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Article

Multifactor Point-Based Modeling of Operational Strategy Performance in Industrial Enterprises

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Abstract: This article explores the theoretical and methodological foundations for assessing the efficiency of operational activities and working capital utilization in industrial enterprises. The primary objective of the study is to develop a multi-factor scoring methodology that enables the identification of the resource-saving and resource-intensive nature of operational activity strategies in industrial enterprises. The research employs system analysis, factor analysis, and economic-mathematical modeling methods. As a result of the study, an 8-stage scoring scale was developed to reflect the interdependence between the dynamics of production and sales volumes and the turnover velocity of working capital. The proposed multi-factor scoring model provides the management of industrial enterprises with a tool for conducting rapid (express) diagnostics and making optimal managerial decisions to mitigate operational risks.

Keywords: operational strategy, industrial enterprises, working capital, turnover ratio, multi-factor scoring modeling, intensive growth, resource efficiency, operational efficiency.

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Introduction. In recent years, enhancing the competitiveness of industrial enterprises and implementing resource-efficient manufacturing systems have become core priorities of the state economic policy in Uzbekistan. Specifically, Decree No. UP-158 of the President of the Republic of Uzbekistan, dated September 11, 2023, titled "On the 'Uzbekistan – 2030' Strategy," sets key strategic objectives aimed at increasing labor productivity in industrial sectors by 1.8 times, ensuring resource efficiency within production processes, and optimizing operational expenditures [1]. Implementing these strategic mandates necessitates refining operational strategies across industrial enterprises and deploying multi-factor evaluation mechanisms to optimize the efficiency of working capital utilization.

In today's dynamic market environment, the sustainable performance of industrial enterprises critically depends on the mutual alignment of three fundamental managerial decisions: investment decisions aimed at fixed capital renewal, financial decisions optimizing capital structure, and operational decisions ensuring the continuity of production and sales processes. Within this framework, operational management requires executing long-term operational strategies alongside resolving routine operational-tactical tasks. However, perfecting the methodological toolkit for formulating operational strategies—specifically those capable of accurately assessing product lifecycle dynamics and resource utilization—and evaluating their efficacy remains a critical and timely issue [2].

As operational activity encompasses the entire integrated cycle of product manufacturing and distribution, the working capital management mechanism serves as the primary driving element of this strategic system. The success and ultimate economic outcome of an operational strategy in industrial enterprises rely heavily on achieving an optimal equilibrium between the total volume of working capital and its velocity of circulation (days sales of working capital). Nevertheless, traditional analytical tools and retrospective statistical metrics of working capital turnover fail to adapt to high-factor data volatility. This limitation creates an urgent imperative to comprehensively evaluate resource utilization indicators within operational management systems by employing novel conceptual criteria and multi-factor economic-mathematical models [3].

From this perspective, the multi-factor scoring approach to modeling operational strategy effectiveness serves as the most optimal and rapid (express) tool. By integrating diverse econometric indicators into a unified multi-criteria scale, this method enables comprehensive diagnostics of various combinations of resource consumption and turnover duration. It offers distinct advantages, including the early identification of an enterprise's operational strategy—whether resource-efficient (intensive) or resource-intensive (extensive)—the mathematical systemization of the relationship between production and sales volume dynamics and working capital efficiency through credit-scoring metrics, and the facilitation of prompt managerial decision-making to minimize financial and operational risks.

Based on the aforementioned considerations, the primary objective of this research is to develop and empirically substantiate a multi-factor scoring methodology that enhances operational efficiency in industrial enterprises, reduces capital-freezing costs, and facilitates a transition toward a resource-efficient operational strategic state [4]. To achieve this objective, the following priority tasks were formulated:

Classify the functional dependencies between operational strategies and working capital turnover velocity;

Develop an 8-stage integral scoring scale to evaluate the impact of intensive and extensive factors;

Identify optimal strategic alternatives that maximize efficiency for industrial enterprises, along with the key drivers for transitioning to these states.

The research hypothesis (H_1) posits that an integral assessment of production volume and working capital dynamics based on multi-factor scoring modeling accelerates the transition from resource-consuming (extensive) strategies to resource-efficient (intensive) strategies, thereby enhancing overall operational performance.

Operational strategy and working capital management mechanisms play a pivotal role in ensuring the competitiveness and sustainable development of industrial enterprises. Theoretical and practical research in this field spans two primary domains: strategic enterprise management and working capital optimization [5].

The conceptual foundations of corporate strategy, competitive advantage, and operational organization were established by seminal international scholars. Within the CIS context, strategic planning and risk management frameworks have been actively expanded [6],[7],[8]. In Uzbekistan, sector-specific strategies and enterprise governance mechanisms have been extensively investigated by local researchers [9].

The second domain—focusing on financial mechanisms, inventory optimization, and working capital efficiency—is grounded in classical financial management theories [10]. Methodologies for working capital diagnostics, supply chain process optimization, and production management were further refined in CIS regional studies [11]. In Uzbekistan, key aspects of operational performance, competitiveness, and management accounting have been critically evaluated in local economic literature [12].

