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# ORGANIZATIONAL AND METHODOLOGICAL FOUNDATIONS OF THE FORMATION A BUSINESS MANAGEMENT SYSTEM

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## *Abstract*

As part of the study, it was shown that the integration a business management system for metallurgical enterprises that produce products for the railway industry is a factor of ensuring their competitiveness and sustainable development. As a result of a comparative analysis the processes of the integrated management system for metallurgical enterprises that produce products for the railway industry, with the 22 mandatory business management system processes established in ISO / TS 22163, it was found that the requirements of the standards are more consistent, but the ISO / TS 22163 standard contains specific requirements, which fully reflect the specifics of the railway industry. It is reasonable that the business management system implementation into the organization's integrated management system, developed in accordance with the requirements of the standards: ISO 9001, ISO 14001 and OHSAS 18001, reduces the time and financial resources for the implementation of the system, and integration can be carried out on the basis of 10 common processes identified by the authors: requirements for products and services; project management; control over the processes, products and services provided from the outside; design and development of products and services; the provision of products and services. These processes must be described using the "Turtle" diagram. It is proposed to develop a business management system as an innovative project. In forming the enterprise's business management system, it is necessary to implement three main stages: development, implementation and certification.



**Keywords:** Business management system, metallurgy, railway industry.

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## 1. Introduction

In modern conditions, a market leader, constant profit growth and competitiveness are the fundamental goals of any organization (Kolchurina, Ivanova, & Shipuniva, 2019; Siougle, Dimelis, & Economidou, 2019). The key to sustainable development of an organization is to satisfy the requirements of consumers, which, according to the principle of quality management, must not only be met, but also surpassed (Kolchurina & Epifantseva, 2018).

This is also true for the railway sector of the national economy, which has great importance for the transport of passengers and goods in Russia. Despite the unchanged destination of trains, technology in the railway sector is developing rapidly. Therefore, like other types of industry, the railway industry is forced to improve and adapt to the ever-changing conditions of the world. For effective management, modern international management standards are being introduced at the enterprises of the railway industry (Zalunaev, 2014).

This fact leads to the development and implementation of new strategies and initiatives to improve the efficiency of business activities of enterprises and the development of the railway industry, which include the development and implementation of the ISO / TS 22163: 2017 standard, which affects manufacturers of rolling stock: cars, motive-power units, components and parts, as well as infrastructure components and track machines.

## 2. Problem Statement

Nowadays, the issue of implementation and certification of a business management system (BMS) for compliance with the requirements of the standard «Railways. Quality Management System. Requirements for business management systems for railway companies: ISO 9001: 2015 and particular requirements applicable in the railway industry: technical specification ISO / TS 22163: 2017» (ISO / TS 22163) for metallurgical enterprises producing products for the railway industry. Management systems of large metallurgical enterprises, as a rule, are built based on integrating the requirements a number of international standards, which include ISO 9001, ISO 14001, OHSAS 18001, etc. The issue of determining a possible development option for BMS, as well as the practical implementation of this task for organizations, is difficult due to the low degree of theoretical and practical elaboration of this issue.

## 3. Research Questions

The business management system of the enterprise manufacturing products for the railway industry.

## 4. Purpose of the Study

Formation of approaches to the development and implementation of a business management system at an enterprise manufacturing products for the railway industry.

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## 5. Research Methods

The solution of the designated goal was provided by using a system of scientific methods, including comparisons, abstraction, systemic, situational and correlation analysis. The study is based on the requirements of GOST R ISO 9001 and ISO / TS 22163, as well as foreign and domestic literary sources.

## 6. Findings

The BMS in an organization can be developed both on the basis of an integrated management system (or a quality management system (Lukichev & Romanovich, 2016), and as an independent system. The paper considers the option of introducing a BMS into an existing integrated organization management system (IMS) developed in accordance with the requirements of standards: ISO 9001, ISO 14001 and OHSAS 18001.

As the main idea for the construction of the BMS, the model of the management system described in the standard GOST R ISO 9001-2015 was taken. Quality Management Systems. Requirements (GOST R ISO 9001-2015). According to the provisions laid down in the basis of ISO 9000 series standards (Carey, 2018; Levshina, 2016; Priede, 2012), the management of processes and systems as a whole can be carried out in accordance with the stages of the PDCA cycle. This approach involves a number of actions. The process owner continuously or with a specified frequency controls the process and makes management decisions in case of deviations of the process parameters from the criteria established for the normal process. The process owner in the course of management plans to allocate resources to achieve the set goals of the process with maximum efficiency. The progress of the process by the performers, the owner checks the information that comes from the control points. The process owner conducts operational process management, managing, changing the planned distribution of resources, changing plans, timelines and requirements for the results of the process in accordance with the changed situation. The activity of the process owner is planned in the normal course of the process or unscheduled - in cases of problematic situations requiring immediate intervention.

