the required quality levels.

Definition 1. The quality of the project is the degree of compliance of all its characteristics with the requirements of the project.

The main parameter of project quality is the quality of the product (service), which is the result of the project. Project product quality means compliance with customer requirements (customer goals).

Differences between project quality and product quality:

- High quality product - a product that fully meets the specifications.
- High-quality project - a project that was completed in the project triangle and was executed in accordance with the rules of the executing organization.

Key aspects of quality:

1. Product quality as compliance with market needs and consumer expectations.
2. Quality of project development and planning.
3. Quality of project work in accordance with the planning documentation.
4. Quality of resources involved in project implementation.
5. Quality of operation of project products.
6. Quality of project product development.
7. Quality of disposal and processing of the product after use.

Regarding the quality of the project, there are two main elements.

1. Compliance with project objectives.
2. Compliance with consumer requirements.

The term conformance quality refers to the degree to which the requirements of a product or service project are met. Achieving compliance with the project level is based on daily monitoring. It should be obvious to any manufacturer (or service company) that a product or service can be adjusted, but it will have a low degree of quality compliance, and vice versa.

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The concept of project quality management

Classical methods of quality management are based on technical approaches such as: the use of statistical methods of information processing and physical methods of quality control. Modern methods have a social orientation in a broad sense, so take into account the requirements of consumers, society, and employees of the project. Modern methods of quality management are as follows:

- Continuous improvement (Kaizen method);
- Exactly in lines (Kanban method);
- TQM (total quality management).

The following principles are common in modern and classical methods:

1) Increasing the role and responsibility of management;
2) Direct focus on the customer;
3) Focus on error-free production;
4) Process management;
5) Application of motivation levers and training of the development team.

All the variety of approaches to quality management can be divided into two main areas:

1) Administrative - the life cycle of the product from marketing research to disposal is studied. Methods of defect elimination at each stage are developed.
2) Economic approach - the reasons for the decline in quality are also investigated, but the estimated level of quality depends on the economic feasibility of the cost of achieving it.

Administrative principles and concepts need to be enriched with economic content.

Total Quality Management (TQM) is an organization's philosophy based on the pursuit of quality and management practices that lead to overall quality.

It follows that quality is not something that has to be tracked or added at some stage of the production process, it is the very essence of the organization.

Today, TQM is the most modern, most complete approach to quality development.

The philosophy of TQM is fully reflected in the principles of TQM:

1. Orientation of the organization to the customer.
2. The leading role of leadership.
3. Involvement of employees.
4. Process approach.
5. System approach to management.
6. Evidence-based approach to decision-making.
7. Relations with suppliers.
8. Minimize losses associated with poor performance.

Component of TQM:

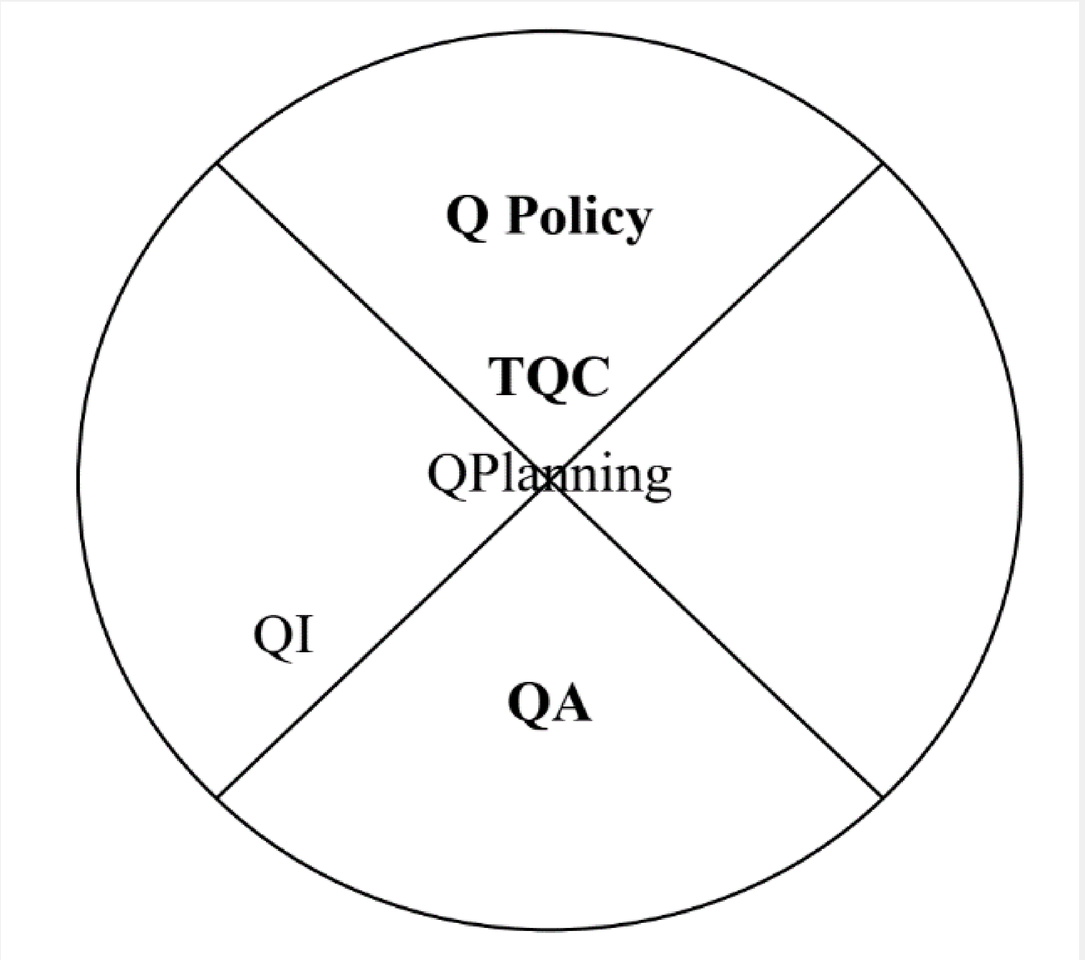
TQC – Total Quality Control – quality management in order to meet the established requirements;

QA – Quality Assesment;

QI – Quality Improvement;

QPlaning – quality planning;

QPolicy – quality policy.



14 tips on Deming and project quality management:

1. Ensure the consistency of the goal towards improvement.
2. Adopt a new philosophy.
3. Stop depending on inspections.
4. Stop the practice of doing business on the basis of orders to private firms for supply with a fixed price.
5. Constantly improve.
6. Enter in-service training.
7. Maintain management.
8. Replace fear.
9. Remove barriers between employee departments.
10. Cancel slogans, sermons and attitudes for employees.
11. Turn off target management.
12. Remove barriers to pride in quality work.
13. Introduce learning and self-improvement.
14. Transformation is everyone's job.

Definition 2. Quality management in the project - a section of project management, consisting of processes and actions of the implementing organization, which define the policy, objectives, and responsibilities in the field of quality so that the project meets the requirements for which it was created; these are actions aimed at establishing, ensuring and maintaining the required level of project quality in the process of its development, justification, and implementation.

Quality management is carried out through a quality management system that provides certain rules and procedures, as well as actions for continuous improvement of processes.

Quality management in modern projects is carried out at all stages and covers all aspects of the project.

In quality management in the project, there are two aspects: the quality of the final product and the quality of project management processes.

To ensure the quality of the sold product, it is necessary:

1. have a clear specification;
2. use appropriate standards and norms;
3. to involve human resources of the necessary qualification;
4. conduct an audit of the quality of the product and the project as a whole;
5. carry out flexible quality control;
6. have some experience in project management.

Modern project quality management is based on the principles:

1. quality is not an independent management function, but an integral part of the project as a full;
2. quality is what the consumer expects;
3. responsibility for the quality of the project should be targeted;
4. quality can be improved only by the efforts of all employees;
5. control the process more always than the result (product);
6. The quality policy and quality assurance program should be part of the overall project plan.

