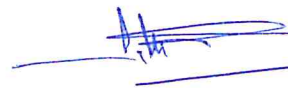


Ministry of Education and Science of the Russian Federation
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"Ural State University of Economics"

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Malyshev Dmitrii Sergeevich

**MANAGEMENT OF THE SYSTEM OF INDICATORS AND LABOR
PRODUCTIVITY FACTORS AT METALLURGICAL ENTERPRISES**

Specialty 5.2.3. Regional and sectoral economics

Abstract of the dissertation for an academic degree
PhD in Economics

Scientific supervisor:
Doctor of Economics, Associate Professor
Dolzhenko R. A.

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Relevance of the research topic. Modern enterprises are influenced by many contradictory internal and external factors that destabilize business opportunities and threaten the possibilities of existence and development. Among them are globalization and multipolarity, which, on the one hand, enhance the competitiveness of enterprises in international markets, forcing them to increase their efficiency, and on the other hand, focus on working in specific areas. Another contradiction is the need to stabilize its activities and maintain basic guidelines in the face of constant changes and simultaneous development pushed by digitalization and a change in the technological structure. Many large enterprises have a strong, often negative impact on the nature and society in which they exist, while the need for sustainable development requires them to develop their production processes, reduce harmful impacts on the environment, invest in comprehensive territorial development projects, and be a socially responsible business. Technological innovations are intensifying, determining the transition to a new way of life, among them: digitalization, additive technologies, artificial intelligence, etc. All this opens new opportunities for significantly increasing production efficiency and labor productivity, which are necessary in a modern economy.

Industry is one of the sectors that requires an increase in labor productivity to a qualitatively different level, associated not only with minimizing costs, but also with the maximum effect from the use of all types of resources, comprehensive consideration of all factors that can, to one degree or another, affect the efficiency of production and management staff. This direction is especially important for metallurgy, in which, on the one hand, the basic principles of production remain unchanged, on the other hand, new technologies are being actively introduced: powder metallurgy, direct reduction of iron, new alloys, resource saving, low-carbon technologies, basic oxygen and electric furnace melting processes, etc. These innovations require significant investments and a revision of the basic principles of work organization, which makes it difficult for them to be widely implemented in the industry, while many other factors for increasing efficiency have not been exhausted and can be systematically used to accumulate resources for a

technological breakthrough. This requires developing approaches to assessing and managing labor productivity, so the topic of the dissertation research is relevant.

The degree of knowledge of the problem. The topic of labor productivity has always occupied the close attention of researchers. The fundamental principles of economic science in general, as well as productivity theory in particular, are described in the works of A. Smith, D. Ricardo, A. Marshall, K. Marx, F. Knight, J. Schumpeter, S. G. Strumilin, V. V. Leontyev, F. Taylor.

Studies of factors of production, represented by the works of classics: C. Diehl, D. Locke, W. Liebknecht, W. Petty, D. Stewart, D. Hume, W. Franklin, F. Taylor, G. Emerson, D. Sink, P. Drucker, I. Masaaki, M. Aoki, D. Norton, Kaplan, etc. In their works, labor productivity is considered from the point of view of various factors, its multifactorial essence is defined. In addition, serious attention is paid to the issues of managing labor productivity through the effective use of these factors.

To substantiate the essence of the concept, evaluation criteria, and build an organizational structure for managing total labor productivity, the works of M. Albert, S. Brew, K. McConnell, A. Marshall, M. Mescon, D. Stevenson, R. Thomas, S. Franklin, F. Khedouri, R. Schonberger, etc., as well as the International Labor Organization (ILO) concept of productivity.

The topic of labor productivity and production efficiency criteria in the Soviet period was studied by such researchers as A. Gastev, O. Ermansky, S. Kamenitser, M. Kunyavsky, I. Lyasnikov, P. Petrochenko, N. Mayorov, A. Tashchev, G. Cherkasov, A. Kaktyn, I. Borshchevsky, N. Vlasova, R. Gavrilov, V. Novozhilov, A. Petrov, N. Petrov, S. Strumilin, A. Frenkel and others.

