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FEATURES OF THE FORMATION OF BUSINESS PROCESSES OF INTERNATIONAL COMPANIES IN THE CONDITIONS OF DIGITAL TRANSFORMATIONS

ОСОБЛИВОСТІ ФОРМУВАННЯ БІЗНЕС-ПРОЦЕСІВ МІЖНАРОДНИХ КОМПАНІЙ В УМОВАХ ЦИФРОВИХ ТРАНСФОРМАЦІЙ

Summary. The article highlights the problems of organizing business processes of international companies in the conditions of digital transformation. It was noted that carefully organized and effectively implemented business processes become a key element of the company's successful activity, aimed at achieving maximum profit and meeting the needs of consumers. Theoretical approaches to defining the concept of "business processes" were characterized and it was determined that it is a sequence of actions and operations performed by the company to achieve its strategic goals and meet the needs of its customers in the international market.

The classification of business processes of international companies according to key features was presented and it was emphasized that business processes are an indicator of its success. A structural and logical diagram of digitization of business processes of an international company was built. It was established that modern directions of digital transformation include the

introduction of electronic data exchange technology, methods, and tools for analyzing and processing large volumes of data (Big Data), advanced solutions in the field of cloud computing, the use of intelligent technologies (machine learning), and the possibility of applying hybrid approaches.

The key factors of digital transformation when building business processes of an enterprise are identified, such as flexibility, openness to innovation and constant adaptation to changes in the international environment.

It was concluded that the conditions of digital transformation today provide international companies with unique opportunities to expand markets, increase operational efficiency, and introduce innovative processes. At the same time, these transformations require international companies to constantly monitor and update approaches to organizing and managing business processes.

Key words: business processes, digital transformation, digitalization, international companies, innovations, competitiveness.

Анотація. В статті висвітлено проблематику організації бізнеспроцесів міжнародних компаній в умовах цифрової трансформації. Зазначено, що ретельно організовані та ефективно впроваджені бізнеспроцеси стають ключовим елементом успішної діяльності компанії, спрямованої на досягнення максимального прибутку та задоволення потреб споживачів. Охарактеризовано теоретичні підходи до визначення поняття «бізнес-процеси» та визначено, що це послідовність дій та операцій, які виконує компанія для досягнення своїх стратегічних цілей та задоволення потреб своїх клієнтів на міжнародному ринку.

Подана класифікація бізнес-процесів міжнародних компаній за ключовими ознаками та наголошено, що бізнес-процеси є індикатором її успішності. Побудовано структурно-логічну схема цифровізації бізнес-процесів міжнародної компанії. Встановлено, що сучасні напрями

цифрової трансформації включають в себе впровадження технології електронного обміну даними (EDI — Electronic Data Interchange), методи та інструменти аналізу й обробки великих обсягів даних (Big Data), передові рішення у сфері хмарних обчислень (Cloud Computing), використання інтелектуальних технологій (машинне навчання) та можливість застосування гібридних підходів.

Розглянуто ключові чинники успішної цифрової трансформації при побудові бізнес-процесів підприємства, такі як гнучкість, відкритість до інновацій та постійна адаптація до змін у міжнародному середовищі.

Зроблено висновок, що умови цифрових трансформацій сьогодні надають міжнародним компаніям унікальні можливості щодо розширення ринків, підвищення ефективності функціонування та впровадження інноваційних процесів. Одночасно ці трансформації вимагають від міжнародних компаній постійного моніторингу та оновлення стратегій управління бізнес-процесами.

Ключові слова: бізнес-процеси, цифрова трансформація, цифровізація, міжнародні компанії, інновації, конкурентоспроможність.

Statement of the problem in a general form. Digital transformation has become a key factor in all areas of activity, enhancing the way companies are managed to improve their financial and economic efficiency and increase flexibility and competitiveness. The use of modern software, equipment, and digital tools becomes the basis for creating a competitive advantage for the company in the international market.

The basis of the economic activity of any company is the organization of business processes, the formation of which depends on the strategic goal and tasks. Today, the influence of information technologies on business processes is becoming more and more evident in all industries. We are witnessing the spread of the trend towards the transformation of business processes in the digital

environment: from video communication for work meetings and conferences to the conduction of remote professional interviews through web services and the provision of advice to clients through telecommunication services such as the exchange of text messages through messengers and social networks. Additionally, nowadays virtual, and augmented reality are used for virtual demonstrations and events. These technologies provide companies with new opportunities for effective implementation and optimization of business processes in the digital space. In addition, each company has its website that demonstrates to investors, partners, and customers the advantages of choosing it over any other.

Therefore, if the company has promptly moved to the digital environment and uses digital technologies to organize business processes, this will guarantee its stability and economic growth. In this context, one of the important tasks of the development of companies is the ability to quickly adapt to modern trends of international business, in particular, the active use of digital technologies and the safe storage of digital data. Consequently, the problem of organizing business processes of international companies in the conditions of digitalization is relevant and requires more thorough research.

Analysis of recent research and publications. Many scientific works were devoted to the theoretical aspects of the essence and organization of business processes in corporate activity, in particular, by well-known foreign and domestic scientists, such as M. Binner [1], M. Tushman [1], T. Davenport [2], J. Short [2], M. Rother [3], Shook J[3], M. Hammer [4], D. Champi [4], M. Porter [5], P. Drucker [6], H. Harrington [7], K. Esseling [7], L. Chornobai [8], O. Duma [8], O. Lysenko O. [9], O. Kozachenko [10], O, Lyashenko [10], I. Ladko [10], L. Denysenko [11], S. Shatska [11], and others. At the same time, the intensification of competition and the active use of information technologies have created opportunities for improving business processes aimed at ensuring the efficient operation of international companies. The issues of the

development of the digital economy and ways to optimize business processes from the point of view of digitization were covered in the scientific works of domestic and foreign scientists, namely: S. Tyutyunnikova [12], O. Fridman [12], A. Dligach [13], O. Savitskaya [14], V. Salabai [14], V. Fishchuk [15], K. Gurska [16], Yu. Vdovichenko [17], O. Kryvda [18], K. Velychko [19], E. Tsybulska [19], and others. Yet in our opinion, the problem of forming a modern mechanism for managing business processes of international companies in conditions of digitalization remains insufficiently investigated.

