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METHODS FOR ASSESSING THE LEVEL OF UTILIZATION OF INDUSTRIAL POTENTIAL IN REGIONAL ECONOMIC DEVELOPMENT

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Abstract

This study examines methodological approaches for assessing the level of industrial potential utilization in regional economic development. The paper analyzes the essence of industrial potential, its structural components, and key evaluation methods. Particular attention is given to indicators reflecting the efficiency of fixed asset utilization and their role in enhancing industrial performance. The study highlights the importance of comprehensive assessment methods in improving resource allocation and strengthening regional competitiveness.

Keywords: Industrial potential; regional development; production potential; resource utilization; fixed assets; capital productivity; industrial efficiency; assessment methods; competitiveness; economic growth.

Introduction

The sustainable development of regional economies increasingly depends on the ability to transform available industrial resources into tangible economic results. In many cases, regions possess considerable production capacities, labor resources, infrastructure facilities, and investment opportunities; however, the economic outcomes generated from these resources differ significantly. Such



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disparities indicate that the scale of industrial potential alone cannot adequately explain regional development dynamics. Greater attention should therefore be paid to the extent to which existing industrial capacities are effectively utilized.

Industrial potential represents a complex economic category that reflects the aggregate capacity of a region to generate industrial output through the interaction of production assets, technological resources, human capital, innovation capabilities, and organizational mechanisms. The contribution of these factors to regional growth depends not only on their availability but also on the efficiency with which they are employed. As a result, the assessment of industrial potential utilization has become an important analytical instrument for identifying development reserves, production constraints, and opportunities for improving industrial performance.

Current economic conditions characterized by technological modernization, digital transformation, increasing competition, and structural changes in production systems have further strengthened the need for objective assessment methods. Traditional approaches based exclusively on output volumes or investment indicators often fail to capture the real level of industrial resource utilization. Consequently, more comprehensive evaluation methods are required to reflect the multidimensional nature of industrial development and to reveal hidden inefficiencies within regional production systems.

The methodological assessment of industrial potential utilization is particularly important for the formulation of effective regional industrial policies. Reliable evaluation results make it possible to determine priority areas for investment, identify bottlenecks in production processes, improve resource allocation, and support evidence-based decision-making. Moreover, a systematic assessment framework allows policymakers to monitor structural changes within the industrial sector and to evaluate the effectiveness of development programs



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implemented at the regional level.

Therefore, the study of methods for assessing the level of utilization of industrial potential in regional economic development possesses both theoretical relevance and practical significance. The development and application of appropriate assessment methodologies contribute to a deeper understanding of regional industrial dynamics and provide a scientific basis for enhancing economic competitiveness, increasing production efficiency, and ensuring sustainable long-term growth.

Since industrial potential is a complex economic category, its constituent elements also comprise numerous components. Therefore, it is appropriate to first examine the concept of production potential and subsequently address the issues related to assessing the level of its utilization.

The efficient utilization of production potential in the industrial sector implies achieving superior final outcomes through the rational use of all available resources simultaneously. Various methods and methodologies are employed in the academic literature to assess the utilization of production potential. For instance, the effectiveness of production potential utilization is commonly evaluated through functional-potential, result-oriented (goal-oriented), and optimization-based approaches [1]:

- Functional-Potential Approach:

$$R_{ep} = f(P_v - F_v) \rightarrow \min H_n \quad (1)$$

Here: P_v – the potential capabilities of the industry (sector);

F_v – the actual level of utilization of production potential;

H_p – losses arising from the underutilization of production potential.

If $P_v = F_v$, this indicates a situation in which the available potential capabilities are being utilized to their fullest extent.



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- Result-Oriented (Goal-Oriented) Approach:

$$R_{ep} = Ef_{ep} / Ts \quad (2)$$

Here: Ef_{ep} – the magnitude of efficiency (planned, forecasted, or actual), expressed either in value terms or in physical/natural units;

Ts – the planned, forecasted, or achieved objective of the industry's activity, reflecting its development targets in the short, medium, or long-term perspective.

The optimization-based approach makes it possible to optimize the level of production potential utilization by minimizing variable costs within the industry. In assessing production potential, including the efficiency of utilizing its constituent components, the resource-potential approach is also widely applied. Under the resource-potential approach, the efficiency of utilizing the industry's production potential (including its structural components) is determined through an integral assessment value. This indicator is calculated as the ratio of the efficiency outcome to the value of variable resources (R_p) and is expressed as follows:

$$Ef_{ep} = E_p / R_p \quad (3)$$

In some academic studies, it is argued that the assessment of the level of production potential utilization should be based on evaluating the efficiency of the individual elements that constitute such potential. A substantial part of production potential is associated with the efficient utilization of fixed assets. Therefore, the key indicators used to assess the efficiency of fixed asset utilization are discussed below.