During the transition to a market economy, the attention of domestic scientists was reoriented to foreign experience in managing total productivity, which is reflected in the studies of Yu. Vavilova, O. Germanova, N. Gorobey, M. Gosudarev, V. Zubov, A. Ismailov, V. Kardashchevsky, A. Nikiforova, V. Prisyazhny, I. Prokopenko, V. Sidorov, L. Sokolova, and other authors.

In modern domestic economic literature, problems of labor productivity in a market economy are presented in the works of V. Adamchuk, B. Andreev, V. Belkin,

V. Volgin, B. Genkin, O. Germanova, N. Gorelov, V. Zubov, V. Kardashevsky, V. Kiseleva, R. Kolosova, Y. Kokin, L. Labunsky, P. Lutovinov, Y. Odegov, N. Revenko, I. Rofo, B. Reisenberg, V. Rozhkova, D. Savelyev, L. Sokolova, P. Shlender, V. Charintseva, A. Shcherbakov, R. Yakovlev, G. Kremnev, V. Petrukhin, O. Agabekyan, V. Kardashevsky, A. Bondarenko, V. Kudrov, R. Podovalova, A. Nikiforova, A. Shcherbakov, R. Yakovlev, P. Ignatovsky and others.

The topic of comparing labor productivity at Russian enterprises with foreign countries in the economy as a whole and industry is explored in the works of V. Varzar, E. Vasiliev and H. Kovalzon, S. Strumilin, V. Kondratyev and Y. Kurenkov, A. Alam, P. Casero, F. Kahn and K. Idomzev, V. Bessonov, V. Gimpelson, Y. Kuzminov and E. Yasin, M. Uzyakov, I. Voskoboinikov, M. Mamonov and A. Pestova. Some works (for example, reports by the McKinsey Consulting Company and materials presented at the Presidium of the State Council of the Russian Federation) contain assessments for individual sectors of the manufacturing industry. Issues of comprehensive measurement and management of labor productivity at enterprises in the aspect of methodological approaches to managing labor productivity in the digital economy are practically not considered.

Despite the continued interest in the topic of labor productivity in recent years, the problem of managing the factors that influence it, especially at the regional level, has not been fully studied. Only a few domestic labor economists (O. Bocharova, Yu. Dulshchikov, R. Kolosova, S. Potokina, L. Sokolova, O. Lanina, T. Uskova, G. Yasheva), analyzing issues of economic growth in the regions, consider productivity issues labor as its most important factor.

At the same time, some aspects of the problem of increasing labor productivity require further in-depth research. This concerns the development of an approach that ensures increased labor productivity at the current stage of technological and socio-economic development, digitalization of the economy and adaptation of social life to external threats.

The purpose of the dissertation research is to develop theoretical and practical aspects of managing the labor productivity of personnel at metallurgical

enterprises through the analysis of indicators and the use of factors in conditions of business orientation towards maximizing organizational efficiency through the implementation of projects to improve it.

To achieve this goal, the following **tasks are formulated in the dissertation**:

1. Systematize scientific ideas about labor productivity and the factors that influence it.

2. Classify factors of labor productivity at an enterprise, as well as indicators of their use, considering changes occurring in the economy, identify their systemic importance in understanding the efficiency of the economy of enterprises, industries, and countries.

3. Summarize methodological developments in the use of modern approaches to labor productivity management at metallurgical enterprises.

4. To develop a mechanism for increasing labor productivity based on the methodology for implementing projects to increase organizational efficiency, ready for practical use in modern production.

The object of the study is a system of indicators and factors of labor productivity of personnel of a metallurgical enterprise in the context of implementing projects to increase organizational efficiency.

The subject of the study is the mechanism for increasing organizational efficiency and managing the labor productivity of personnel at a metallurgical enterprise.

Theoretical and methodological basis of the study. The theoretical basis consists of research on the definition of crowdsourcing, works of foreign and domestic scientists in the field of management theory, corporate governance, organization management theory, research in the field of group management, in the field of knowledge economics and behavioral economics.