Formulation of the goals of the article (task statement). The purpose of the article is to analyze the impact of digital technologies on the structure, strategies, management, and efficiency of business processes in international companies, as well as to identify the main factors of successful adaptation to digital transformations.

Presentation of the main material. In modern conditions, when the business environment is constantly changing, the main task of companies is to promptly respond to changes and take the necessary measures to effectively manage their business activities. Based on world experience, it can be stated that the dynamics of the development of international markets of goods and services, changes in the external and internal environment of the company, and the growth of competition require a constant search for new methods and strategies of business management.

Organizational processes have always existed in any company, but relatively recently they also became an object of management. In general, a process is defined as a systematic, sequential definition of functional operations that lead to a certain result, that is, it is a sequence of related operations or tasks necessary to achieve a result.

The concept of "business process" is multifaceted and does not currently have a generally accepted definition. The unification of all definitions emphasizes the fact that business processes are continuous, with certain inputs

(supply of resources, emergence of business ideas, creativity of new products, services, etc.) and outputs in the form of products that satisfy the needs of consumers. That is, business processes cover the entire activity of the company. The business process is formally considered a limited set of activities characterized by such concepts as "input", "process", "output", "management", "process supplier", and "process client".

A business process in a broad sense is defined as a structured sequence of actions related to the performance of a certain type of activity at all stages of the life cycle of the subject of activity – from the creation of conceptual ideas and design to implementation and results (supply of products, provision of services, completion of certain phases of activity), i.e. a certain closed process.

So, a business process is a set of business operations, a certain number of actions that start with one or more inputs and end with the creation of a product needed by the customer. The primary purpose of business processes is to provide customers with products or services that meet their needs and expectations in terms of value, quality, and service. Business processes must be focused on meeting the needs of customers and contribute to the creation of value for them.

Table 1 presents the approaches to the interpretation of the concept of "business process".

 ${\it Table~1}$ Approaches to interpreting the concept of "business process"

Authors, source	Definition of the concept of "business process"
Benner M. [1]	a system of interconnected actions, the results of which are the
	production of products/services that represent value for external and
	internal consumers.
Davenport T., Short J.	a structured set of measurable activities designed to produce a
[2]	specific service or product for a specific customer or market.
	Includes jobs, ordered in space and time tasks, defined "inputs" and
	"outputs".
Rother M., Shook J. [3]	a system of consistent, purposeful, and regulated activities in which,
	with the help of managerial influence and resources, process inputs
	are transformed into outputs - process results that are valuable to the
	consumer.

Authors, source	Definition of the concept of "business process"		
Hammer M.,	a set of different types of activity, within which at the "input" one or		
Ciampi J. [4]	more types of resources are used, and, as a result of which, at the		
	"output" they form a product that has value for the consumer.		
Harrington J., Esseling	a logical, sequential, interrelated set of activities that consumes a		
K., Nimwegen H.	supplier's resources, creates value and delivers a result to a		
Wang [5]	consumer.		
ISO 9001 [20]	a stable, purposeful set of interrelated types of activities, which		
	according to a certain technology transforms input into output.		
Kibyk O., Kotlubai V.,	a hierarchy of internal and interdependent functional actions, the		
Kornilova O. [21]	ultimate goal of which is the production of products or individual		
	components thereof.		
Chornobai L., Duma O.	a system of continuous, interconnected, ordered, and managed		
[8]	actions, which is an element of the mechanism of the formation of		
	added value in the process of transformation of enterprise resources,		
	aimed at ensuring high productivity and efficiency of the enterprise		
	in general and ensuring the realization of consumer value for the		
	target market, applying the business model of the enterprise.		
Tyutyunnikova S.,	"workflows" at the enterprise, which represent an ordered sequence		
Fridman O. [12]	of actions (works) from the moment of initiation and setting of the		
	task to its completion, the overall result of which is added value.		
Kozachenko H.,	the sequence of a set of actions related to the implementation of		
Lyashenko A., Ladko I.	activities that transform resources at the "input" to obtain a result that		
[10]	has value for the consumer.		
Sharko V., Nikitishyn	the process of interrelated operations, as a result of which the		
A. [22]	company's resources are used to improve the object to achieve a		
	better result of obtaining profit, which has a cross-functional impact		
	on a structural unit or an individual employee of the company, which		
	satisfies the requests of the target buyer.		

Source: summarized by the authors based on [4,5,8,10,12,20,21,22]

Based on the analysis of scientific sources (Table 1), it can be stated that there are different interpretations of the "business process" in the scientific works of domestic and foreign authors. Thus, Benner M. [1], Hammer M., and Ciampi J. [4] focus on the added value of implementing business processes. Harrington J., Esseling K., Nimwegen H. Wang [7], Davenport T., and Short J. [2] emphasize the interrelationships and interdependencies of organizational business processes, that is, they form an understanding of the company as an established system of interconnected processes, which together create consumer value for the company's end customers.

In our opinion, it is appropriate to consider a business process as a complex sequence of actions, stages, and operations that are performed within

the framework of the company's activities to achieve a certain goal or result. This is a systematized way of performing various tasks and operations aimed at optimizing work processes, increasing efficiency, and achieving the company's strategic goals. A business process can include such elements as planning, execution, control, analysis, and continuous improvement. Its main goal is to ensure the optimal use of resources and ensure the successful functioning of the company.

Agreeing in general with the given definitions (Table 1), we propose to understand the business process as an orderly sequence of actions (business operations) from the moment of defining conceptual ideas and setting a task to their implementation, the result of which is bringing the product (service) to the consumer and receiving profit.

Therefore, the main goal of the business processes of an international company is to satisfy the needs of customers, which are conventionally divided into five different types:

- 1) primary customers that receive primary outputs;
- 2) secondary clients who are outside the process and receive secondary output;
- 3) indirect customers who do not receive the initial output, but are the next in the chain, so the later output is reflected on them;
- 4) external customers (outside the company) who receive the output of the process (distributors, agents, etc.);
 - 5) external indirect customers consumers.

