UDC 338:656
DOI: https://doi.org/10.32782/2415-8801/2025-2.14

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NEW PRACTICES OF BUSINESS PROCESS MANAGEMENT IN INDUSTRIAL COMPANIES

The relevance and timeliness of the research are driven by the fact that industrial companies are currently experiencing increasing uncertainty in their operating and development conditions. This is influenced by both the cyclical nature of the economy and shifts in consumer preferences, which are becoming increasingly unpredictable. These factors have collectively shaped a stochastic environment for the operation of industrial companies, in which traditional approaches to business process management prove to be ineffective. Therefore, the aim of this article is to systematize and describe new practices of business process management in industrial companies through the lens of their characteristic features. Based on the results of the study, the key characteristic features of modern business process management practices in industrial companies have been outlined and systematized. These include: adaptive business process management, real-time management, Agile BPM, and real-time supply chain management. The analysis of the outlined practices clearly shows that, in terms of principles, approaches, tools, objectives, and key advantages, each of them is distinct. However, they all share a common foundation in digital technologies and facilitate the transition to iterative management cycles.

Keywords: *resilience to external shocks, real-time management, iterative process improvement, streaming data, instant response.*

НОВІ ПРАКТИКИ УПРАВЛІННЯ БІЗНЕС-ПРОЦЕСАМИ ПРОМИСЛОВИХ КОМПАНІЙ

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Актуальність і своєчасність дослідження зумовлені тим, що для промислових компаній наразі характерне зростання невизначеності щодо умов функціонування та розвитку. Це зумовлено як циклічністю економіки, так і змінами у споживчих уподобаннях, характер яких стає все менш передбачуваним. Ці фактори в сукупності сформували стохастичне середовище функціонування промислових компаній, у якому традиційні підходи до управління бізнес-процесами виявляються малоефективними. Відтак, метою статті є систематизація та опис нових практик управління бізнес-процесами промислових компаній через призму їх характеристичних ознак. За результатами дослідження окреслено й систематизовано ключові характеристичні ознаки сучасних практик управління бізнес-процесами промислових компаній, зокрема: адаптивне управління бізнес-процесами, реальновремене управління, Agile BPM, управління ланцюгами постачання в реальному часі. За аналізом окреслених практик очевидно, що за принципами та підходами, інструментами, цілями та ключовими перевагами кожна з них є специфічною, хоча й однаково базується на цифрових технологіях і забезпечує перехід до ітераційних управлінських циклів. У дослідженні окреслено базові елементи, що дозволяють коригувати бізнес-процеси промислових підприємств у режимі реального часу. У цьому контексті адаптивне управління бізнес-процесами промислових компаній охоплює: оперативні зміни бізнес-процесів у реальному часі; постійне відстеження та аналіз стану бізнес-процесів; автоматизацію та оптимізацію бізнес-процесів; постійне вдосконалення; прогнозування можливих змін у бізнес-процесах. Реально-часове управління промислових компаній охоплює: завершення повторюваних завдань; контроль якості продукції; оптимізацію роботи складів і логістики; модифікацію робочих параметрів виробничих ліній. Agile BPM промислових компаній охоплює: короткі цикли виконання, ітеративний розвиток, крос-функціональні команди та швидке реагування на зворотний зв'язок. Управління ланцюгами постачання в реальному часі охоплює: коригування стану ланцюга постачання в реальному часі; створення моделей, здатних

адаптувати ланцюг постачання на основі актуальних даних; точний облік і оперативне реагування на зміни попиту; оперативне реагування на перебої в ланцюгах постачання.

Ключові слова: *стійкість до зовнішніх шоків, реально-часове управління, ітеративне вдосконалення процесів, потокові дані, миттєве реагування.*

Statement of the problem. The relevance of the research is determined by the fact that the industrial sector is currently experiencing an increase in market uncertainty: both the cyclical nature of the economy and changes in consumer preferences are becoming increasingly unpredictable. These factors, collectively, have created a stochastic environment for the operation of industrial companies, where traditional approaches to business process management prove to be ineffective.

Classical BPM methods are oriented towards a stable, predictable environment (where processes are defined once and for the long term) and often rely on a hierarchical decision-making structure with lengthy approval cycles. Classical BPM processes focus on risk minimization through standardization and control. Moreover, traditional management often overlooks the possibilities offered by real-time analytics, artificial intelligence, and automation – technologies that are now critical for the rapid adaptation of processes.