The research methodology is based on the application of a process approach. The methods of logical analysis, analogy, observation, questioning, comparative analysis, interviews, statistical research using expert assessments - descriptive statistics-were used in the course of the work. Practical examples were analyzed

using the case study method. To develop the concept of using crowdsourcing, functional modeling was applied (IDEF0 methodology was used).

The informational and empirical base of the study is based on the theoretical and methodological basis of the study are the works of domestic and foreign scientists in the field of labor economics (labor productivity, labor efficiency, digitalization of production processes, efficiency of digital transformation, etc.). The author relied on modern basic theories of organizational effectiveness: LEAN, 6 SIGMA, The theory of constraints (TOC) etc.

The research methodology is based on a systems approach that considers labor productivity management at a metallurgical enterprise as an element of the overall industrial economic performance management system. In addition, the work uses a process approach and LEAN methodology aimed at optimizing all production processes. The methodological basis for studying indicators and factors of labor productivity at the macro level is the institutional approach, which considers the existing system of formal and informal institutions, approaches, values, and rules of behavior of economic entities as a formalized framework that limits the development of approaches to assessing and managing economic performance.

When performing the dissertation work, the following methods were used: systemic, functional, process approaches. In the process of work, methods of logical analysis, analogy, observation, questioning, the method of comparative analysis, interviews, statistical research using expert assessments - descriptive statistics were used. Practical examples were analyzed using the method of specific situations (case studies) for several metallurgical enterprises in Russia and Italy. Machine learning methods were used to develop a model for identifying the movements of workshop workers.

The information and empirical base of the study consisted of official statistics, documents, and materials from metallurgical enterprises in the Urals and Siberia. The empirical basis was the results of in-depth interviews with managers (N = 12) and experts of metallurgical enterprises (N = 26) involved in digital transformation projects, as well as questionnaire surveys of enterprise employees (N = 1197). Focus

groups were conducted to calibrate the survey instrument (N = 25). In addition, to identify problem areas in the development of approaches to labor productivity management, 2 rapid foresights were conducted with representatives of metallurgical enterprises and heads of HR departments. During the pilot testing of the methodology projects were implemented to improve organizational efficiency at 17 enterprises, including 6 mining, 7 metallurgical, 4 processing, in different regions of the country: Sverdlovsk region, Republic of Bashkortostan, Orenburg region, Tyumen region, Tomsk region, Vladimir region, Kurgan region, Kirov region, Altai region.

Scientific novelty of the dissertation research lies in the development of theoretical and methodological foundations for labor productivity management, reflecting the possibilities for the development of production processes, personnel training, and the introduction of management innovations; in developing the concept of a comprehensive assessment of factors and indicators of labor productivity using an automated system for analyzing data collected at all areas of production processes.

The main scientific result of the dissertation research:

1. The importance of labor productivity in the conditions of economic and production development is clarified due to the complication and digitalization of production and support processes that contribute to the transition to a new technological structure, through the systematization of approaches to labor productivity, as well as the factors influencing it, which develops promising opportunities for the use of methodological approaches to labor productivity management. The originality and novelty of the approach is determined by the substantiation of the expected development of ideas about labor productivity management in the new technological structure at metallurgical enterprises.

2. A multi-level complex classification of labor productivity factors at metallurgical enterprises, as well as indicators of their use, was carried out, systematizing the possibilities of its assessment and management in modern conditions. The originality and novelty of the classification of factors and indicators

lies in the fact that they are grouped into areas that are relevant from a management point of view; each level is associated with a characteristic, examples of manifestation and parameters for evaluation. This systematizes all possible factors, including new ones, and facilitates the possibility of taking them into account and assessing their impact on labor productivity in the organization.

3. A concept for labor productivity management has been developed, revealing the content and sequence of stages of managing production and support processes in the context of implementing operational transformation projects. Methodological approaches to measuring labor productivity at various levels, as well as assessing factors that influence various indicators, are proposed. The concept and methodological approaches differ from traditional ones, as they consider the specifics of the industry and its characteristic factors for increasing labor productivity, focus on the primary need to use intra-organizational factors, develop the basic provisions of the concept of lean production and other methods for increasing organizational efficiency in relation to the characteristics of industry and metallurgy.