While International Accounting Standards (IAS 7) and traditional financial literature typically define "operational activity" within primary revenue-generating boundaries, broader perspectives integrate pricing strategies, marketing, and asset reproduction.

Despite these foundational contributions, existing literature predominantly captures the interplay between working capital dynamics and operational strategies through isolated turnover indicators. To address the practical demands of industrial enterprises, this study establishes a multi-factor functional relationship between operational strategy and working capital velocity, utilizing an integrated 8-stage scoring scale.

Research methodology. Throughout the research process, the theoretical and methodological foundations for enhancing operational efficiency and evaluating working capital utilization in industrial enterprises were systematized. The methodological framework of the study comprises systemic and structural-functional analysis, economic-mathematical modeling, grouping, and comparative analysis methods.

To classify operational strategies and evaluate their effectiveness, the following logical and methodological stages were sequentially executed:

Indicator Selection: The relationship between enterprise operational performance (production and sales volume) and resource factors (working capital volume and its turnover indicators) was selected as the core diagnostic metric.

Classification of Strategic Alternatives: Based on the structural trends of operational indicators, eight primary strategic alternatives were identified and categorized into resource-efficient (intensive) and resource-consuming (extensive) clusters.

Formulation of the Scoring Scale: To rank strategies according to their efficiency levels, an integral scoring evaluation system was developed.

Index and factor analysis methods were employed to identify the impact of intensive and extensive factors on the operational performance of industrial enterprises. To express the functional relationship between working capital turnover velocity and production volume, the following factor model was applied:

$$V = N \cdot D_o$$

Where:

- V — sales volume of industrial products;
- N — average balance of working capital;
- D_o — working capital turnover ratio (number of rotations).

To calculate the integral score indicator (S_i) of operational strategies, expert estimation and weighting methodologies were applied. The reliability and consistency of expert rankings were validated using Spearman's rank correlation coefficient (r_s).

Financial and operational reporting data from industrial enterprises served as the empirical foundation for verifying the scoring model. The research sample was formed in strict accordance with principles of representativeness, and data processing was conducted using modern statistical software packages and information technology tools.

Results and discussion. To enhance operational efficiency and evaluate working capital utilization in industrial enterprises, eight primary operational strategies are classified. In this study, an integral scoring evaluation scale was developed to rank strategic alternatives according to their efficiency levels.

The scoring evaluation system is founded upon two fundamental methodological principles:

Priority of Intensive Factors: Achieving operational performance through intensive factors (accelerating working capital turnover velocity and reducing capital intensity) is evaluated as significantly higher in efficiency compared to relying on extensive factors (merely increasing the volume of circulating assets and resources).

Advantage of Production and Sales Growth: Proportional growth in output and sales volume holds a critical socioeconomic, financial, and competitive priority over production decline [13].

In order to maintain equal intervals across the strategy evaluation scale and to establish a distinct dichotomous differentiation between positive and negative trends, the Neutral (Sub-extensive Growth) strategy was assigned a baseline score of S_i=0. Effective strategies are evaluated with positive scores (ranging from +1 to +4), whereas ineffective strategies are designated with negative scores (ranging from -1 to -3) (Table 1).

Table 1. Scoring Evaluation Scale of Operational Strategies in Industrial Enterprises*

Score (Si)	Strategy No.	Strategy Name	Abbreviation	Character of Interplay Between Operational and Resource Factors
+4	4	Intensive Growth	IG	Output increases ($\Delta V > 0$), working capital decreases ($\Delta N < 0$), turnover accelerates ($\Delta D_o < 0$)
+3	5	Intensive Decline	ID	Output decreases ($\Delta V < 0$), working capital decreases sharply ($\Delta N \ll 0$), turnover accelerates ($\Delta D_o < 0$)
+2	3	Sub-intensive Growth	SubIG	Output increases ($\Delta V > 0$), working capital increases ($\Delta N > 0$), turnover acceleration predominates
+1	6	Sub-intensive Decline	SubID	Output decreases ($\Delta V < 0$), working capital decreases ($\Delta N < 0$), resource release is observed
0	2	Sub-extensive Growth	SubEG	Output increases ($\Delta V > 0$), working capital growth outpaces turnover acceleration
-1	7	Sub-extensive Decline	SubED	Output decreases ($\Delta V < 0$), turnover deceleration offsets the effect of resource reduction
-2	1	Extensive Growth	EG	Output increases ($\Delta V > 0$), working capital and turnover days increase simultaneously ($\Delta N > 0, \Delta D_o > 0$)
-3	8	Extensive Decline	ED	Output decreases ($\Delta V < 0$), working capital increases ($\Delta N > 0$), turnover decelerates sharply ($\Delta D_o \gg 0$)

*Note: The S_i scores represent an expert ranking scale developed by the author, expressing the synergistic and resource-saving effect of operational and resource factors

on enterprise profitability (ranging from the optimal maximum of +4 to the least optimal minimum of -3).

Analysis of Results and Dichotomy of Operational Strategic Alternatives. Empirical analysis and results from the scoring evaluation model demonstrate that the Intensive Growth strategy (IG, No. 4) achieved the highest ranking on the scoring scale with +4 points. This strategy enables an enterprise to simultaneously expand production and sales volumes while reducing the total volume of working capital and maximizing its turnover velocity [14].