While traditional BPM is "tailored" for an environment where changes are slow and predictable, new practices are focused on continuous change, uncertainty, and rapid adaptation to shifts [1; 5]. As a result, in the new conditions, management is increasingly shifting towards new practices that ensure the adaptability of business processes, speed in decision-making, flexibility in operational models, as well as predictability and resilience to external shocks.

Analysis of recent research and publications. The general issues of business process management in entities of various forms of economic activity have been thoroughly covered in scientific research by a number of Ukrainian scholars. Each author focuses on specific aspects of the issue. For instance, M. O. Prokopenko concentrated on clarifying classification approaches to business processes, justifying the need to distinguish them based on functional characteristics and their role in creating added value [6]. O. A. Klepikova focuses on business process modeling tools (in particular, the author analyzes the possibilities of using modern modeling technologies to optimize the structure and operation of enterprises in the context of digital transformation) [2]. O. V. Koretska highlights the specifics of business process management in the port sector, where external factors, process flexibility, and adaptation to an unstable external environment play a crucial role [4].

At the same time, it is the systematization and description of new business process management practices in industrial companies that have been overlooked by researchers. Primarily, a significant portion of academic literature is based on already proven approaches, which slows down the inclusion of the latest practices into the scientific discourse. Moreover, the rapid development of management practices outpaces (though not precludes) the possibilities for their comprehensive academic analysis and theoretical generalization.

Setting the task. The aim of the article is to systematize and describe new business process management practices in industrial companies through the lens of their characteristic features.

Summary of the main research material. The author emphasizes that the stochastic environment in which industrial companies operate refers to business conditions characterized by a high level of uncertainty and variability, meaning constant changes and unpredictable events that have a significant impact on the set of production and technological processes aimed at creating goods and services to meet the needs of society and the economy. In this environment, industrial companies face the following characteristics:

1. Changes in demand, fluctuations in raw material and finished goods prices, and unpredictable crisis situations (economic, political, social). An example of this is global economic crises, such as the 2008 financial crisis, the 2020–2021 period, and others, when a decline in product demand due to recession led to a significant reduction in production volumes across many industries.

2. Unpredictable supply disruptions, changes in supply chains due to natural disasters, political decisions, trade wars, etc. For example, typhoons in the Philippines or earthquakes in Japan have repeatedly caused significant disruptions in the supply of components for production lines, while various political decisions, such as the imposition of tariffs on exports between the US and China, have led to supply chain failures, increased customs duties, and rising raw material costs.

3. The rapid development of new technologies, the need for continuous innovation, and the adaptation of business entities to new conditions. In particular, the implementation of Industry 4.0 requires industrial companies to continuously update technologies for automation and improve production efficiency (e.g., the use of robots, artificial intelligence, 3D printing, etc.), while Industry 5.0 focuses not only on automation and the use of cutting-edge technologies but also on the interaction between humans and machines.

4. Changes in consumer demands and preferences, which can not only cause temporary fluctuations but also alter the company's overall strategy. For instance, the growing popularity of eco-friendly products has forced many companies in the food industry to change their production processes, switching to more environmentally sustainable materials and methods of production (e.g., using organic products, eliminating plastic).

As a result of the factors outlined, the stochastic environment requires industrial companies to transition to new business process management practices, considering that these practices act as triggers for enhancing flexibility, adaptability to changes, and decision-making in conditions of uncertainty (fragmented and, at times, inaccurate information) [5].

Among such practices are: adaptive business process management; real-time management; Agile BPM; and real-time supply chain management. In accordance with the above, we have proposed a matrix of new business process management practices for industrial companies [6].

This matrix is a tool that helps visually and systematically represent different approaches and strategies for management in a stochastic environment (see Fig. 1). Its value lies in its ability to allow industrial companies to assess how they can apply various management practices to achieve flexibility, adaptability, and decision-making under conditions of uncertainty.

The matrix presented actually covers management practices that distinguish the following characteristic features [5–6]:

- Specific principles and approaches that define the content of each practice (e.g., flexibility, adaptability, forecasting changes);
- Tools that identify specific technical means and methods (e.g., use of artificial intelligence, machine learning, real-time analytics);
- Application goals that highlight the expected outcomes from implementing each practice (e.g., increased efficiency, reduced costs, faster decision-making);
- Key advantages that emphasize the features of application and interconnections between practices (e.g., how Agile BPM interacts with real-time management or adaptive business process management).

