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**РАЗВИТИЕ УПРАВЛЕНИЯ КАЧЕСТВОМ С 50-Х ГОДОВ
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Аннотация. В данной статье рассматривается влияние информационного прогресса на эволюцию управления качеством. Приведены различные методы эффективного управления производственными процессами, особенности систем управления. В статье показан один из возможных примеров анализа развития менеджмента качества с 50-х годов 19 века до наших дней. Глобализация и неравномерность мирового развития несут значительную нагрузку на управление качеством продукции и способствуют организации гибких систем производственных процессов управления предприятием (КАНАРСПИ, TQM, ISO и т. д.). Непрерывные улучшения в управлении информационными потоками, технологических и исполнительных процессов необходимы для поддержания качества, которое состоит из обеспечения качества, управления качеством и улучшения качества продукции для идеальной организации управления производством. Основываясь на фундаментальных принципах этих систем управления качеством продукции, можно добиться высокого качества продукции и предприятия. Целью данного исследования является ознакомление читателя с результатами исследований и идеями на тему менеджмента качества и его развития с 50-х годов 19 века до 21 века наших дней по ключевым моментам. Актуальность статьи обусловлена необходимостью изучения механизмов управления качеством, от которых зависит качество управления всей организацией в целом. Практическая и теоретическая значимость данной проблемы определили актуальность данного исследования. Теоретической и методологической основой стали исследования российских и зарубежных авторов в области менеджмента качества, отраженные в соответствующих публикациях. Практическая значимость данной статьи заключается в возможности использования данного материала в ходе лекций по дисциплинам, связанных со специальностью «Управление качеством» на английском языке.

Ключевые слова: управление качеством, производственные процессы, системы управления качеством, организация, инженер по качеству, информационная глобализация.

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DEVELOPMENT OF QUALITY MANAGEMENT FROM THE 50S OF THE 20TH CENTURY TO THE PRESENT DAY

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Abstract. *This article discusses the impact of information progress on the evolution of quality management. The various methods of effective control of production processes, the features of their control systems are given. The article shows one of the possible examples of the analysis of quality management development from the 50s of the 19th century to the present day. Globalization and uneven global development carry a significant burden on product quality management and contribute to the organization of flexible systems of production processes of enterprise management (KANARSPI, TQM, ISO, etc.). Continuous improvements in the management of information flows of technological and executive processes are necessary for the graduated maintenance of quality, which consists of quality assurance, quality management and improvement of product quality for the ideal organization of production management. Based on the fundamental principles of these production quality management systems, it is possible to achieve high quality of the product and the enterprise. The purpose of this study is to acquaint the reader with the results of research and ideas on the topic of quality management and its development since the 50s of the 19th century till the 21st century of our days on the key points. The relevance of the article is due to the need to study the mechanisms of quality management on which the quality of management of the entire organization as a whole depends. The practical and theoretical significance of the given problem determined the relevance of this research. The theoretical and methodological basis of this research was the works of the Russian and foreign authors in the field of quality management, reflected in the relevant publications. The practical significance of this article lies in the possibility of using this material in the course of lectures on disciplines related to the specialty «Quality Management» in English.*

Keywords: *quality management, manufacturing processes, quality management systems, organization, quality engineer, information globalization.*

Introduction

The object of the given research is the various methods of effective management of production processes.

The relevance of this study is due to the need to study management in connection with the changing management technologies that adapt to changes in the market and production, as the correct organization of the function and quality of management depends on the work of the entire enterprise.

The purpose of this study is to acquaint the reader with the results of research, ideas and discussions on the topic of quality management and its development since the 50s of the 19th century till the 21st century of our days on key points.

The studied material about the given problem revealed that it has been in the focus of scientists since the 19th century and it is still actual today; there are different approaches towards this problem, investigated by different scientists in this field: Anette Oxenswardh, Per-Arne Forsberg, Dominik Zimon, Grzegorz Zimon, Graeme Knowles, Hellman Pasi, Liu Yang, Ian Smith, Lilian M. de Menezes, José Batista da Costa, José Carlos Sá and others [1-24]. For example, Hellman Pasi and Liu Yang in their work «Development of Quality Management Systems: How Have Disruptive Technological Innovations in Quality Management Affected Organizations?» investigated the quality management systems development from the time of Hammurabi's law to modern quality tendencies [10].

Research methodology

Considering the patterns of changes in quality management processes the methods of scientific abstraction, analysis and synthesis, systems approach, the modeling methods were used in our research.

The author's conceptual approaches to problem solving and their analysis

The emergence of quality management as a scientific concept dates back to the edge of the 19th and 20th century, when the development of the industrial revolution in Europe and the United States led to the organization and quality of labour as a result of the transition to large-scale and mass manufacturing of products. Before that in certain industries, for example, in the weapons producing there were elements of mass production, but there was no separation of the operations of the manufacturing process between different workers.