The application of the ISO / TS 22163 standard for the implementation of the BMS is not the only normative document containing the requirements for the development of the system; there are a number of additional requirements and provisions. In addition, the ISO / TS 22163 standard establishes 22 mandatory processes and 1 recommended “innovation management”. Based on the analysis of this regulatory document, a list of mandatory processes was determined. The following processes are attributed to the obligatory group of authors: risk and opportunity management; budget planning, approval and control; verification and calibration (resources for monitoring and measurement); competency management; control of documented information; Planning the transfer of processes to be performed by third-party organizations or transfers; management during tenders; project management; configuration management; change management; requirements management; design and development; process, products and services supplied by external suppliers (EPPPS); production and provision of services; management of special processes; post-delivery activities; monitoring inappropriate results; RAMS / LCC Event Management first product inspection (FAI); ensuring the availability of supplied products and spare parts (management of obsolescence of products); conducting an internal audit; inconsistencies and corrective actions.

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To justify the possibility of integration by the authors of the study, a comparative analysis of the IMS processes of the enterprise manufacturing products for the railway industry was performed with 22 mandatory BMS processes established in ISO / TS 22163 (table 1).

**Table 01.** Comparative analysis of the IMS and BMS processes (fragment)

| BMS processes | ISO/TS 22163 | ISO 9001 | OHSAS 18001 | ISO 14001 |
|---|---|---|---|---|
| Risk and opportunity management | 6.1, 8.1.3.8 | 6.1 | 4.3.1 | - |
| Human resources management | 7.1.2 | 7.1.2 | 4.4.2 | - |
| Maintenance and repair of equipment | 8.1, 8.1.1 | 8.1 | - | - |
| Monitoring and measuring resources | 7.1.5, 9.1.1, 9.1.3 | 7.1.5 | 4.5.1 | - |
| Budget management | 4.1, 9.3.2 | 7.1 | - | - |
| Configuration management | 8.1.4 | - | - | - |
| Control of the first product | 8.9 | - | - | |
| Depreciation Management | 8.10 | - | - | - |
| Project management | 7.7.5 | - | - | - |
| Internal Audit of BMSs | 9.2 | 9.2 | 4.5.4 | 4.5.2 4.5.5 |
| Monitoring, measuring, analyzing and improving | 10.3 | 9.1, 10.3 | 4.3.4 | 4.5.1 |
| Change management | 8.5.6 | 6.3, 8.2.4, 8.3.6, 8.5.6 | 4.3.1 | 4.6 |
| Tender Management | 8.1.2 | - | - | - |
| Managing Inappropriate Process Outputs | 8.7 | 8.7 | 4.5.3.2 | 4.4.7 |
| Definition and analysis of requirements | 4.1, 8.2, 9.1.2 | 8.2.2, 8.2.3 | 4.5.1 | 4.4.7 |
| Design and development | 8.3 | 8.3 | 4.3.1 | 4.3 |
| RAMS/LSS management | 8.8 | - | - | - |

From the analysis of Table 1 it follows that the requirements of the standards are more consistent, but the ISO / TS 22163 standard contains specific requirements that fully reflect the specifics of the railway industry; 10 processes are common for IMS and BMS: monitoring, measurement, analysis and improvement; product design and development; definition and analysis of product requirements; manufacturing control; sales of products; human resource management; management of equipment for monitoring and measurement; environmental management for the functioning of processes; IMS planning; purchases. To describe and control the BMS processes of an organization manufacturing products for the railway industry, one should take into account not only the requirements established by ISO / TS 22163, but also the requirements of ISO 9001:2015.

BMS processes can be described using process maps and a list of risks (Zhemchugova & Levshina, 2018), except the five mandatory processes, which, according to the requirements of ISO / TS 22163, must be described using the “Turtle” diagram.

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The “Turtle” diagram is a means of visualizing the characteristics of processes and other high-level information intended for the effective implementation and improvement of basic business processes. It offers effective and efficient audit procedures and provides the auditor with a convenient picture of the processes and framework conditions that need to be checked. There must be transparent and important objects; internal and external process consumers; internal and external process suppliers; interfaces and dependency (input / output); the content of the work / work process; material resources; human resources; performance indicators; main risks and opportunities. During certification procedures, five mandatory processes must be verified. Five mandatory processes include requirements for products and services; project management; control of production processes; design and development of products and services; the provision of products and services.