An effective means of quality management is standardization, which includes a set of norms, rules, and requirements for product quality. The process of product standardization is regulated by a set of regulatory and technical documentation, for example: international standards ISO 9000 series; national standards; industry standards; specifications; enterprise standards.

The standard is the main regulatory and technical document in which quality indicators are set based on the latest advances in science, technology, and consumer demand.

For example, one such standard is the quality management standards of the ISO 100006 project “Quality Management Systems. Guidelines for quality management in projects". Project management processes are grouped into ten groups:

- ✓ The first group is a strategic process that sets the direction of project development.
- ✓ The second group includes the processes of interdependence management among all other processes.
- ✓ The remaining eight groups are processes related to terms of reference, time, price, resources, personnel, interaction, risks.

Definition 3. Product certification is one of the important elements of the quality management system, which involves assessing the conformity of products to certain requirements and the issuance of a certain document-certificate. A certificate is a document that certifies a high level of product quality and its compliance with international standards, such as ISO.

Project quality management covers all phases of the project life cycle: from the initial formulation of the project nature, through project processes, project team management, project product and to project completion.

Project quality management is the responsibility of project, program, and portfolio managers and is part of overall quality management. Quality management is based on the participation of all members of the project team, who should treat quality as the foundation of the project.

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Project quality management planning

The main work facing the team of the innovative project at the planning stage is to set clear project goals in the field of quality and make a plan to achieve them.

Definition 4. Quality planning is the definition of what quality standards need to be applied to a given project and how to meet them; the process of defining requirements and / or quality standards for the project and its deliverables, and documenting how the project will demonstrate compliance with established requirements and standards.

One of the fundamental principles of modern quality management - quality is planned, not tested. For effective quality planning, it is necessary to have the following initial data:

1. Factors of the external environment of the project subject. Normative and legislative acts, rules, standards, and regulations for individuals' areas.

2. Assets of the organizational process. Quality policy developed by the project manager and reflects the goals of the organization in the field of quality in a publicly available form. Historical databases and accumulated knowledge from previous projects

3. Quality policy. Represents the general goals and directions of the organization with an emphasis on quality, formally expressed by top management.

4. Description of the project content. It is also a key parameter in quality planning, as it documents the main results of the project and the objectives - the necessary information to determine the basic requirements of stakeholders.

5. Product description. Although the elements of the product description may be included in the description of the project content, the product description often contains details of technical results and other important details that may affect quality planning.

6. Standards and norms. The International Organization for Standardization defines standards and norms as follows:

A standard is a document of general and multiple use, approved by the relevant organization, which sets out rules, guidelines, or specifications for products, processes, or services and which is not mandatory.

A standard is a document that underlies the required characteristics of a product, process or service, including the administrative procedures used, and this document is mandatory.

7. Results of other planning processes. To describe the content of the project and the product, the results of processes in other areas of use of project management knowledge should be considered as part of project planning.

Methods of quality planning in projects.

1. The project quality assurance program is an action plan that ensures compliance of the actual project quality with the planned one.

2. Block diagram development is a graphical representation of the process that reflects the relationships between stages of the process.

3. Repetitive improvement (PDCA cycle) - is a practical method of implementing the principle of continuous quality improvement in the implementation of the PDCA cycle (P - plan, D - do, C - check, A - act).

4. Analysis of profits / expenses. The purpose of the method is to maintain the required ratio between income and expenses in the project. Project quality assurance undoubtedly leads to additional costs, so for each proposed quality assurance method it is necessary to analyze the profitability ratio.

5. Causal charts or Ishikawa charts, or herringbone charts, showing how different causes and causes are associated with potential problems or consequences.

6. "Quality Chain". The method is based on business process analysis. The first step in the analysis is to draw the business process, "as it is" or as it is planned, with the necessary level of detail.

7. The principle of zero defects. At the planning stage of the project, it is advisable to draw parallels between personal life and different parts of the project and identify those where you set yourself and your employees the goal of working with zero defects.