So, adaptive business process management (Adaptive BPM) refers to practices that, based on their characteristic features (Table 1), involve a shift away from traditional, rigidly structured models in favor of those

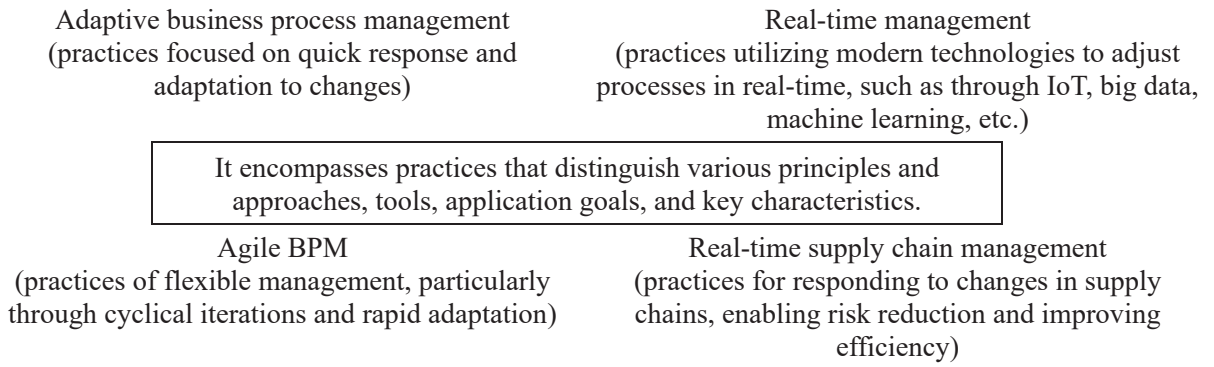

Figure 1. Matrix of new business process management practices in industrial companies

Source: compiled based on [1; 4–5]

Table 1

Characteristic features of Adaptive BPM in industrial companies

Characteristic features	Specification of characteristic features	Main directions
Specific principles and approaches	Flexibility of business processes (the ability to change them when necessary). Rapid response to market, technological, and other changes. Forecasting changes based on analytics and risk modeling. Iterative process improvement, specifically their continuous update based on acquired experience.	Operational changes to business processes in real-time. Continuous monitoring and analysis of business process status. Automation and optimization of business processes. Continuous improvement. Forecasting potential changes in business processes.
Tools that identify specific technical means and methods	Real-time Analytics systems. IoT for monitoring production processes. Machine learning for forecasting changes. Artificial intelligence for process optimization. Next-generation automated BPM systems.	
Goals	Improved operational efficiency through quick response to changes. Reduced operational costs by preventing risks. Increased decision-making speed in an unpredictable environment. Ensuring resilience to market and technological shocks.	
Key advantages	Ability for rapid integration with other practices, such as fast iterative process improvement. Use of streaming data for immediate response. Presence of built-in self-learning mechanisms for processes.	

Source: compiled based on [1; 3–4]

focused on flexibility and rapid response to changes in conditions of uncertainty.

Considering the outlined features, it is evident that through Adaptive BPM practices, an industrial company can transition to iterative management cycles, which ensure flexibility in management influence.

Real-time management refers to influencing practices that, based on their characteristic features (see Table 2), allow for the automatic adjustment of production processes, optimizing resource usage, reducing costs, and increasing productivity.

Through the outlined practices, industrial company management can ensure stakeholders high quality and efficiency at all stages of the production process.

Agile BPM refers to a set of practices that, according to their characteristic features (see Table 3), combine the principles of flexibility and adaptability inherent in the Agile methodology with business process management. These practices are based on the idea that effective business processes must be flexible and capable of rapid adaptation in a changing and unstable environment.

Table 2

Characteristic features of Real-time management in industrial companies

Characteristic features	Specification of characteristic features.	Main directions
Specific principles and approaches	Immediate response to changes in the external and internal environment. Adaptation of management decisions based on current information. Use of real-time analytics to predict potential risks and opportunities. Continuous data updates for all process participants.	Completion of repetitive tasks Product quality control Optimization of warehouse and logistics operations Modification of operational parameters of production lines
Tools that identify specific technical means and methods	IoT for data collection from production lines and warehouses. Artificial intelligence for rapid analysis of large data volumes. Real-time analytics for process monitoring. Automation through robotics for immediate task execution. Cloud technologies to ensure data access anytime and anywhere	
Goals	Increased speed of managerial decision-making. Risk minimization through proactive problem prevention. Optimization of time, financial, and material resource usage. Ensuring operational resilience in an unstable environment.	
Key advantages	High level of integration with Adaptive Business Process Management through joint efforts in real-time analysis and process adjustment. Rapid iterative modification of processes based on real-time data. Continuous interaction among monitoring, analytics, and automation systems to close the business process management loop.	