4. A methodology has been developed and tested to increase labor productivity at a metallurgical enterprise through the implementation of organizational transformation projects, which involves the assessment of factors and indicators, as well as a set of measures to improve them and consolidate the effects and new approaches. A special feature of the methodology is its universal nature, which is confirmed by the results of testing; coverage of key intra-company factors of labor productivity growth, ensuring its average increase of up to 15%; bringing to the level of specific technologies and tools of application.

The theoretical significance of the study lies in the addition of theoretical and methodological provisions on labor economics in terms of assessing labor productivity at metallurgical enterprises, including clarification of the conceptual and categorical apparatus of the problems of assessing labor productivity and the factors that influence it; labor productivity indicators, methods and tools for factor

management were studied; directions for managing labor productivity in the context of digitalization of production and support processes have been identified.

The practical significance of the research results lies in the development of a concept for managing the labor productivity of a metallurgical enterprise through optimization of production and support processes, digital transformation and complex balancing of factors using artificial intelligence and machine learning technologies, as well as the formation of comprehensive recommendations for working with factors affecting labor productivity enterprises based on system and process approaches, which can be used directly in the practical activities of domestic metallurgical enterprises to increase worker productivity. The proposed recommendations differ from existing ones in their complexity, considering the widest possible range of factors, the use of modern data analysis technologies, and their suitability for use at metallurgical enterprises. They are of interest to top management of domestic factories, HR directors, and heads of digital transformation offices. The results of the dissertation research were also used in the educational process in programs of higher and additional professional education in the profile “Economics” and “Human Resource Management” in the subjects “Economics of Human Resources”, “Labor Economics”, “Analysis of Labor Indicators” to analyze business cases, as well as in training specialists in organizational transformation at several enterprises in the Sverdlovsk region.

The results of the study were discussed and tested at 7 international conferences: “Advances in Intelligent Systems and Computing” (Prague, 2019), “Ural - 21st century: macro-region of neo-industrial and innovative development” (Ekaterinburg, 2018), “X Decent work is the basis of stable society” (Ekaterinburg, 2019), “Management and entrepreneurship in the paradigm of sustainable development” (Ekaterinburg, 2019), “Digital transformation of industry: trends, management, strategies” (Ekaterinburg, 2019), “XIV Decent work is the basis of a stable society” (Ekaterinburg, 2022), “XV Decent work is the basis of a stable society” (Ekaterinburg, 2023); as well as at five all-Russian and regional conferences (Moscow, Omsk, Novosibirsk). The research results are included in

grant reports, where the author is a co-executor: RFBR: “Prospects for the use of digital technologies of distributed registries and smart contracts in the system of social and labor relations” No. 19-010-00785 (2019–2020). The results of the study were used to apply for a grant on the topic “Reserves and opportunities for increasing labor productivity at industrial enterprises of the Sverdlovsk region No. 24-28-20469”, which was supported by the Russian Science Foundation as part of the 2024 competition “Conducting fundamental scientific research and exploratory scientific research by small individual scientific groups” (regional competition), the author became part of the scientific group to carry out the research.

Based on the dissertation research materials, 17 scientific papers were published, including 9 articles in journals recommended by the Higher Attestation Commission of the Russian Federation, 1 in Scopus/Web of Science, 1 textbook and 1 monograph. The total volume of published materials belonging to the author is 9.2 pp. The results of the study and recommendations were discussed at meetings of the commission for the development of the system of competencies and qualifications of the Sverdlovsk Regional Union of Industrialists and Entrepreneurs (2018–2022), accepted for practical implementation by the Ministry of Industry and Science of the Sverdlovsk Region, JSC UMMC-Holding, JSC Uralelectromed", for use in the educational process of the Federal State Budgetary Educational Institution of Higher Education "Ural State Economic University" within the framework of the discipline "Labor Economics".

Structure of the dissertation. The paper consists of an introduction, three chapters, a conclusion, and a list of references, including 202 titles, including 46 in a foreign language. The dissertation contains 27 figures, 50 tables, 5 appendices.