

Algorithmization of business processes as a tool for increasing the efficiency of enterprise management in the digital economy

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Abstract. The article explores business process algorithmization as a tool for enhancing the efficiency of enterprise management in the digital economy. It is shown that algorithmization goes beyond technical automation and forms a new logic of managerial activity based on structured procedures, analytical reasoning, and the use of data as the main resource for decision-making. Algorithmic models enable the standardization of managerial tasks, reduction of error probability, and improvement of enterprise predictability.

Theoretical and methodological foundations of algorithmization are based on the synthesis of systems approach, cybernetics, and mathematical modeling, which ensures accuracy and rationality of managerial decisions. Algorithmization is defined as a factor of digital transformation, since it creates prerequisites for the integration of artificial intelligence, machine learning, and automated decision support systems. It transforms both strategic and operational management models, providing enterprises with new opportunities to adapt to a changing environment.

Practical models of algorithmization are illustrated in financial management, logistics, human resource management, and marketing. They demonstrate the ability of algorithms to reduce costs, increase labor productivity, optimize resources, and ensure transparency of business processes. Algorithmization emerges as a tool for shaping an innovative organizational culture oriented toward responsibility and continuous improvement.

Alongside its advantages, the article outlines challenges and limitations of algorithmization: high implementation costs, shortage of qualified staff, employee resistance, and risks of excessive automation. The study concludes that further development of algorithmization requires investment support, expansion of digital competencies, and strengthening of trust-based culture within enterprises.

Keywords: business process algorithmization, digital economy, strategic management, operational models, resource optimization, automation, artificial intelligence, analytical systems, financial management, logistics, skill shortage, competitiveness.

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Алгоритмізація бізнес-процесів як інструмент підвищення ефективності управління підприємством у цифровій економіці

Анотація. У статті досліджено алгоритмізацію бізнес-процесів як інструмент підвищення ефективності управління підприємствами в умовах цифрової економіки. Показано, що алгоритмізація виходить за межі технічної автоматизації і формує нову логіку управлінської діяльності, засновану на структурованості процедур, аналітичності та використанні даних як головного ресурсу прийняття рішень. Алгоритмічні моделі дозволяють стандартизувати управлінські завдання, зменшувати ймовірність помилок і підвищувати передбачуваність функціонування підприємств.

Теоретико-методологічні засади алгоритмізації базуються на синтезі системного підходу, кібернетики й математичного моделювання, що забезпечує точність і раціональність управлінських рішень. Алгоритмізація визначається як чинник цифрової трансформації, оскільки створює передумови для інтеграції штучного інтелекту, машинного навчання та автоматизованих систем підтримки рішень. Вона трансформує стратегічні та операційні моделі управління, надаючи підприємствам нові можливості адаптації до змінного середовища.

Практичні моделі алгоритмізації розкриваються на прикладі фінансового менеджменту, логістики, управління персоналом і маркетингу. Вони демонструють здатність алгоритмів скорочувати витрати, підвищувати продуктивність праці, оптимізувати ресурси та забезпечувати прозорість бізнес-процесів. Алгоритмізація постає як інструмент формування інноваційної організаційної культури, що орієнтована на відповідальність і безперервне вдосконалення.

Разом із перевагами стаття окреслює виклики та обмеження алгоритмізації: високу вартість впровадження, кадровий дефіцит, опір персоналу й ризики надмірної автоматизації. Зроблено висновок, що подальший розвиток алгоритмізації потребує інвестиційної підтримки, розширення цифрових компетентностей та зміцнення культури довіри всередині підприємств.

Ключові слова: алгоритмізація бізнес-процесів, цифрова економіка, стратегічне управління, операційні моделі, оптимізація ресурсів, автоматизація, штучний інтелект, аналітичні системи, фінансовий менеджмент, логістика, кадровий дефіцит, конкурентоспроможність.

Introduction

The algorithmization of business processes is considered a key tool for enterprise management in the digital economy. It ensures the formalization of decisions, increases the accuracy of managerial actions, and creates conditions for resource optimization. In modern conditions, algorithmization acquires strategic importance, as it allows enterprises to achieve resilience, innovation, and competitiveness.