In accordance with the requirements of the ISO / TS 22163 standard, the organization must report in the KPI process maps for each process separately, with the help of which the effectiveness and efficiency of the process will be evaluated. The concept of «KPI (Key Performance Indicators)» is interpreted in the standard as: «an indicator selected by the management of the first level to assess the effectiveness of BMS.» Thus, in accordance with the requirements of the standard, the organization must develop, implement and maintain a documented KPI system to monitor and improve the efficiency of its processes, products, services and projects, as well as collect data on reports of internal and external technical failures in accordance with established criteria (Roubtsova & Michell, 2013; Sari, 2015).

In addition to above, the standard also defines a number of other requirements. So, when determining each KPI, the following should be established: the process associated with it; KPI calculation method (for example, formula); the goal associated with it, achievable in the specified period; KPI person when it is necessary to report on KPI and to the responsible for identifying associated activities (Wohlers, Dziwok, Pasic, Lipsmeier, & Becker, 2019).

According to the requirements of ISO / TS 22163:

1) KPI should measure: customer satisfaction; delivery to the consumer on time; inconsistencies indicated by the consumer; internal inconsistencies; non-compliance of external suppliers; delivery from external suppliers on time; low quality costs; project costs; requirements management process; design and development process;

2) KPI should be measured: response time to nonconformities and claims received from the consumer; production capacities, including forecast, including for the production and installation of infrastructure; time to solve problems, for example, open-ended questions; inspections of the first production samples; downtime of production equipment; internal audit process; tendering management process.

Management of BMS requires special approaches. Complex events contribute to the emergence of many restriction, the most important of which are internal. Internal obstacles to the development of innovations are focused around two areas: the lack of motivation of the management for long-term growth of the enterprise and the inability of enterprises to introduce innovations. Moreover, BMS is not only a tool for developing the innovative potential of an enterprise, but also an innovative project, the result of which are innovations that allow achieving competitive advantages by providing products (services) that meet

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consumer requirements and applicable legislative and regulatory requirements, increase the efficiency of processes and the effectiveness of the organization as a whole (Levshina & Troshkova, 2017).

Innovation can be both the result and the result itself. In accordance with clause 3.6.15 of ISO 9000:2015. Quality Management Systems. Fundamentals and vocabulary, innovation is a new or changed object that creates or redistributes value (Tsekouras, Dimara, & Skuras, 2002).

Development and implementation of innovative projects, which should include: identification of changes in the environment of the organization; innovation planning; prioritization of innovations on the basis of a balance between their urgency, availability of resources and strategic organization; stakeholder engagement.

Building BMS based on the existing management system (IMS) allows you to use the time to implement the system. Integration can be done based on 10 common processes.

It is known that in general terms, the BMS formation of an enterprise can be represented in the form of three main stages: development, implementation and certification (Levshina, 2018; Westcott & Russell, 2013). The BMS development process consists of a preparatory phase, designing a process model of a business management system and documenting it in accordance with regulatory requirements.

The preparatory stage involves the analysis of the requirements for the created management system put forward by the main stakeholders, as well as the determination of organizational and methodological approaches for its creation. In turn, the design of the process model of a business management system is aimed at ensuring the transparency of its management system, as well as defining its clear boundaries.

The stage of introducing a business management system as a tool to ensure certification requirements in an organization originates after the order on the implementation of an organization's business management system is issued. That is, the BMS documentation is introduced into the work of the organization.

Before commence work on the implementation of the BMS organization, it is necessary to conduct training for managers and staff. After a successful training, the heads of structural divisions should analyze their activities for their compliance with the documented procedures of the business management system. Thus, the heads of structural units, after training, should instruct and motivate subordinates and employees to reorganize their activities to meet new regulatory requirements.

The stage of implementation of a business management system also implies testing the previously written documented procedure "Internal Audits". The purpose of conducting internal audits at the stage of implementation of the BMS is, first, to check the documentation of the business management system and the actual fulfillment of the requirements set forth in it.

The audit of the documentation of the business management system is carried out in several areas: compliance with the requirements of the Quality Manual, Quality Policy, Goals and objectives in the field of quality; compliance with documented procedures, as well as the direct availability of documentation at workplaces.

All structural divisions declared in the field of application of the business management system are subject to checks. After the first internal audit, another cycle of internal audits of the BMS of the organization is carried out, the purpose of which is to assess the effectiveness of corrective actions based

on the results of the first audit. Carrying out this cycle of internal audits allows us to evaluate the effectiveness and efficiency of the organization's business management system.

Thus, the implementation of the development, implementation and certification of BMS are necessary stages in the formation of this system and are aimed at its successful functioning.