In the activities of international companies, a process approach to management is appropriate. Thus, all companies go through different stages of development. Initially, in many companies, business processes and control over their organization are carried out by the owner. When the business begins to grow, standard work situations are formed, which are accompanied by repeated actions of the company's employees. Further development leads to an expansion

of tasks, an increase in the number of processes, and the need to attract additional employees. As a result, a business process is formed, which describes in detail all the components of the algorithm, indicating the specific duties of the employees involved, which contributes to increasing the efficiency of the business as a whole. Companies have about twenty key business processes, the quality of which depends on success in the market, and the total number of business processes in the company may exceed several hundred [9; 10; 23].

It should be noted that business processes in companies are heterogeneous since the organizational activity itself is a set of various interdependent business processes that reflect the implementation of various functions of the enterprise.

From the point of view of elements' separation, a business process is defined as a series of interrelated activities that transform resources (input) into products/services (output) to create value for consumers. That is, any business process has a person responsible for its implementation, and the input, output, resources, and results are distinguished as elements (fig. 1).

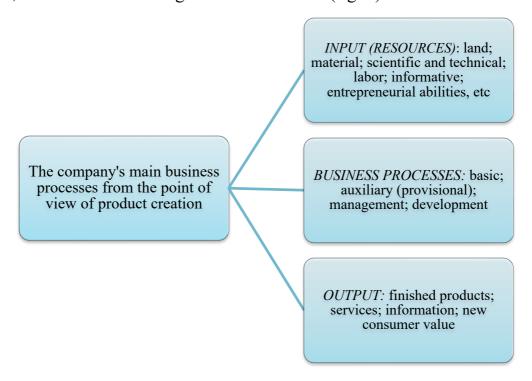


Fig. 1. The structure of the company's business process

Source: summarized by the authors based on [9; 10; 22; 23]

Input resources of the business process include land, equipment, personnel, information, software, etc. At the output, they receive a result, namely: finished products, services, and information, that is, a new consumer value. Responsible for the business process is its manager, who sets the goals of the process and aligns them with the company's strategic goals. The business process manager is responsible for its efficiency and effectiveness and exercises direct control over other participants to ensure initial results and achieve set goals. During the implementation of business processes, resources are transformed, that is, a set of interdependent sequential operations - the transformation of resources (at the input) into a high-quality final product/service (at the output) according to defined methods and established parameters.

Currently, there is no generally accepted classification of business processes in domestic economic literature and, in practice, companies, analyze their activities and determine the list of main business processes, classifying them according to several features and types. To achieve a strategic goal, it is important for companies to clearly define key business processes, conduct a business analysis, identify the main problematic aspects, and optimize business processes. At the same time, business processes can be classified by purpose into the main ones important to produce goods or services, auxiliary ones that support the main functions, and management and development processes aimed at managing and ensuring the growth of the company (Table 2).

Table 2
Characteristics of the company's business-processes

Definition	Distinct characteristics	Result		
Main business processes				
business processes that create	is a mirror image of the company's	release of		
added value for the company's	business activities;	the finished		
product/service;	ensure the company receives income;	product		
business processes that create a	form consumer value;	(service		
product/service for an external	is a source of profit;	provision)		
consumer;	determine the business profile;			

Definition	Distinct characteristics	Result		
business processes aimed at	are of strategic importance;			
obtaining profit;	may be in the development/exit stage			
business processes for which the	depending on market needs or company			
external consumer is ready to pay	strategy.			
money.				
Auxiliary (provisional) business-processes				
business processes whose	products can be sold on the foreign market;	creation of		
consumers are the main business	have no strategic importance;	conditions		
processes;	can turn into the main process;	for the		
business processes that support	provide basic business processes (supply	implementa		
the company's infrastructure.	and distribution of resources, security	tion of main		
	management, etc.);	processes		
	may disappear if competitive alternatives			
	appear and their implementation is			
	outsourced.			
Man	agement business-processes			
business processes that ensure the	have a typical internal structure: planning;	increase in		
survival, competitiveness, and	organization; accounting; control;	the		
development of the company,	regulation; management of resources and	efficiency		
regulate its current activities;	communications;	and		
business processes, the purpose of	the differences depend on the specifics of	effectiveness		
which is the management	the business process management objects	of the main		
processes of the company's	(strategy; suppliers; personnel; cash;	and auxiliary		
activities.	inventory).	processes		
Development (strategical) business-processes				
business processes that ensure	include the development of new products;	sustainable		
the company receives profit in the	introduce innovative, communication,	development		
long term, as a result of	and resource-saving technologies into the	of the		
reorganization, optimization, or	processes of production, management, and	company		
improvement of processes.	sale of products;			
	optimization of the organization of			
	employees' work.			

Source: summarized by the authors based on [8; 12; 23; 24]

Main (primary, reproducible) business processes include those based on the creation of added value for the company. They have the following characteristics:

- create added value for the company's products or services;
- create products that are valuable for external consumers (customers);
- have the purpose of making a profit;
- take a direct part in the company's activities;

- play a significant role in shaping the company's profitability and competitiveness;
- are of strategic importance.

The main business processes can be divided by type of activity into administrative, production, financial, marketing, scientific, and innovative.

Auxiliary (provisional, additional, servicing, supporting) business processes of the company support the general infrastructure of the company and are used by the company's divisions, employees, and main business processes. According to the place of origin, additional business processes are divided into processes from the main activity and processes from the non-main activity.

Management business processes are also considered auxiliary business processes that do not create value but ensure the execution of the main business process. They allow the management of the company in the process of ensuring its competitiveness, survival, and further development, as well as regulate the current activities of the company.

Development business processes ensure the long-term development of the company and the formation of added value. They are also defined as investment formation centers. Usually, the process of business development is considered a business project, which includes one-time actions for the business of implementation, restructuring, automation, reengineering, bringing new products to the market, and other projects that contribute to the strategic development of the company.

The presented classification of business processes is convenient for company management, as it provides an opportunity to monitor economic activity and carry out effective management. Each set of business processes plays an important role and contributes to the formation of the company's value.

For example, the main business process provides profit and serves as the center of its formation. Auxiliary business processes ensure the operation of the main business processes and support the company's infrastructure. Management

processes manage core and supporting business processes and serve as a cost center for the enterprise. Development business processes ensure the company's strategic development. In this way, a general model of the company's business processes is formulated, which reflects the relationships between different groups of business processes and the impact on the result of the company's activity – profit (fig. 2).