The relevance of the study lies in the fact that algorithmization goes beyond the automation of individual processes and forms a new logic of management based on analytical models and data. It opens opportunities for the integration of artificial intelligence, machine learning, and digital platforms into the daily practice of enterprises. As a result, algorithmization transforms both strategic and operational management models.

The necessity of scientific analysis consists in defining the theoretical and methodological foundations of algorithmization, its role in digital transformation, practical models of application, as well as identifying the challenges and prospects for the further development of this process.

In the scientific literature, there is a growing interest in the issue of algorithmization. Studies emphasize different aspects: technical, organizational, and strategic. Some authors consider algorithmization as a stage of digital transformation that contributes to the

effectiveness of managerial decisions. Others emphasize its significance for developing managers' digital competencies and creating new business models. Such multidimensionality of approaches forms the basis for a comprehensive understanding of business process algorithmization in the digital economy.

Results

The algorithmization of business processes occupies a central place in modern enterprise management, as it ensures the structuring of tasks, the formalization of decisions, and the creation of conditions for increasing efficiency. In the digital economy, where the speed of information processing and the accuracy of decision-making acquire strategic importance, algorithmization becomes a tool for enhancing competitiveness and the long-term sustainability of business. It combines engineering logic with managerial practice, transforming complex processes into systematic and controllable sequences of actions.

Modern business conditions are characterized by a high level of uncertainty, which determines the need for tools capable of minimizing risks and increasing enterprise adaptability. Algorithmization makes it possible to develop development scenarios, forecast the results of managerial decisions, and ensure transparency of interaction within the organization. In this context, it goes beyond technical automation, forming a new management culture in which the standardization of procedures is combined with innovative dynamics.

The relevance of studying the algorithmization of business processes is conditioned by its role in transforming management models. Traditional management methods, based on intuition or manual control, are losing effectiveness, while algorithmic solutions create an environment for well-founded and rapid decision-making. Algorithmization becomes a necessary prerequisite for the implementation of digital technologies, artificial intelligence, and data analysis systems, which shape a new quality of strategic planning and operational management.

The theoretical and methodological foundations of business process algorithmization form the basis for understanding its role in managing enterprises in the digital age. Algorithmization appears as a process of formalizing managerial tasks into clearly structured procedures that ensure a logical sequence of actions and minimize the probability of errors. The methodological framework is based on the synthesis of systems theory, cybernetics, and mathematical modeling tools, which make it possible to represent business processes as algorithms with a high degree of precision.

Business process algorithmization performs a dual function. It standardizes management procedures, increases the predictability and controllability of enterprise activity, and at the same time creates conditions for adaptation to an unstable environment. Algorithms can be adjusted under the influence of market changes or technological innovations, turning algorithmization into a strategic mechanism of flexible management.

Theoretical approaches emphasize the importance of algorithmization for rationalizing resource use, reducing transaction costs, and ensuring the transparency of management processes. Thanks to this, enterprises build management systems where decisions are data-driven, and efficiency is evaluated through quantitative indicators. Algorithmization becomes the foundation for the implementation of artificial intelligence and automated decision-support systems, which expand the horizons of strategic planning.

The algorithmization of business processes in enterprise management is considered one of the key factors of digital transformation. It provides the foundation for integrating digital technologies into both strategic and operational management, forming a new type of managerial logic in which decisions are based on data and algorithmic models. Algorithmization ensures the transition from traditional practices to digital platforms that combine analytics, automation, and decision-support systems.

Algorithms are becoming a structural element of the digital infrastructure of enterprises. They enable the integration of large data sets, real-time processing, and the transformation of information into practical recommendations for managers. As a result, algorithmization contributes to forecasting accuracy, increases the speed of decision-making, and strengthens business resilience in a changing environment.

Algorithmization also functions as a catalyst for organizational change. It fosters the development of new forms of coordination, enhances the transparency of internal processes, and stimulates a culture of responsibility. In the digital economy, it is algorithmization that enables the integration of artificial intelligence, machine learning, and automated analytical systems into the daily practice of management.

Thus, the algorithmization of business processes emerges as a factor of digital transformation that defines a new quality of strategic enterprise management and strengthens its competitive advantages.

Practical models of business process algorithmization demonstrate ways of transforming managerial tasks into formalized procedures that improve enterprise efficiency. Algorithms are implemented in financial management, logistics, human resource management, marketing, and customer services. They enable the creation of standardized action scenarios that ensure the accuracy of operations, reduce time costs, and enhance the level of control.