8. The cost of quality. Represents the total cost of all measures during the product life cycle aimed at improving quality, ensuring compliance with certain requirements, as well as preventing factors that can cause quality degradation and non-compliance (refinement). Costs due to defects are often divided into internal (project detection) and external (customer detection).

9. An affinity chart is a tool for the effective organization of information through the classification of ideas or facts. It helps to generate or collect many ideas or facts, sort them and highlight natural pictures or ways of grouping information, which allows the team to reduce the number of key issues and not distract from the vast amount of unstructured information.

10. Sample comparison involves the process of comparing actual or planned results with those of other projects to generate ideas for improvement and to ensure a standard by which performance is monitored.

11. Flowcharts are any charts, graphs, and charts that show the relationship between the various elements of a quality system.

12. Experimental design is an analytical method that helps determine which variables have the greatest impact on the overall result.

The result of the quality planning process is:

1. Quality management plan - a document that regulates specific measures in the field of quality, resources, and their sequence for a particular product, project, or contract: design control; control of documentation; control over the purchase of materials; inspections; test control (testing); corrective actions; records on quality; audits. The following should be described in this plan:

Quality system is a set of organizational structure, methods, processes, and resources required for quality management. It is designed to meet the internal needs of the organization.

A quality manual is a document that sets out a quality policy and describes an organization's quality system. The quality guide may cover all or part of the organization's activities.

Quality program - a document that regulates specific measures in the field of quality, resources, and sequence of activities related to a specific product, project, or contract.

2. Quality metrics - describe in specific terms of the parameters of the project or product, and methods of measuring these parameters.

3. Quality checklists - a structured document, which usually refers to a specific element, which is used to confirm the implementation of all planned actions.

4. Process Improvement Plan - describes the process of process analysis to determine actions that increase the value of these processes.

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Quality assurance of the innovation project

Definition 5. Quality assurance is a regular inspection of the project implementation in order to establish compliance with previously defined quality requirements; it is a system of successively planned and implemented works to confirm that the project meets the relevant standards; assessment of the overall implementation of the project on a regular basis to confirm that the project meets quality standards.

Purpose of the process - the implementation of planned, systematic operations that ensure the use in the project of all processes necessary to meet quality requirements.

Definition 6. The implementation of quality assurance is one of the implementation processes, which uses the data obtained during the implementation of quality control.

For effective quality assurance, it is necessary to have the following initial data:

1. A quality management plan describing how quality assurance will be carried out within the project.
2. Results of quality assessment.
3. Process improvement plan.
4. Information on the performance of works is information (on the status of delivery results, on the necessary corrective actions, as well as performance reports), which is used in the audit, expert quality assessment and process analysis.

5. Approved change requests shall include changes in working methods, product requirements, quality requirements, content, and schedule. Approved changes are checked for their impact on the quality management plan.

6. Quality checklists (quality metrics). The checklist is a page with instructions for the supervisor. The items on the list should be important enough, because if the checklist is overloaded, it will not be used.

7. Results of quality control - the result of quality control operations. Data on the results of control are transmitted to the executing organization for use in the quality assurance process, for re-evaluation and analysis of quality standards.

Tools and methods of project quality assurance

1. Quality Improvement Plan (QIM) is a structured approach to problem-solving and quality improvement in projects. Includes 5 stages: issue identification, cause analysis, corrective action, results, and standardization.

2. Control charts - a graphical representation of the nature of changes in quality over time. Divided into: control charts by quantitative characteristics; control charts on qualitative grounds.

3. The inspection shall include processes such as testing initiated to determine the compliance of the project results with the accepted requirements and standards. There are testing of both individual business processes and their totality (integration testing). Testing scenarios are developed for testing.

4. Quality audit is a systematic and independent analysis that allows to determine the compliance of planned activities and results in the field of quality, as well as the effectiveness of their implementation and the degree of achievement of objectives.

5. Checklists are a table in which it is necessary to note the presence or numerical value of a parameter (parameters) with a given frequency (e.g., once an hour).