Fig. 2. Organization of business processes of the company in the formation of profit *Source:* compiled by the authors based on [11; 25]

When analyzing approaches to the classification of business processes of companies, it is expedient to highlight the following classification, which divides the main business processes of the company into five main groups [25]:

- 1) main business processes;
- 2) processes serving the main business processes;
- 3) business processes of development;
- 4) business processes of management of company activities;
- 5) business processes of management service.

It is worth noting that the analysis of scientific publications [1-16] makes it possible to note the presence of systematization of business processes according to various classification features:

- by the formation of the result;
- by orientation;
- by place in the value chain;
- by the nature of the product;
- by the company's customers;
- by the level of detail of the review;
- by direction of movement;
- by types of activity; by areas of activity;
- by level of difficulty; by the functional basis;
- by the nature of the impact on success;
- by level of detail; by the degree of connection of individual components;
- by level of implementation;
- by the degree of impact on productivity;
- by the sign of time;
- by level of stability;
- by the components of the balanced system of indicators;
- by the focus of management activity;
- by types of development, etc.

The classification of business processes according to the main characteristics is presented in Fig. 3.

Given the relevance and necessity for each subject to respond to transformational changes in the external environment in the context of digitalization, we suggest distinguishing between "traditional types of business processes" and "new types of business processes" for the main and auxiliary processes.

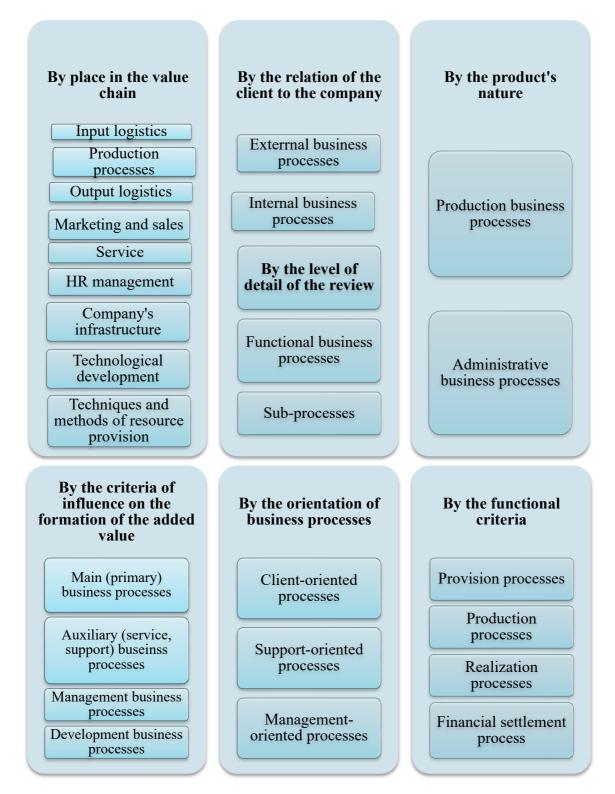


Fig. 3. Types of business processes by classification criteria

Source: compiled by the authors based on [9; 11; 13; 14; 15; 16; 23; 24; 25]

It is expedient to divide the main business processes by types of resources and by management functions. At the same time, business processes for managing digital technologies should be added to the new main business processes by type of resources, as well as new main business processes by type of activity in the virtual and real environment.

New core business processes by management functions may include managing big data analysis, monitoring globalization processes, international logistics, and other related business processes. The classification of business processes of international companies according to the proposed features is presented in Table 3.

Table 3

Classification of business processes of international companies

Types	Features	Traditional types of business processes	New types of business processes
Main business processes	By types of activity By types of resources By management functions	administrative production financial marketing scientific innovative financial HR technical and technological information interface material intellectual infrastructure innovative planning organization motivation	in a virtual environment in real environment digital digital management of big data analysis monitoring of globalization
		control and coordination	processes international logistics etc.
Auxiliary business processes	By place of origin	core activity non-core activity	online offline

Source: compiled by the authors based on [8; 9; 26]

The presented classification generally describes business processes aimed at obtaining added value for the company and achieving the main goal - increasing profits, satisfying consumer needs, and solving other business tasks (reducing costs and optimizing resources; improving the quality of products or

services; increasing efficiency and productivity workflows; expansion of market presence and attraction of new customers; support and development of the company's brand, etc.).

The business processes of an international company are an indicator of its success because transformational changes are possible if they correspond to organizational support, including its process component. Improving the systematization of business processes based on the proposed characteristics makes it possible to formalize the organizational mechanism of company management in more detail, considering new elements (business processes) that meet the requirements of the external environment in the context of digitalization.

An important feature of business entities in the context of digitalization is the introduction of information technologies in all areas of activity, especially management based on electronic document management, which turns information resources (data) into a means of achieving business goals.

An important characteristic of the information (data) used is its great variety, which complicates the structuring, processing, storage, management, and use of the database. Due to the rapid development of communication networks and the use of new data storage tools, the possibility of creating and accumulating large amounts of information has increased, but problems with the possibilities of data processing and analysis have also arisen. Digital technologies expand opportunities for interaction and data exchange between product developers, suppliers, and end users, as well as researchers, providing opportunities for the continuous search for innovation - the creation and modification of products and services based on large-scale technological changes [17, p. 80].

Digital transformation is the introduction of modern technologies into the company's business processes. This approach involves not only the installation of modern equipment or software, but also radical changes in management

methods, corporate culture, and external communications. As a result, the productivity and level of satisfaction of customers and each employee increase, and the business entity gains the reputation of a progressive and modern company [27].

Modern trends in digital transformation include the introduction of electronic data exchange technology (EDI - Electronic Data Interchange), methods and tools for analyzing and processing large volumes of data (Big Data), advanced solutions in the field of cloud computing, the use of intelligent technologies (machine training), and the possibility of applying hybrid approaches. With the help of these technologies, companies can: quickly get access to large resources of data about their customers and types of economic activity; properly use the potential of the obtained data and predictive modeling; predict trends and quickly respond to market challenges.

Leading companies that coordinate sales, marketing, customer support, human resources, and other areas of activity see new technologies as a key element of innovation. They also decide whether innovation should be the goal of all activities carried out in the company and whether other structural units, besides IT, should make decisions about the use of such new technologies [18, p. 49].