The idea of a standard quality emerged in the end of the 19th century at the Colt factory in the United States, where the weapons weren't out of customized parts, but from the lot of interchangeable parts. The position of the controller appeared at that time, whose duty was not to pass unfit details for assembly line.

This idea of standard quality was developed in the early 20th century by Ford in the production of cars (work on calibers). He introduced the balanced assembly line which consisted of workstations with different tasks [7, p.7]. In-line production increased labour productivity, which made it possible to produce relatively cheap products.

F. Taylor gave the scientific substantiation of the system of mass production. A. Fayol and M. Weber gave the scientific quality management system, which was based on the principles of rejection of defective products.

In the period of the Soviet Union the method of management was based on quality, reliability, resource with the first products (it was known as KANARSPI). This method thanks to its effectiveness was much ahead of other similar techniques of that time. Many of the principles KANARSPI are relevant today [12-20]. The author of this method was the chief engineer of the

Gorky aviation plant, T. F. Seifi. He was one of the first to stand out the leading role of information and knowledge; he paid great importance to the description of the main directions of implementation of engineering and organizational and technical measures aimed at ensuring high quality indicators, and also focused his attention on the analysis of tests.

Thus, we can observe that already in the distant 50-70s of the 20th century the engineers and managers began to pay attention to the control and use of the information component in quality management.

The progress of technical capabilities in information processing: the world of the Internet, communication satellites, mobile video resources increased the consumption of rotating information greatly and reduced the time of its processing and transmission significantly. The evergrowing information sector is one of the main reasons why communication management is so important for productivity. As Naisbitt says: «The time of transmission of information is the time from the moment of transmission of the message to the moment of its reception». A good example is the «East India Company», which during its existence (1600-1874) took months to find out whether its vessels reached their destination safely. Today, the headquarters of such a transnational corporation receives similar messages almost instantly [16]. The introduction of techniques and technologies in the field of processing of useful information has led to an increase in productivity comparable to what was once given to standardization and assembly lines production at the beginning of the industrial revolution.

This speed of development of the information sector has led to evolutionary leaps and other production areas, one of which is quality management. Highly developed communication technology and modern information management processes significantly increase the need for the development of methods of quality management control. Over the past 50 years, there have been many international standards that use advanced technologies and methods to obtain a quality product. One of such leaps occurred in the 1970s and 1980s, when the transition from total quality management (TQM) to production quality management began. TQM is also managing goals and requirements. TQM also includes quality assurance, which is interpreted as a system of measures to ensure consumer confidence in the quality of products, as shown in Fig.1, where:

- TQC – Total quality control;
- QPolicy – Quality policy;
- QPlanning – Quality planning;
- QI – Quality improvement;
- QA – Quality assurance.

Fig. 1. – Illustration of the system TQM.

TQM system is a system of complex character focused on minimization of production costs, continuous improvement of quality and delivery of production precisely in time [12].

Also, in our time, the International Organization for Standardization (ISO) system is used, founded in 1987 and has had a very significant impact on the management and implementation of quality assurance [22]. The provisions of the ISO imply that once the products are manufactured, quality control cannot be effective. This activity should be carried out in preparation for the production process and directly in the production of products. In accordance with the new version of ISO 9000:2000 QMS, the entire system of internal management, the functioning of which is based on the quality criteria of products and executive processes, consists in the organization, i.e. in the enterprise, firm, company, etc., and is integral and is not considered as a subsystem [24]. The main purpose of the latest version of the standard is not only to get rid of internal conflicts, disunity and abandonment, which are often inherent in the structures of functional hierarchical enterprises, but also to focus on the process approach to the organization and management of all works of the system [20].

The quality management system is in constant development, so at the end of the 20th century and the beginning of the 21st century new Quality Management methods appeared such as Failure Mode and Effect Analysis (FMEA-analysis), 6-Sigma, Balanced Scorecard (BSC), Quality Function Deployment (QFD- analysis), Benchmarking, the method of Reengineering (the methodology of radical improvement, which is known as Business Process Reengineering or BPR) and others.