6. Pareto charts - a histogram, sorted by the frequency of certain factors for each result, it allows you to focus on a few important factors.

7. A trend chart is a line graph that shows the points of data located on the chart in the order of their occurrence. The trend chart gives an idea of trends, fluctuations in time, as well as positive and negative changes in the time process. Trend analysis is performed using trend charts and includes the use of mathematical methods to predict future results based on past data.

8. Self-assessment can be carried out as a one-off comprehensive measure with the development and adoption of recommendations for improvement.

9. Dependence diagrams are a graphical representation of the process. There are many styles of presenting these charts, but they all reflect operations, decision points, and data processing. Dependency diagrams give an idea of how different elements of the system interact with each other.

10. Seven main tools of Ishikawa quality - checklist; histogram; Pareto diagram; stratification method (data stratification); scatter diagram; Ishikawa diagram (causal diagram); control card.

The result of the quality assurance process is:

1. Measures to improve quality include actions to improve the efficiency of project implementation to provide additional benefits to project stakeholders (customers, contractors, consumers, etc.). For the most part, the implementation of quality improvement measures requires the preparation of requests for permission to make changes to the project and various corrective actions, which will require the project team to manage and control these changes.

2. Requests for changes. Quality improvement involves taking action to improve the efficiency and / or effectiveness of the implementing organization's rules, processes, and procedures.

3. Recommended corrective actions. Corrective action is an action recommended for immediate implementation as a result of quality assurance measures (audit or process analysis).

4. The project management plan (update) is subject to update in accordance with changes in the quality management plan developed as a result of the quality assurance process.

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Quality control of the innovation project

Definition 7. Quality control is the monitoring of certain project results to determine whether they meet quality standards and to identify ways to address the causes of poor performance; monitoring specific results of project activities in order to determine their compliance with standards and quality requirements and identify ways to eliminate the causes of non-compliance; the process of monitoring and recording the results of quality assurance actions to assess implementation and develop recommendations for necessary changes.

Quality control

1. Quality control is carried out throughout the project.

2. The results of the project include both the results of work and management results, such as performance indicators and deadlines.

3. Project quality control is designed to ensure the elimination of any deviations from standards and plans. In the generally accepted control cycle, monitoring is performed by evaluating the results and deviations, checking the specifications for each acquired result. It is necessary to distinguish:

- ✓ prevention (prevention of errors in the process) and verification (preventing erroneous results from reaching the consumer);
- ✓ random check of compliance (result is either satisfactory or not) and random check of deviations (the result is evaluated on a numerical scale that measures the degree of compliance);
- ✓ tolerance (result acceptable if within acceptable limits) and control limits (thresholds indicating whether the process remains controlled).

For effective quality control, it is necessary to have the following initial data:

- Quality management plan.
- Results of quality assessment.
- Checklists of quality control procedures.
- Information on the implementation of works includes technical measurement of implementation, the state of completion of the results of the project and the implementation of the necessary corrective actions.
- Approved change requests may include changes such as revised working methods and a revised schedule.
- Delivery results.

The quality planning process involves establishing a relationship, to income and expenses. The benefits of meeting quality requirements are that less rework will be needed in the future, which means higher productivity, lower costs, better satisfaction of consumer and all stakeholder requirements.

For the most part, the cost or cost of complying with quality requirements is the cost of project quality management.

The common classification of these costs includes:

- costs of preventing quality problems;
- costs of quality assessment and control (information);
- internal losses due to low quality;
- external losses due to poor quality.

Definition 8. Preventive costs are costs associated with quality planning; organization of quality management system; development of requirements for quality control of raw materials, production processes and products; preparation of methodical instructions, etc.

Definition 9. Evaluation costs are the costs of testing and control during the receipt of input materials; inspection of control and measuring devices and their repair; technical control; testing of products to assess their performance; the cost of workers' time to check the quality of their work and technological process, rejection in the production process (self-control); quality supervision and quality systems.