According to the authors [19] "digitalization as a whole manifests itself due to the following components: global nature, new technologies, increase in of the amount data. change in interaction with customers. transformation/disappearance of traditional industries, automation and optimization, data security and privacy, development of new markets".

K. Shukets believes that the purpose of digitalization of business processes is to create and provide new value (usefulness) to consumers, and not just to improve what has already been done or provided [28].

Undoubtedly, the digitization of business processes is primarily aimed at optimizing resources and increasing the company's productivity through the

introduction of modern technologies. This encompasses the use of the latest tools, such as digital workplace technologies, mobile devices, information, and communication technologies, etc., to create a unified connection and the ability to work regardless of location. Digital tools contribute to improving the efficiency of tasks and provide greater flexibility in the organization of business processes.

Digitization is not just the conversion to digital of large volumes of data. The list of procedures that can be transferred to a digital environment is significant, starting from the digitization of typical production processes, control of work performance and product quality, and communication with teams and customers, all the way to the construction of logistics and delivery. Digital transformation enables the creation of digital revenue streams and offerings. Reengineering business processes will allow the reorganization of work methods/strategies to increase the company's income. It is worth noting the possibilities of digitalization in the process of creating added value for products, including updating production processes through the integration of information technologies in the use, processing, and storage of databases.

Digitization of the company's business processes will allow recording the changes made and highlighting the main points so that managers of all levels can control quality at every stage. As a result, changes will be implemented with minimal expenditure of time and effort and lead to a more perfect business. In general, the goals of digitalization of business processes fully correspond to the general goals of companies, focusing the efforts of leaders and managers on optimizing the potential of available resources to increase the efficiency of economic activity. The structural and logical scheme of digitalization of the company's business processes is presented in Fig. 4.

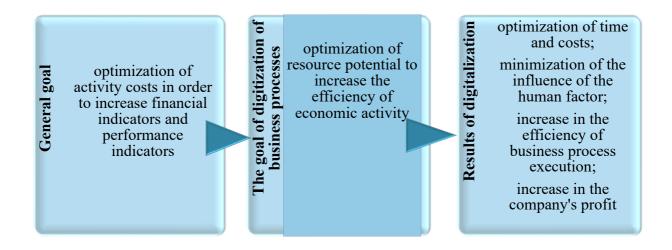


Fig. 4. Structural and logical scheme of digitalization of business processes of an international company

Source: compiled by the authors based on [29, p. 53]

To fully understand the possibilities of applying digitalization to business processes, we will analyze the application of digital technologies in practice. If there is interaction between the structural divisions of the company at the international level, then at a certain stage of its development, it is necessary to simplify the communication system between branches, obtain intermediate indicators for monitoring business processes, train new employees, and establish effective interaction between employees. All these issues are gradually being solved because of data digitization. In addition, thanks to the implementation of new software, most processes can be transferred to a digital environment, thereby increasing the efficiency of the company's work.

Thus, the structure of the company's information system, which involves the use of specialized procedures to ensure interaction between managers, employees, and customers, is presented in Fig. 5.

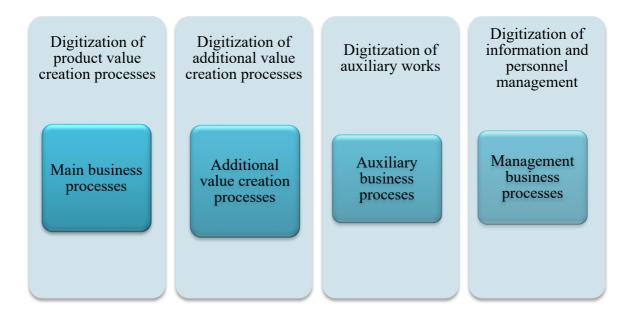


Fig. 5. The structure of the information system of an international company in the context of digitalization

Source: compiled by the authors

All services of the information system are closely interconnected, which allows the necessary information to be transferred from the sender to the recipient as quickly as possible. In addition, depending on the communication channel, the sender can be a company manager or an employee, and the recipient can be an employee or a customer. For example, if we consider the information path of a potential candidate from a certain vacancy, then after a remote interview with the HR manager, the candidate must pass (also online) a technical interview with mentors from the company's central office. To do this, they use the capabilities of 3D-resume services, which involve examining the candidate, completing a technical task, and passing an interview. This is done to determine the level of foreign language learner's knowledge, and professional skills and assess his technical skills in the company's field of activity. This step allows for saving time and money on offline meetings with potential candidates, which is an important advantage for personnel management in international companies.

It should be noted that many international companies also use information systems to support personnel processes, including interviewing candidates for vacancies. They not only rely on the results of indirect professional selection and talent assessment but also look for the opportunity to meet directly with the personnel manager since it is difficult to understand the personality of a candidate for a vacant position or to assess his soft skills from a distance or with the help of special machines [30, p. 29]. If the technical interview is successfully completed, the integration process of the new employee will be carried out through an internal information system, which involves completing tasks of various types of tests, text tasks and video interviews. The integration process can be completed at any convenient time but within the deadlines set by management.

Digital transformation is a key factor in modern business, requiring companies to adapt to new technological requirements and change business processes. In this regard, business process management is extremely important for international companies to maintain market competitive advantages.

Business process management plays an important role in a company's ability to work in the modern business environment and adapt to changes in the international market. The goal of digital transformation is to help companies participate in market competition, and effectively adapt to changes, which allows for more dynamic business activities, adapting to the process of digital transformation and the introduction of digital technologies [31].

Let's consider the essence of business process management in the context of digital transformation. In general, the process of business process management is a combination of certain tools and solutions that can help businesses become more flexible and move to digital processes faster. The main goal of this concept is, first of all, to optimize and improve the company's business processes to achieve strategic business goals. On the other hand, it can be considered a methodology that allows a company to increase the efficiency of

business processes, and the quality of products and services, reduce costs, and find weak links in the management system. It is expedient to consider the components of business process management at each of the five stages: design, modeling, implementation, monitoring, and optimization (Fig. 6).