Source: compiled based on [2; 4]

Table 3

Characteristic features of Agile BPM in industrial companies

Characteristic features	Specification of characteristic features.	Main directions
Specific principles and approaches	Readiness to quickly modify business processes in response to new requirements or environmental changes. Implementation of changes through short cycles (iterations) with continuous review of outcomes. Close collaboration between teams, customers, and process users. Focus on achieving results that deliver maximum business value.	Short execution cycles (sprints), iterative development, cross-functional teams, and rapid response to feedback.
Tools that identify specific technical means and methods	BPM platforms with support for flexible process customization. Tools for managing projects in Agile style – Jira, Trello, Asana. Scrum and Kanban methodologies for organizing work on process changes. Automation of process changes through low-code/no-code solutions.	
Goals	Reducing the time needed to adapt business processes to changes in the external environment. Increasing the flexibility of the industrial company in response to market challenges. Ensuring transparency and rapid feedback regarding changes in processes. Enhancing employee engagement in process improvement.	
Key advantages	Close integration with real-time management. Focus on rapid changes and minimizing rigid structures. Emphasis on experimentation, learning, and continuous process improvement rather than stability and fixation.	

Source: compiled based on [1–2; 4]

Through the outlined practices, an industrial company can leverage the experience of quickly adapting its supply chain [4]. For example, in the case of supply disruptions or changes in raw material markets, the team can implement changes in the supply process, adjusting the order schedule or switching to alternative suppliers, all within a few sprints. Each cycle will take into account new data and refine the process.

Real-time supply chain management refers to practices that, based on the characteristic features of influencing business processes (see Table 4), focus on monitoring, analyzing, and adjusting supply chains in real time [3–4]. The core of such practices is the ability to respond quickly to changes in demand, supply disruptions, fluctuations in raw material prices, or external factors that may affect the efficiency of the supply chain.

Through the outlined practices, an industrial company can apply experience in responding to dynamic market changes (specifically, continuously adapting its operational strategies based on current data). This enhances operational efficiency and the flexibility of business process management.

Conclusions from the study. The results of the research outline and systematize the key characteristic features of modern business process management practices in industrial companies, including: adaptive business process management, real-time management, Agile BPM, and real-time supply chain management. Based on the analysis of these practices, it is evident that, in terms of principles and approaches, tools, goals, and key advantages, each of them is specific, although they all equally rely on digital technologies and ensure a shift to iterative management cycles. At the same time, the author outlines the basic elements that allow for the adjustment of business processes in industrial enterprises in real-time mode.

In this context, adaptive business process management in industrial companies includes operational changes to business processes in real time; continuous monitoring and analysis of the state of business processes; automation and optimization of business processes; continuous improvement; and forecasting potential changes in business processes.

Real-time management in industrial companies encompasses the completion of repetitive tasks; quality control of products; optimization of warehouse and logistics operations; modification of working parameters of production lines.

Agile BPM in industrial companies involves short execution cycles (sprints), iterative development, cross-functional teams, and rapid response to feedback.

Real-time supply chain management encompasses the real-time adjustment of the supply chain status; creation of models that can adapt the supply chain based on current data; accurate tracking and rapid response to demand changes; and quick response to disruptions in the supply chain.

The prospects for further research lie in identifying ways to adapt the management practices outlined by us for integration into a unified management influence system. This will enable the formulation of a strategic response from industrial enterprises that is adequate to the challenges of an unstable market.

Table 4

Characteristic features of real-time supply chain management in industrial companies

Characteristic features	Specification of characteristic features.	Main directions
Specific principles and approaches	Continuous monitoring of changes in supply, demand, and logistics. Rapid adjustment of the supply chain based on new data. Use of analytics to predict disruptions and demand changes. Close interaction among key stakeholders in the supply chain.	Real-time supply chain state adjustments. Creating models capable of adapting the supply chain based on current data. Accurate tracking and prompt response to changes in demand. Quick response to supply chain disruptions.
Tools that identify specific technical means and methods	Supply chain management with real-time analytics – SAP SCM, Oracle SCM Cloud. IoT for tracking the location of shipments, equipment status, etc. Big data analytics and machine learning for adaptive planning. Early warning systems for disruptions, automatic event response modules.	
Goals	Reduction of risks related to supply disruptions. High accuracy in planning supply chain operations. Cost reduction through optimization of routes, inventories, and production decisions. Continuity of operations even in turbulent conditions.	
Key advantages	Standardization of data collection and processing technologies. Data supply for adjusting internal processes. Integration with Agile BPM, where supply chain management becomes part of short, flexible management cycles.	

Source: compiled based on [1; 3–4]

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