In the financial sphere, algorithmization makes it possible to automate accounting, planning, and analysis processes, ensuring the timeliness of decisions and reducing the risk of errors. In logistics, algorithms optimize delivery routes, increase the efficiency of inventory management, and reduce transportation costs. In human resource management, algorithmization supports the development of recruitment and competency assessment systems as well as the creation of individualized learning trajectories.

Marketing processes, supported by algorithms, gain greater precision. Data processing systems allow for audience segmentation, consumer behavior forecasting, and the construction of personalized communication strategies. Customer services acquire new quality through algorithms powering chatbots, support systems, and automated interaction channels, which increase consumer satisfaction.

Practical models of algorithmization demonstrate that its implementation transforms the operational logic of enterprises, ensuring speed, flexibility, and innovation in management.

The algorithmization of business processes in modern enterprises serves as an effective tool for improving management efficiency. It enables the systematization of operational procedures, reduces functional duplication, and ensures consistency across structural units. Formalized algorithms create the conditions for transparency of internal processes and strengthen the discipline of implementing managerial decisions.

Through algorithmization, enterprises achieve cost optimization. Automated decision-support systems minimize human error, accelerate information processing, and allow for more accurate forecasting of performance outcomes. This ensures productivity growth and lays the foundation for more efficient use of resources.

Algorithmic approaches also contribute to the development of a real-time control system. Monitoring key performance indicators makes it possible to promptly detect deviations and implement corrective actions. As a result, managerial decisions become more substantiated, and the management process itself becomes more stable and predictable.

In this context, the algorithmization of business processes not only increases management efficiency but also shapes a new managerial culture focused on analytical thinking, responsibility, and continuous improvement.

The challenges and limitations of business process algorithmization form a complex context for its practical implementation. Despite obvious advantages, enterprises face a number of barriers that slow down or restrict the scale of algorithmic solutions.

One of the key challenges is the high cost of developing and implementing algorithms. The creation of modern digital systems requires significant investment in software, technical infrastructure, and staff training. Limited access to financial resources often constrains the full realization of algorithmic projects.

Another limitation is the shortage of qualified personnel. Effective algorithmization requires specialists with digital competencies – analysts and programmers capable of adapting algorithms to the specifics of business processes. The lack of such expertise slows down transformation processes and increases enterprises' dependence on external contractors.

A serious challenge is employee resistance. The implementation of algorithmization alters the structure of work processes, often perceived as a threat to established practices and jobs. This can lower motivation and necessitates building a culture of trust and engagement.

An additional limitation lies in the risks of excessive automation. Dependence on algorithms may reduce the flexibility of managerial decisions and restrict space for creative approaches. In critical situations, the absence of human oversight may lead to unforeseen consequences.

Thus, the challenges and limitations of business process algorithmization call for a comprehensive approach that combines investment support, the development of digital competencies, and the formation of an organizational culture oriented toward innovation.

Conclusions

The algorithmization of business processes in the digital economy is defined as a strategic tool for modernizing enterprise management. It ensures the formalization of tasks, the optimization of resources, and creates conditions for greater transparency of internal processes. Its implementation shapes a new managerial culture in which analytical rigor and responsibility are combined with innovative dynamics.

First, algorithmization increases management efficiency by standardizing procedures, reducing the risk of errors, and accelerating decision-making. Enterprises gain the ability to build real-time control systems and respond promptly to changes in the external environment.

Second, practical models of algorithmization expand the opportunities of digital transformation. Their application in finance, logistics, human resource management, and customer services proves that algorithms are becoming an integral element of both strategic and operational management.

Third, algorithmization creates strategic potential for enhancing competitiveness. It provides access to modern technologies, promotes the integration of enterprises into global economic systems, and forms the foundation for long-term development.

At the same time, the outlined challenges – high implementation costs, personnel shortages, employee resistance, and risks of excessive automation – require systemic responses. The effective implementation of algorithmization is possible under the conditions of combining investment support, the development of digital competencies, and the formation of an organizational culture oriented toward innovation.

Thus, the algorithmization of business processes emerges as an integral component of the digital economy, defining new benchmarks for strategic management and establishing the basis for sustainable enterprise growth.

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