Innovation Performance Measurement and Investment Effectiveness in Industrial Enterprises: A Multidimensional and Institutional Approach

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In the context of intensifying global competition, ensuring sustainable economic growth, accelerating scientific and technological progress, and enhancing the effectiveness of innovation activity has become one of the central priorities of state economic policy. In Uzbekistan, the ongoing structural reforms—particularly those aimed at industrial modernization, digital transformation, and the expansion of import-substituting production—have significantly increased the need for a scientifically grounded assessment of enterprises' innovation performance. Under these conditions, improving the methodological foundations for evaluating innovation effectiveness, revising existing assessment frameworks, and adapting them to the evolving economic environment emerges as a critically important research and policy task.

The identification of pathways to enhance investment performance requires close consideration of enterprises' financial strategies, capital structure optimization, investment portfolio diversification, and the effectiveness of corporate governance mechanisms. This, in turn, highlights the necessity of further developing the theoretical and methodological foundations of corporate financial management, introducing advanced evaluation tools, and conducting a deeper analysis of the institutional mechanisms governing investment processes. Such an approach enables a more accurate assessment of how financial decisions influence innovation outcomes and long-term competitiveness.

For Uzbekistan, the evaluation of investment effectiveness demands the development of an integrated methodological framework that combines best international practices with the specific features of the national economic context. On the one hand, this framework would ensure transparency and reliability of information for foreign investors; on the other, it would provide an objective and comprehensive basis for assessing the effectiveness of the country's investment policy. As a result, investment decisions could be better aligned with national development priorities and structural transformation goals.

In today's highly competitive global environment, the measurement and assessment of innovation performance represents a strategic determinant of economic growth. Methodologies for evaluating innovation effectiveness should extend beyond purely financial indicators to incorporate technological, organizational, and social dimensions of performance. Such a multidimensional approach allows for a more complete disclosure of enterprises' innovation potential and creates favorable conditions for the sustainable development of the innovation ecosystem. Ultimately, this contributes to strengthening technological resilience, enhancing productivity, and ensuring long-term economic sustainability.

According to B.S. Zhikharevich, the effectiveness of investment activity can primarily be identified through the level of income generated as a result of capital вложения. Within his analytical framework, the economic outcome of investment is interpreted in a narrowly defined manner, where performance is assessed predominantly through financial indicators. In this approach, investment efficiency is directly associated with capital recovery and profitability metrics, emphasizing the return on invested funds as the key criterion for evaluation.

In contrast, Yu.V. Savelyev proposes a broader and more structurally oriented interpretation of investment efficiency. He argues that an adequate assessment of investment performance requires not only measuring the total volume of capital investments but also analyzing their horizontal and vertical composition. From this perspective, efficiency is determined not solely by final output indicators, but also by how investment resources are distributed across sectors, stages, and structural components of the economy. Such an approach highlights the significance of investment allocation patterns in shaping long-term economic outcomes.

At the same time, the domestic researcher S. Rustamova advances a substantially more comprehensive understanding of investment efficiency. In her interpretation, investment effectiveness is not limited to financial returns but reflects the overall configuration of economic, political, regulatory, legal, and social conditions that influence investment processes within a country. This conceptualization shifts the analytical focus from isolated financial results to the broader institutional environment, emphasizing that investment efficiency should be evaluated in conjunction with the quality of the investment climate, governance structures, and socio-institutional factors. Consequently, this approach underscores the necessity of assessing investment performance as a multidimensional phenomenon embedded within the broader socio-economic system.

At the same time, the results of the empirical analysis reveal the presence of a number of constraints that limit the effectiveness of innovative activity at the enterprise level. In particular, restricted access to external sources of financing, the high cost of investment capital, and the insufficient effectiveness of existing state support instruments significantly slow down innovation processes. Although 82 percent of surveyed enterprises report having received some form of government support at least once, only 13 percent regard public assistance as a decisive factor driving their innovative development. This discrepancy indicates a structural mismatch between policy instruments and the real needs of innovation-oriented firms.

In this context, improving existing methodological approaches requires a substantial expansion of the criteria used to assess innovation performance. Specifically, the introduction of dynamic, integrated, and cognitively oriented analytical models becomes necessary. Such models make it possible to empirically evaluate the impact of innovation on economic outcomes, identify the level of financial sustainability, and assess the degree of scientific and technological integration within enterprises.