Fixed Asset Turnover Ratio (Capital Productivity). This indicator reflects the amount of output produced per unit of fixed assets. An increase in this indicator signifies a more efficient utilization of fixed assets. It is calculated as follows:



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$$FR = \frac{Q}{FA} \quad (4)$$

Here: FR – Fixed Asset Turnover Ratio (Capital Productivity);

Q – Volume of Production (Output);

FA – Average Annual Value of Fixed Assets.

Indeed, the better the condition of fixed production assets in an industrial sector, the greater the sector's ability to utilize its technological potential more fully. As a result, production output tends to increase.

The indicator opposite to the fixed asset turnover ratio is the fixed asset intensity ratio (capital intensity). This indicator represents the monetary value of fixed production assets required to produce one unit of output (or one monetary unit of production). As noted above, an increase in the fixed asset turnover ratio reflects higher production efficiency, whereas a continuous increase in fixed asset intensity over time indicates a decline in production efficiency. It is calculated as follows [2]:

$$FC = \frac{FA}{Q} \quad (5)$$

Here: FC – Fixed Asset Intensity Ratio (Capital Intensity);

Q – Volume of Production (Output);

FA – Average Annual Value of Fixed Assets.

Another important indicator reflecting the efficiency of fixed asset utilization is the capital-labor ratio (or the degree of capital endowment of labor). This indicator represents the average annual value of fixed assets per employee engaged in industrial production and is calculated as follows:

$$SA = \frac{FA}{L} \quad (6)$$



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Here: SA – Capital-Labor Ratio (Degree of Capital Endowment of Labor);

FA – Average Annual Value of Fixed Assets;

L – Number of Employees Engaged in Industrial Production.

Fixed assets may undergo both physical depreciation and obsolescence (moral depreciation). Physical depreciation refers to the gradual wear and tear of fixed assets resulting from their use in the production process. Over time, these assets become physically unsuitable for operation and are either replaced with new ones or restored through major repairs of certain components.

Obsolescence arises for two main reasons. First, the invention and adoption of new, more productive machinery in production reduce the value of existing equipment even before the end of its physical service life, rendering it technologically outdated. Second, technological advancement and improvements in labor productivity lead to a decline in the value of machinery currently in operation.

Thus, fixed production assets gradually depreciate over time, which, in turn, leads to a corresponding reduction in the production potential of the industrial sector.

The reproduction of fixed assets is characterized by the following indicators [3]:

- a) the operational, physical, and technical condition of fixed assets;
- b) the rate of renewal of fixed assets;
- c) indicators reflecting the utilization of fixed assets.

The operational condition of fixed assets is assessed only for their active component, namely machinery, power equipment, and production tools. The physical condition of fixed assets is characterized by their depreciation coefficient and serviceability (fitness-for-use) coefficient.

Depreciation Coefficient (C_d):

$$C_d = \frac{F - F_r}{F} \quad (7)$$



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Here: F – Gross (Original) Value of Fixed Assets;

F_r – Residual (Net Book) Value of Fixed Assets.

If the depreciation coefficient is subtracted from one, the serviceability coefficient (C_s) is obtained:

$$C_s = 1 - C_d; \quad C_s = \frac{F_r}{F} \quad (8)$$

To characterize the rate of reproduction of fixed assets, as well as changes in their physical and technical condition, the fixed asset renewal coefficient and the fixed asset retirement (disposal) coefficient are calculated.

$$C_s = \frac{F_{r,k}}{F_1}; \quad C_s = \frac{F_{r,t}}{F_0} \quad (9)$$

The convergence of these two coefficients indicates that obsolete fixed assets are being replaced by new ones, whereas a substantially higher renewal coefficient compared to the retirement coefficient reflects the expanded reproduction and modernization of fixed assets.

Conclusion

The assessment of industrial potential utilization requires a comprehensive evaluation of production resources, their efficiency, and the extent to which they contribute to achieving industrial development objectives. In this regard, functional-potential, result-oriented, optimization-based, and resource-potential approaches provide a methodological basis for measuring the effectiveness of production potential utilization.

Particular importance is attached to the efficient use of fixed assets, as they constitute a fundamental component of industrial production potential. Indicators such as fixed asset turnover, fixed asset intensity, capital-labor ratio, depreciation, serviceability, renewal, and retirement coefficients make it possible to assess the



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condition, productivity, and reproduction dynamics of fixed assets. The improvement of these indicators reflects a more efficient utilization of available resources, enhanced technological capacity, and increased industrial output. Consequently, maintaining a high level of fixed asset renewal and ensuring their effective use are essential prerequisites for strengthening industrial potential and supporting sustainable regional economic development.

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