The results of the study of the quality management development from the 50s of the 20th century to the present days and the chronology of the emergence of quality management methods can be systematized as the following in the given table:

Date of emergence	Quality management development
The edge of the 19 th and 20 th century	Quality management as a scientific concept appeared.
The end of the 19 th century	The idea of a standard quality emerged at the Colt factory in the United States.
The early 20 th century	In-line production was introduced by H. Ford.
In 1905 - 1910	The scientific substantiation of the system of mass production was given by F. Taylor.
In 1911-1916	The scientific quality management system was given by A. Fayol and M. Weber
In 1950	Armand Feigenbaum introduced Total Quality Control, which is known as TQM
In 1958	T. F. Seifi paid great importance to the description of the main directions of implementation of engineering and organizational and technical measures aimed at ensuring high quality indicators (KANARSPI, which was known as based on quality, reliability, resource with the first products).
In the end of the 50s of the 20 th century	Failure Mode and Effect Analysis (FMEA-analysis) was introduced.
In 1960	Communication management appeared.
In 1966	Quality Function Deployment (QFD-analysis) was created in Japan.

In the 1970s and 1980s	The transition from total quality management (TQM) to production quality management began.
In 1986	6-Sigma (Six Sigma) was introduced as a production management concept developed by Motorola Corporation.
In 1987	The International Organization for Standardization (ISO) system was founded.
The end of the 20 th and the beginning of the 21 st century	Balanced Scorecard (BSC), Benchmarking, the method of Reengineering (Business Process Reengineering (BPR) and so on.

Results

Quality management of the process requires more than just constant monitoring and regular data analysis – this is done by almost all the organizations and managers at all levels. It is necessary that at all levels of process management all, who are authorized to interfere in it, would be able to make on the basis of the facts (we will remember the principles of quality management) the decision on whether it is necessary to interfere in the process and if it is necessary, who must do it. After all, the process can be interfered both by people involved in it (line staff) – the so-called local intervention, and by those who are responsible for the system as a whole (top management), resulting in changes in the system either for the better (which is desirable) or for the worse (which is undesirable). There is, of course, a third option – nothing changes in the system (which is undesirable). If we consider the situation on the part of the process, there are options: the process requires local intervention, i.e. it is necessary to eliminate something that in the normal course of the process should not be; the process requires improvements, i.e. it goes well, but we want something better in its outputs. We have identified these categories for a very simple reason: local intervention should be carried out by line staff, because only people in the workplace know thoroughly what is happening and how it should happen in the process. And it should be improved by top managers, because only they are responsible for the system (i.e. for how the process is organized) as a whole [20]. One of the ways to improve the work of many functions and business processes in companies is also to conduct various educational activities [10].

All actions taken by the organization to meet a particular customer should be carried out by shifting the center of gravity of all management from function to integrated process management, which will ensure the unity of management and free management from the current tasks of operational process management. Modern Russian companies are dominated by a spontaneous and intuitive type of sales management system and quality management. This is due to the professional incompetence of managers and their need to study modern literature in this field. For example, Graeme Knowles gives historical and modern facts in the field of quality management in his book «Quality Management». It aims to provide a consistent picture of the fundamental principles of quality management and how they relate to practical application in a number of organizations [9].

Analysis of the results

So, there are various methods of effective control of production processes.

Total quality management (TQM) is considered a very important factor for the long-term success of an organization [1].

The quality of products in quality management system is the cumulative result of activities at each stage of preparation, production and sale of products that make up its life cycle. Therefore, the main idea of the standard is to meet the requirements. In case of non-compliance, a number of

actions are taken, referred to in the standard as corrective or preventive. Systematic identification and management of existing processes in the organization and especially the interaction of these processes form the basis of the process approach, which, in turn, allows you to design the entire production as a system of processes [10-22].

Conclusion

Thus, the globalization and uneven global development carry a significant burden on product quality management and contribute to the organization of flexible systems of production processes of enterprise management. Continuous improvements in the management of information flows of technological and executive processes are necessary for the graduated maintenance of quality, which consists of: quality assurance, quality management and improvement of product quality for the ideal organization of production management, which are used with the above quality management systems (KANARSPI, TQM, ISO, etc.). Based on the fundamental principles of these production quality management systems, it is possible to achieve high quality of the product and the enterprise.

References:

1. Ahire S.L., Dreyfuss, P. The impact of design management and process management on quality: an empirical investigation. *Journal of Operations Management*, 2000, no. 18(5), pp. 549-575.
2. Anette Oxenswardh, Per-Arne Forsberg. To Lead Change - To Work and Study with Creativity and Structure - A Course Design for Deeper Learning Outcomes within a Course in Quality Technology. *Quality Innovation Prosperity*, 2019, vol. 23, no. 1. DOI: <http://dx.doi.org/10.12776/qip.v23i1.1167>
3. Bou J.C., Beltran I. Total quality management, high-commitment human resource strategy and firm performance: an empirical study. *Total Quality Management*, 2005, vol. 16, no. 1, pp. 71-86.
4. Dellana S. and Kros J. ISO 9001 and supply chain quality in the USA. *International Journal of Productivity and Performance Management*, 2018, vol. 67(2), pp.297-317. DOI: <https://doi.org/10.1108/IJPPM-05-2015-0080>
5. Dominik Zimon, Grzegorz Zimon. The Impact of Implementation of Standardized Quality Management Systems on Management of Liabilities in Group Purchasing Organizations. *Quality Innovation Prosperity*, 2019, vol. 23, no. 1. DOI: <http://dx.doi.org/10.12776/qip.v23i1.1210>
6. Douglas T.J. and Judge W.Q. Total quality management implementation and competitive advantage: the role of structural control and exploration. *Academy of Management Journal*, 2001, vol. 44, no. 1, pp. 158-69.
7. Evans J. R., Lindsay W. M. *Managing for Quality and Performance Excellence*. – Ohio: Thomson Business and Economics, 2008.
8. Fonseca L.M., Domingues J.P. Empirical research of the ISO 9001: 2015 transition process in Portugal: Motivations, benefits, and success factors. *Quality Innovation Prosperity*, 2018, no. 22(2), pp.16-46. DOI: <http://dx.doi.org/10.12776/qip.v22i2.1099>
9. Graeme Knowles. *Quality Management*, 2011, p 192.
10. Hellman Pasi, Liu Yang Development of Quality Management Systems: How Have Disruptive Technological Innovations in Quality Management Affected Organizations? *Quality Innovation Prosperity*, 2013. DOI: <http://dx.doi.org/10.12776/qip.v17i1.154>
11. Ian Smith. Organisational quality and organisational change: Interconnecting paths to effectiveness. *Library Management*, 2011, vol. 32, pp.111-128. DOI: <https://doi.org/10.1108/01435121111102629>
12. Il'enkovoj S. D. *Quality management*. M.: 1998, pp. 53-78.

13. Johnsen T.E. Purchasing and supply management in an industrial marketing perspective. *Industrial Marketing Management*, 2018, vol. 69, pp. 91-97. DOI: <https://doi.org/10.1016/j.indmarman.2018.01.017>
14. Kafel P., Simon A. The Reasons for Decertification of ISO 9001: Financial Aspects. *Quality Innovation Prosperity*, 2017, no. 21(3), pp.173-184. DOI: <http://dx.doi.org/10.12776/qip.v21i3.1024>
15. Lilian M. de Menezes. Job satisfaction and quality management: an empirical analysis. *International Journal of Operations & Production Management*, 2012, vol. 32 Issue: 3, pp.308-328. DOI: <https://doi.org/10.1108/01443571211212592>
16. Majkl M., Majkl A., Franklin H. *Management basics*. DELO Publ., 1997, pp. 473-485.
17. Melnik A.D., Goncharov S.S., Drozdov E.A. Automatization in the agro-industrial complex. In the collection: *Information and communication culture: science and education collection of articles of the conference*, 2019, pp. 201-203. URL: <https://elibrary.ru/item.asp?id=37613760>
18. Melnik A.D., Petukhov V.V., Leonov A.Yu. Information systems in modern world. In the collection: *Information and communication culture: science and education collection of articles of the conference*, 2019, pp. 205-208. URL: <https://elibrary.ru/item.asp?id=37613761>
19. Petros A. Kostagiolas, Maria B. Kitsiou. Issues and perceptions for ISO 9000 implementation in Greek academic libraries. *Library Management*, 2008, vol. 29, Issue: 6/7, pp. 583-599. DOI: <https://doi.org/10.1108/01435120810894572>.
20. Pohlovskaja T.M., Adler Ju.P., Nazarova I.G., Henuzidi E.I., Shper V.L. *Standards and quality*, 2004, no. 5, pp. 76 – 81.
21. Romeu Araujo, Gilberto Santos, José Batista da Costa, José Carlos Sá *The Quality Management System as a Driver of Organizational Culture: An Empirical Study in the Portuguese Textile Industry*. *Quality Innovation Prosperity*, 2019, vol. 23, no. 1. DOI: <http://dx.doi.org/10.12776/qip.v23i1.1132>
22. Ruchinskaja N.A., Limarev A.S., Levandovskij S.A. *Quality management system, Magnitogorsk. FGBOU VPO «MG TU» Publ.*, 2011, 166 p.
23. Sejfi T.F., Jaroshenko A.I., Bakaev V.I. *System KANARSPI, High quality Guarantee. Committee of Standards, Measures and Measuring Instruments under the Council of Ministers of the USSR Publ.*, 1968, 147 p.
24. Shvec V.E. Performance of quality management system based on new versions ISO of the series 90002000. URL: <http://quality.eup.ru/MATERIALY9/s-smk-i9k.htm>.

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