Currently, the evaluation of innovation performance in enterprises is dominated by traditional financial indicators, including the volume of innovative output, profit dynamics, and cost recovery ratios. However, a comprehensive system of indicators that captures the scientific, technological, and social effects of innovation activity has not yet been fully developed. For this reason, the present study proposes the application of a multi-index approach, based on a multidimensional and aggregated assessment framework, as a scientifically grounded solution for evaluating innovation performance.

The analytical foundation of innovation performance assessment is formed by a set of interrelated indicators, including the level of technological renewal, the efficiency of intellectual resource utilization, financial stability, the speed of market introduction of innovations, and the capacity to generate new employment opportunities. The robust analysis of these indicators requires the combined use of statistical, correlation, and index-based methods, ensuring both analytical depth and methodological consistency.

For the purpose of evaluating innovative activity in industrial enterprises, the following core system of indicators is employed:

- the share of innovative products in total output (%);
- the economic effectiveness of innovation projects;

- the technological renewal coefficient;
- the proportion of investment directed toward innovation (%);
- the number of new jobs created as a result of innovation activities;
- the share of intellectual property assets, including patents, licenses, and know-how.

Based on these indicators, an integrated innovation performance index is calculated, incorporating both financial and non-financial dimensions. This approach enables innovation effectiveness to be assessed not only through economic results, but also from the perspective of scientific contribution and social impact.

To ensure the scientific reliability and empirical validity of the integrated innovation activity indicator, the study conducts an in-depth analysis of financial and innovation reports covering the last five years for 57 leading industrial enterprises, alongside a systematic review of more than 40 academic publications devoted to innovation performance assessment. In addition, 16 in-depth expert interviews with senior managers of large industrial companies were carried out, and their insights played a crucial role in shaping the applied orientation of the research. Furthermore, key performance indicators recommended by the American Productivity and Quality Center (APQC) were examined, allowing for the selection of internationally comparable indicators aligned with global standards of innovation assessment.

Based on the results of the empirical investigation, a multifactor methodology for assessing the innovative activity of industrial enterprises has been developed and proposed. To construct the integrated performance indicator, a synthesized methodological framework combining economic-statistical analysis, correlation–regression modeling, and expert scoring techniques was applied. Within this framework, five core performance indicators were selected as the key determinants of innovation effectiveness:

- the share of innovative products combined with a profitability index;
- the coefficient of technological renewal;
- the degree of capital recovery generated by innovation activities;
- the effectiveness of research and development (R&D) expenditures;
- the speed at which innovative initiatives are introduced and diffused in the market.

In addition to these core variables, the methodology recommends calculating three indicative indicators that do not directly enter the integrated index but play a crucial role in shaping the overall innovation environment of enterprises. These include:

An indicator reflecting the innovation capacity and performance of scientific organizations, higher education institutions, and research institutes, expressed through the level of R&D development (percentage-based).

The number of proposals related to new technologies and technical or technological solutions submitted by subsidiaries and affiliated entities during the reporting period.

The number of newly granted institutional authorities and competencies resulting from innovation outcomes, reflecting the growth of scientific and organizational autonomy.

The proposed integrated evaluation system enables the simultaneous consideration of both economic and non-economic outcomes of innovation, thereby creating conditions for transforming enterprises' innovation behavior. Within this framework, innovative activity is assessed in conjunction with indicators of economic resilience, scientific capacity, and technological diversification, ensuring a holistic and forward-looking evaluation.

Industrial enterprises occupy a central position within the national innovation system. Investments directed by these enterprises toward research and development, technological modernization, and the production of innovative goods exert a decisive influence on the technological advancement of key sectors of the national economy. The transmission mechanisms of this influence manifest through:

- the establishment of effective systems for innovation commercialization and technology transfer;
- the placement of targeted orders for research and experimental design activities;
- the formation of a competitive market environment that stimulates innovation activity among other economic agents.

In this context, the role of industrial enterprises as primary drivers of innovation-led development becomes critically important in the formulation of their technological strategies. This, in turn, serves as a determining factor in identifying priority technological domains, optimizing resource allocation, and advancing innovation

infrastructure development, thereby reinforcing the long-term trajectory of technological and economic modernization.

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