Under contemporary conditions of the digital economy and industrial transformation, the successful execution of this strategy relies upon the following key drivers:

Digitalization of Production and Logistics Processes. Deploying Enterprise Resource Planning (ERP) and Supply Chain Management (SCM) systems to shorten the turnover cycle of raw materials and finished goods inventories;

Lean Manufacturing Principles. Eliminating non-value-adding waste within the production value chain and establishing Just-In-Time (JIT) delivery mechanisms;

Multi-Factor Optimization Models.Applying mathematical modeling to accounts receivable and cash flow management to minimize capital-freezing risks.

The subsequent alternative exhibiting high operational efficiency is the Intensive Decline strategy (ID, No. 5), evaluated at +3 points. Economic analysis reveals that under deteriorating market conditions or declining demand, reducing the production of technologically or commercially obsolete products represents a sound strategic decision [15], [16]. Within this context, the primary priority lies not merely in reducing volume, but in conducting this process intensively by releasing working capital from excess inventories and sharply curtailing turnover duration.

Key Scientific Conclusion. Strategies No. 4 (IG) and No. 5 (ID) deliver the highest operational efficiency for industrial enterprises. These strategic alternatives align fully with the requirements of the global Sustainable Development paradigm, establishing a robust resource-saving production model.

Practical and Analytical Characteristics of Sub-intensive and Extensive Strategies. During the analysis, the second group of strategies—comprising Sub-intensive strategies (SubIG at +2 points; SubID at +1 point)—was identified as possessing situational efficiency, serving as viable intermediate options under specific operating environments:

Sub-intensive Growth (SubIG). Expanding production output requires additional capital investments and resource commitments into working capital. However, due to shorter turnover days and enhanced capital productivity, the enterprise achieves a net positive operational effect.

Sub-intensive Decline (SubID). A forced reduction in production driven by market demand constraints is accompanied by a proportional release of working capital. This process prevents the temporary freezing of capital resources and mitigates liquidity crises [17], [18], [19].

The third group of strategies—encompassing Sub-extensive and Extensive strategies (SubEG at 0 points; SubED at -1 point; EG at -2 points; ED at -3 points)—exhibits pronounced resource-consuming characteristics, negatively impacting the enterprise's economic stability.

The Extensive Decline strategy (ED, No. 8), which recorded the lowest negative score of -3 points, demonstrates a simultaneous synergistic convergence of destructive factors: as production volume contracts, working capital balances and turnover days increase simultaneously. This condition causes low capacity utilization, inventory stagnation in warehouses, and an accumulation of overdue accounts receivable [20], [21]. Consequently, the enterprise suffers a loss of solvency and liquidity, plunging into a profound financial and operational crisis.

Conclusion and recommendations. The results of this comprehensive research on operational activity management and working capital utilization efficiency in industrial enterprises allow for the formulation of the following fundamental and applied conclusions:

Relationship Between Operational Strategies and Resource Efficiency. The efficiency of operational performance in industrial enterprises is determined not merely by the quantitative expansion of production volume, but critically by the mechanism through which it is attained—whether intensive or extensive in nature. The research establishes that the Intensive Growth (IG, +4 points) and Intensive Decline (ID, +3 points) strategies—which rely upon accelerating working capital turnover velocity and enhancing capital productivity—exhibit high resource-saving characteristics and maximally support the sustainable development of enterprises.

Advantages of Multi-Factor Scoring Modeling.The developed 8-stage integral scoring evaluation model enables a comprehensive assessment of operational strategies and ranks them according to their safety and efficiency thresholds. The model substantiates the resource-consuming nature of sub-extensive and extensive strategies, identifying the Extensive Decline (ED, -3 points) strategy as the most critical risk environment that drives enterprises into profound financial and operational crises.

Drivers and Digital Transformation. Under contemporary conditions of digital economy and industrial transformation, key drivers facilitating the transition toward high-efficiency strategies (+4 and +3 points) include Lean Manufacturing principles, production digitalization, ERP/SCM system deployment, and mathematical models for working capital optimization.

Based on the research findings and the proposed scoring evaluation model, the following practical recommendations are advanced for industrial enterprise implementation:

Implementation of an Integral Scoring Monitoring System. Establishing an operational monitoring mechanism within planning, finance, and operational control departments of industrial enterprises, utilizing the developed scoring evaluation scale (Table 1) on a quarterly basis. This empowers management to detect extensive, resource-consuming trends at an early stage and execute timely managerial interventions.

Transition to a Normative-Optimization Model in Working Capital Management. Shifting away from aggressive and extensive resource accumulation practices toward applying Just-In-Time (JIT) supply chain logistics and Lean technologies, thereby shortening working capital turnover duration by at least 10–15%.

Ensuring Strategic Maneuverability. In response to adverse market conditions and shrinking demand, avoiding extensive production preservation and instead progressively executing an Intensive Decline (ID) strategy to rapidly release capital resources and maintain break-even operations.

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