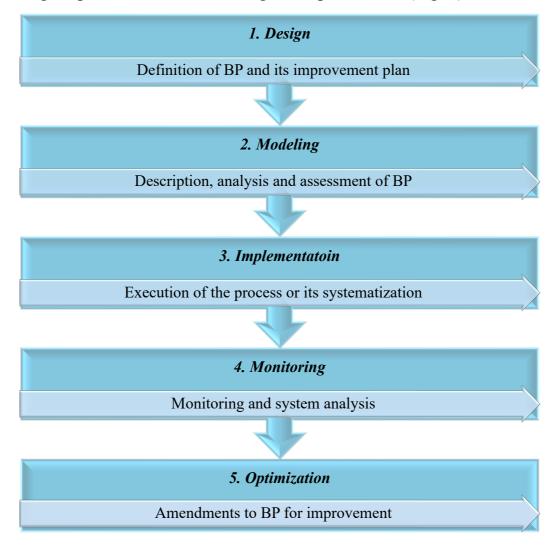


Fig. 6. The main steps of managing the business processes of an international company *Source*: compiled by the authors based on [32]

We will consider each of the above steps in more detail (Table 5).

The listed stages of business process management allow companies to increase productivity and improve the quality of their products or services.

Depending on the stage and business process, it is also important to consider the business process management system through which the main changes take place.

Table 5
Characteristics of business process management of an international company

Step	Characteristics
1. Design (definition of BP)	consists in identifying and documenting the company's business processes, highlighting those business processes that are planned to be changed in the future, and creating a roadmap for their optimization
2. Modeling of BP	processes are described in the form of diagrams, which allows identification of possible problems and finding ways to solve them; includes analysis and evaluation of processes, identification of weak points, and ways to improve them
3. Implementation of BP	based on the results of the modeling analysis, at this stage, changes to the processes are proposed that will increase their efficiency and the efficiency of the company's work in general, as well as ensure their practical implementation
4. Monitoring and management of BP	provides a proper assessment of the execution and management of business processes to improve the efficiency of the company's work
5. Optimization of BP	a re-analysis of already implemented new business processes is carried out, possible weak points are identified, and adjustments are made.

Source: systematized by the authors based on [32]

Since business process management (BPM) is a rather complex field and often involves the use of various tools, experts distinguish the following categories and approaches to effective BPM [33]:

- 1. A system-oriented type of business process management system is responsible for processes that are performed mainly in existing systems (for example, HRMS, CRM, ERP) without the special participation of the employee. Integration-oriented business process management systems are flexible enough to create new processes and improve outdated business processes relatively quickly.
- 2. *Human-centric BPM* is people-oriented, i.e. designed for processes that are primarily performed by humans. They often need a lot of coordination and tasks from individuals. This method requires more time and effort but ultimately shows good results.
- 3. *Document-centric BPM* is a business process management solution for when processes are based on documents, such as contracts or agreements. They

allow you to route, format, validate, and sign documents as your complete tasks in your workflow.

Most business process management systems may include each of the above components, but each of them tends to specialize in certain aspects. Data systems play a key role in the functioning of any company, as they allow the collection, storage, and analysis of significant amounts of information related to all aspects of the business processes and activities of the enterprise. These systems help companies make informed decisions, improve process efficiency, and ensure customer satisfaction [33].

However, despite a wide variety of tools and best practices, many international companies do not focus on enterprise-wide process management. Instead, each department operates independently, has its budget, follows its procedures, and uses digital tools distinct from the company. Only the interactivity and consistency of the entire process can ensure the normal operation of the company, and BPM is designed to solve these problems [34].

Thus, the use of BPM systems can help companies achieve higher efficiency and productivity, reduce costs, improve the quality of products or services, and increase customer satisfaction. However, the success of the BPM system implementation depends on such factors as proper planning, interaction between different company departments, personnel training, and compliance of the information infrastructure with the requirements of the BPM system.

Conclusions and prospects for further research. Digital transformations are radically changing the way international companies operate, making it necessary to review and optimize their business processes. The key goal of digitalization of business processes of international companies is to create and provide new values, while the organization of business processes itself becomes more flexible.

The main components of successful digital transformation for international companies are openness to new (digital) technologies, readiness for

changes, and constant adaptation to the requirements of the international market. At the same time, it is important not only to implement technologies but also to develop the digital culture of the company, which allows to use the potential of digital tools to the maximum.

The use of a process approach in business management requires a deeper understanding of the concept of business processes when the company is considered a complete system consisting of interconnected business processes aimed at the production of a product or service. At the same time, digital transformations require international companies to constantly monitor and update business process management strategies to adapt to a rapidly changing environment. The conditions of digital transformations today create unique opportunities for international companies to expand markets, improve operational efficiency, and introduce innovations.

Prospects for further research in this area can be aimed at predicting future trends in digital transformations of international companies and developing appropriate management strategies for their successful adaptation to changes in the business environment.

Literature

- 1. Benner M.J., Tushman M.L. Exploitation, exploration, and process management: the productivity dilemma revisited. *Academy of Management Review*. 2001. 28(2). doi:10.5465/AMR.2003.9416096.
- Davenport T., Short J. The New Industrial Engineering: Information Technology and Business Process Redesign. Sloan Management Review. 1990. P. 11-27.
- 3. Rother M., Shook J. Learning to See: Value Stream Mapping to Create Value and Eliminate Muda. Publisher: Lean Enterprise Institute Editor: Jim Womack. 1999.

- 4. Hammer M., Champy J. Reengineering the Corporation: A Manifesto for Business Revolution. *Collins Business Essentials*. 2006. URL: https://sohailumar.files.wordpress.com/2014/03/reengineering_the_corporation-clean.pdf (date of access: 10.03.2024).
- 5. Porter M.E., Millar V.E. How information gives you competitive advantage. *Harvard Business Review*. (July–August 1985). P. 149–160.
- 6. Drucker P. Theory of the business. *Harvard Business Review*. September—October 1994. P. 95-106.
- 7. Harrington H.J., Esseling K., Nimwegen V. Business Process Improvement Workbook: Documentation, Analysis, Design, and Management of Business Process Improvement. Publisher: McGraw-Hill Education; 1st edition. 1997. 314 p.
- Чорнобай Л.І., Дума О.І. Бізнес-процеси підприємства: класифікація та структурно-ієрархічна модель. *Економічний аналіз*. 2015. Т. 22, № 2. С. 171-182.
- Лисенко О.А. Класифікація бізнес-процесів на промислових підприємствах: теоретичні аспекти. Університетські наукові записки.
 № 2. С. 190-197.
- 10. Козаченко О.В., Ляшенко А.Н., Ладко І.Ю. *Управління великим підприємством:* монографія. Київ: Лібра, 2006. 384 с.
- 11. Денисенко Л.О., Шацька С.Є. Концептуальні засади класифікації бізнес-процесів, як основи формування бізнес-системи організації. *Ефективна економіка*. 2012. № 11. URL: http://www.economy.nayka.com.ua/?op=1&z=1558 (date of access: 20.02.2024).
- 12. Тютюнникова С.В., Фрідман О.А. Трансформації інноваційного підприємництва в умовах становлення цифрової економіки. *Економічна теорія та право*. 2020. № 2 (41). С. 26-47.