Costs due to internal failures are formed due to inconsistencies in quality identified before shipping to consumers, this is the cost of correcting the defect and the cost of a defect that cannot be corrected.

Costs due to external failures include the cost of finishing products during the warranty period on consumer complaints; the cost of eliminating defects in the maintenance process; fines for low quality within the legal responsibility for quality; costs associated with the return of products that do not meet the appropriate level of quality, or individual parts, components that have failed.

The quality management system must work to eliminate quality problems. Therefore, it is necessary to increase prevention costs and reduce external and internal losses. The axiom for the project manager should be that as a result of proper quality management, profits will exceed costs.

For the quality of products (project product) the classification of quality indicators is used.

№	Indication	The name of the classification element
1	Characteristics characterized	• appointment • reliability • ergonomics • aesthetics • unification • manufacturability • patent law • efficiency • security
2	way of expression	• natural units • cost units

№	Indication	The name of the classification element
3	the number of properties that take into account	• single • group • integrated (effect / cost) • generalized
4	use for evaluation	• basic • relative determining (by which it is customary to evaluate) by stage of determination (projected, production, operational, by stages of the life cycle of the project or product.

Quality control in the project can be completed by the following actions:

- acceptance of the results of works or the project as a whole;
- identification of violations and implementation of actions to manage inappropriate processes and results;
- processing of results for further control;
- correction of processes;
- measures to improve quality;
- introduction of changes in processes.

In addition, until recently, the issue of project quality was decided independently of the project management system as a whole. Theoretically, this allowed the project quality control unit to perform its tasks off schedule and without strict restrictions on the cost of project work. In practice, this led to the division of project participants into responsible and irresponsible, as a result of which the staff who performed the main work on the project was practically not responsible for quality.

Conclusions

This lecture discusses the important concept of quality management of an innovative project. The concept of quality in the context of project management is studied. Here are the key aspects of quality. Fourteen tips on Deming and project quality management and the philosophy of the organization, which is based on the pursuit of quality and management practice "Total Quality Management". Project quality management planning is considered. Twelve methods of quality planning in projects are given. The initial data for quality assurance of the innovative project are outlined. The tools and methods of project quality assurance are studied. Also, the issue of efficiency of quality control of the innovative project is considered.

Conclusions

In conclusion, we can emphasize that the quality management of an innovative project - is an action aimed at establishing, ensuring and maintaining the required level of quality of an innovative project in the process of its development and implementation. And effective means of quality management is standardization, which includes a set of rules, regulations, and requirements for project product quality.

The quality management of an innovative project includes all work that belongs to the overall management function, defines quality assurance policy, tasks, and responsibilities and implements them by means such as quality planning, control and improvement within the quality assurance system.

References

[1]. Evaluation of start-up projects in conditions of risk and uncertainty, Polishchuk V., Publishing house "FOP Sabov AM", 2021.

[2]. Dovhan, L. YE., Mokhonko, H. A. & Malyk, I. P. (2017). Upravlinnya proektamy. K.: KPI im. Ihorya Sikors'koho.

[3]. Rukovodstvo k svodu znaniy po upravleniyu proyektami, 5-ye izdaniye/ Project Management Institute (PMI). – Project Management Institute, Inc., 2012.

[4]. Velykodnyy, S. S. (2021). Modeli ta metody proaktyvnoho upravlinnya proyektamy z rozvytku prohramnykh system i produktiv: monohrafiya.

[5]. Kozyk, V.V., & Tymchyshyn, I.YE. (2012). Praktykum z upravlinnya proektamy: navch.posinyk. Lviv: Vydavnytstvo Lvivskoyi politekhniky.

[6]. https://certifedpmp.wordpress.com/category/quality-management/

[7]. https://quizlet.com/88829126/pmbok-chapter-8-5th-project-quality-management-flash-cards/

[8]. https://app.memrise.com/course/352178/pmbok-5-project-management-exam-study/36/

[9]. https://www.oreilly.com/library/view/a-guide-to/9781935589679/sub8.1.xhtml

Thank you!