In general, the requirements of the ISO / TS 22163 standard help rethink the business and build an effective management system. The result is a holistic BMS, an integral part of which is the management subsystems: strategic, financial, design and quality management. The construction of all these subsystems should provide the ability to manage the organization on an ongoing, regulated basis by setting strategic goals, organizing projects, allocating the necessary resources, bringing the goals to the level of business processes and structural units, on the basis of which operational management of business processes is carried out, staff motivation and continuous improvement of the company.

## 7. Conclusion

The results of the study show that the development, implementation and maintenance of BMS is a necessary condition for maintaining a high level of quality of rail products, increasing market competitiveness and ensuring the stable operation of the enterprise.

It is advisable to develop and implement BMS at the enterprise manufacturing products for the railway industry by integrating the requirements of the ISO / TS 22163 standard with the organization's existing management system.

Mandatory BMS processes: requirements for products and services; project management; control over the processes, products and services provided from the outside; design and development of products and services; the provision of products and services should be described using the «Turtle» diagram.

The development of KPI processes for a business management system is mandatory in accordance with the requirements of ISO / TS 22163.

## References

Carey, R. B. (2018). What Is a Quality Management System, and Why Should a Microbiologist Adopt One? *Clinical Microbiology Newsletter*, *40*(22), 183-189. https://doi.org/10.1016/j.clinmicnews.2018.10.004

Kolchurina, I., Ivanova, E., & Shipunova, V. (2019, November). Cross-border interaction and regional sustainability. In *International Conference on Sustainable Development of Cross-Border Regions: Economic, Social and Security Challenges (ICSDCBR 2019)*. Atlantis Press.

Kolchurina, I. Yu., & Epifantseva, E. S. (2018). Business management system as a tool to increase the competitiveness of an organization manufacturing products for railways. *Actual problems of the economy and management in the 21st century* (pp. 8–14). Novokuznetsk: SibGIU.

Levshina, V. V. (2016). ISO 9001: 2015 standard as the basis of organizational and managerial innovation in Russian universities. *Search and Solutions Mater. of the II Int. sci.-pract. Conf."Quality Management".* In 2 volumes (pp. 85–89). Shanghai, China.

Levshina, V. V. (2018). *Organization quality management system.* Novosibirsk: ANS "SibAK".

Levshina, V. V., & Troshkova, E. V. (2017). *Quality Management System: an innovative project.* Novosibirsk: ANS "SibAK".

Lukichev, S., & Romanovich, M. (2016). The Quality Management System as a Key Factor for Sustainable Development of the Construction Companies. *Proceeding. Engineering 165*, 1717–1721. https://doi.org/10.1016/j.proeng.2016.11.914

Priede, J. (2012). Implementation of quality management system ISO 9001 in the world and its strategic necessity. *Procedia-Social and Behavioral Sciences*, *58*, 1466-1475. https://doi.org/10.1016/j.sbspro.2012.09.1133

Roubtsova, E., & Michell, V. (2013). Modelling and validation of kpis. In *Proceedings of the Third International Symposium on Proceedings of the Third International Symposium on Business Modeling and Software Design, SCITEPRESS-Science and and Technology Publications* (pp. 96-105).

Sari, R. P. (2015). *Integration of Key Performance Indicator into the Corporate Strategic Planning: Case Study at PT*. https://doi.org/10.1016/j.aaspro.2015.01.024

Siougle, E., Dimelis, S., & Economidou, C. (2019). Does ISO 9000 certification matter for firm performance? A group analysis of Greek listed companies. *International Journal of Production Economics*, *209*, 2-11. https://doi.org/10.1016/j.ijpe.2018.04.028

Tsekouras, K., Dimara, E., & Skuras, D. (2002). *Adoption of a quality assurance scheme and its effect on firm performance: A study of Greek firms implementing ISO 9000. Total Quality Management, 13*(6), 827–841. Retrieved from: http://dx.doi.org/10.1080/0954412022000010163

Westcott, R. T. (Ed.). (2013). *The Certified Manager of Quality*. Organizational Excellence Handbook, 4rd ed. Milwaukee (WI): Quality Management Division; American Society for Quality; ASQ Quality Press.

Wohlers, B., Dziwok, S., Pasic, F., Lipsmeier, A., & Becker, M. (2019). *KPI-based monitoring and control of mechatronic systems in production processes*. Retrieved from: https://www.sciencedirect.com/science/article/abs/pii/S0925527319302622

Zalunaev, M. (2014). Creation and implementation of a business management system in accordance with the requirements of IRIS. *Quality management methods, 12*, 40–42.

Zhemchugova, O. V., & Levshina, V. V. (2018). Testing of methodological approaches to choosing a method of applying risk-based thinking in the quality management system of the organization. *Economy and Entrepreneurship, 11*(100), 871–875.