- 13. Длігач А.О. Цифрова трансформація як ліфт у майбутнє. *TQM systems:* website. 2020. URL: https://tqm.com.ua/ua/likbez/ua-articles/cyfrova-transformaciya-yak-lift-u-majbutnye (date of access: 20.02.2024).
- 14. Савицька О.М., Салабай В.О. Діджиталізація управління бізнесом підприємства в контексті розвитку Індустрії 4.0 в Україні. *Бізнес, інновації, менеджмент: проблеми та перспективи: зб. тез доп. І Міжнар. наук.-практ. конф.* (Київ, 23 квітня 2020 р). Київ: Вид-во «Політехніка», 2020. С. 62-63. URL: http://confmanagement.kpi.ua/proc/issue/viewIssue/%D0%91%D0%86%D 0%9C/6416 (date of access: 18.02.2024).
- 15. Фіщук В.В. Діджиталізація це лише початок. 2018. URL: https://day.kyiv.ua/article/ekonomika/didzhytalizatsiya-tse-lyshe-pochatok (date of access: 04.03.2024).
- 16. Гурська К. Чому діджиталізація в бізнесі неминуча? Дія Бізнес. 2021. URL: https://business.diia.gov.ua/cases/tehnologii/comu-didzitalizacia-v-biznesi-neminuca (date of access: 06.03.2024).
- 17. Вдовиченко Ю.Б. Цифрові технології як основа та рушійна сила розвитку сучасної глобальної економіки. *Економіка та держава*. 2018. № 1. С. 79-82.
- 18. Кривда О.В. Четверта промислова революція та цифрові перетворення. *Бізнес, інновації, менеджмент: проблеми та перспективи: збірник тез доповідей І Міжнар. наук.-практ. конф.* (м. Київ, 23 квітня 2020 р.) Київ, 2020. С. 48-49.
- 19. Величко К.Ю., Цибульська Е.І. Трансформація бізнес-моделей компаній: сучасні виклики та перспективи у цифровій економіці. *Економіка та суспільство*. 2023. Вип. 52. doi: https://doi.org/10.32782/2524-0072/2023-52-39.

- 20. ДСТУ ISO 9001:2015 Системи управління якістю. Вимоги (ISO 9001:2015, IDT). *ДНАОП законодавча база: website*. URL: https://dnaop.com/html/61390 6.html (date of access: 10.03.2024).
- 21. Кібік О., Котлубай В., Корнілова О. Ефективний менеджмент як чинник інноваційного розвитку сучасного бізнесу. *Development of management and entrepreneurship methods on transport*. 2022. № 3 (80). С. 26-36. URL: https://www.daemmt.odesa.ua/index.php/daemmt/article/view/420/365 (date of access: 22.02.2024).
- 22. Шарко В.В., Нікітішин А.О. Управління бізнес-процесами підприємства: процесний підхід. *Вісник Хмельницького національного університету. Економічні науки.* 2020. № 4, Т. 2. С. 268-273. URL: http://journals.khnu.km.ua/vestnik/wp-content/uploads/2021/11/vknu-es-2020-n-4-t2-284 46.pdf (date of access: 02.03.2024).
- 23. Ольшанський О.В. Особливості управління бізнес-процесами підприємств торгівлі та методи їх удосконалення. *Науковий вісник Ужегородського національного університету*. 2018. Вип. 22. Ч. 3. С. 22-26.
- 24. Тур О.В., Матусевич А.С. Управління бізнес-процесами на підприємстві. *Ефективна економіка*. 2018. № 6. URL: http://www.economy.nayka.com.ua/?op=1&z=6415 (date of access: 04.03.2024).
- 25. Ільченко Н.Б. Механізм управління бізнес-процесами на підприємстві оптової торгівлі. *Бізнес Інформ*. 2018. № 6. С. 224-230.
- 26. Прокопенко М.О. Удосконалення класифікації бізнес-процесів промислових підприємств. *Ефективна економіка*. 2021. № 12. URL: http://www.economy.nayka.com.ua/pdf/12_2021/204.pdf (date of access: 10.03.2024).

- 27. Як цифрова трансформація змінить ваш бізнес? Де Візу: website. 2021. URL: https://devisu.ua/uk/stattia/yak-cifrova-transformaciya-zminyu-biznes (date of access: 07.03.2024).
- 28. Szukiec K. The Importance of Business Processes Automation and Digitization. *Stepwise*. 2020. URL: https://stepwise.pl/the-importance-and-challenges-of-business-processes-automation-and-digitization (date of access: 10.03.2024).
- 29. Мельник К.Г., Воржакова Ю.П. Діджиталізація управління бізнеспроцесами. *Бізнес, інновації, менеджмент: проблеми та перспективи*: *збірник тез доповідей І Міжнар. наук.-практ. конф.* (м. Київ, 23 квітня 2020 р.). Київ, 2020. С. 52-53.
- 30. Шестакова А.В. Стан та напрями розвитку персоналу аграрних підприємств в умовах цифрової економіки. *Бізнес-навігатор*. 2020. Вип. 2(58). С. 27-29.
- 31. MooreC. et al. Digital transformation with business process management. Toronto: Future Strategies Inc, 2017. 190 p.
- 32. Six steps of business process management. *Power Automate Microsoft*. URL: https://powerautomate.microsoft.com/en-us/business-process-management-steps/ (date of access: 11.03.2024).
- 33. Tucci L. What is business process management? An in-depth BPM guide. *Tech Target Network.* 2022. URL: https://www.techtarget.com/searchcio/definition/business-processmanagement (date of access: 11.03.2024).
- 34. Reijers H.A. Business Process Management: The evolution of a discipline. *Computers in Industry.* 2021. doi: https://doi.org/10.1016/j.compind.2021.103404.

References

- 1. Benner, M. J., & Tushman, M. L. (2001). Exploitation, exploration, and process management: the productivity dilemma revisited. *Academy of Management Review*, 28(2). doi: 10.5465/AMR.2003.9416096.
- Davenport, T., & Short, J. (1990). The New Industrial Engineering: Information Technology and Business Process Redesign. Sloan Management Review, 11-27.
- 3. Rother, M., & Shook, J. Learning to See: (1999). Value Stream Mapping to Create Value and Eliminate Muda. Publisher: Lean Enterprise Institute Editor: Jim Womack.
- 4. Hammer, M., & Champy, J. (2006). Reengineering the Corporation: A Manifesto for Business Revolution. *Collins Business Essentials*, 10. Retrieved from https://sohailumar.files.wordpress.com/2014/03/reengineering_the_corpora tion-clean.pdf.
- 5. Porter, M.E., & Millar V.E. (1985). How Information Gives You Competitive Advantage. *Harvard Business Review*, 149-160.
- 6. Drucker, P. (1994). Theory of the business. *Harvard Business Review*, 95-106.
- 7. Harrington, H. J., Esseling, K., Nimwegen, V. (1997). Business Process Improvement Workbook: Documentation, Analysis, Design, and Management of Business Process Improvement. Publisher: McGraw-Hill Education; 1st edition.
- 8. Chornobai, L.I., & Duma, O.I. (2015). Biznes-protsesy pidpryiemstva: klasyfikatsiia ta strukturno-iierarkhichna model [Business processes of the enterprise: classification and structural-hierarchical model]. *Ekonomichnyi analiz*, 22 (2), 171-182 [in Ukrainian].
- 9. Lysenko, O.A. (2013). Klasyfikatsiia biznes-protsesiv na promyslovykh pidpryiemstvakh: teoretychni aspekty [Classification of business processes

- at industrial enterprises: theoretical aspects]. *Universytetski naukovi zapysky*, 2, 190-197 [in Ukrainian].
- 10. Kozachenko, O.V., Liashenko, A.H., & Ladko, I.Yu. (2006). Upravlinnia velykym pidpryiemstvom [Management of a large enterprise]: monohrafiia. Kyiv: Libra [in Ukrainian].
- 11. Denysenko, L.O., & Shatska, S.Ye. (2012). Kontseptualni zasady klasyfikatsii biznes-protsesiv, yak osnovy formuvannia biznes-systemy orhanizatsii. [Conceptual principles of classification of business processes, as the basis of formation of the organization's business system]. *Efektyvna ekonomika*, 11. Retrieved from http://www.economy.nayka.com.ua/?op=1&z=1558 [in Ukrainian].
- 12. Tiutiunnykova, S.V., & Fridman, O.A. (2020). Transformatsii innovatsiinoho pidpryiemnytstva v umovakh stanovlennia tsyfrovoi ekonomiky [Transformations of innovative entrepreneurship in the conditions of the formation of the digital economy]. *Ekonomichna teoriia ta parvo*, 2 (41), 26-47 [in Ukrainian].
- 13. Dlihach, A.O. (2020). Tsyfrova transformatsiia yak lift u maibutnie [Digital transformation as an elevator to the future]. *TQM systems: website*. Retrieved from https://tqm.com.ua/ua/likbez/ua-articles/cyfrova-transformaciya-yak-lift-u-majbutnye [in Ukrainian].
- 14. Savytska, O.M., & Salabai, V.O. (2020). Didzhytalizatsiia upravlinnia biznesom pidpryiemstva v konteksti rozvytku Industrii 4.0 v Ukraini [Digitization of enterprise business management in the context of Industry 4.0 development in Ukraine]. *Biznes, innovatsii, menedzhment: problemy ta perspektyvy: zb. tez dop. I Mizhnar. nauk.-prakt. konf.* (pp. 62-63). Kyiv. Retrieved from http://confmanagement.kpi.ua/proc/issue/viewIssue/%D0%91%D0%86%D 0%9C/6416 [in Ukrainian].

- 15. Fishchuk, V.V. (2018). Didzhytalizatsiia tse lyshe pochatok [Digitization is only the beginning]. Retrieved from https://day.kyiv.ua/article/ekonomika/didzhytalizatsiya-tse-lyshe-pochatok [in Ukrainian].
- 16. Gurska, K. (2021). Chomu didzhytalizatsiia v biznesi nemynucha? [Why digitalization in business is inevitable?]. *Diia Biznes*. Retrieved from https://business.diia.gov.ua/cases/tehnologii/comu-didzitalizacia-v-biznesi-neminuca [in Ukrainian].
- 17. Vdovychenko, Yu. B. (2018). Tsyfrovi tekhnolohii yak osnova ta rushiina syla rozvytku suchasnoi hlobalnoi ekonomiky [Digital technologies as the basis and driving force of the development of the modern global economy]. *Ekonomika ta derzhava, 1,* 79-82 [in Ukrainian].
- 18. Kryvda, O.B. (2020). Chetverta promyslova revoliutsiia ta tsyfrovi peretvorennia. [The fourth industrial revolution and digital transformation]. Biznes, innovatsii, menedzhment: problemy ta perspektyvy: zbirnyk tez dopovidei I Mizhnar. nauk.-prakt. konf., (pp. 48-49). Kyiv [in Ukrainian].
- 19. Velychko, K.Yu., & Tsybulska, E.I. (2023). Transformatsiia biznesmodelei kompanii: suchasni vyklyky ta perspektyvy u tsyfrovii ekonomitsi [Transformation of business models of companies: modern challenges and prospects in the digital economy]. *Ekonomika ta suspilstvo*, *52*. doi: https://doi.org/10.32782/2524- 0072/2023-52-39 [in Ukrainian].
- 20. DSTU ISO 9001:2015. Systemy upravlinnia yakistiu. Vymohy. [DSTU ISO 9001:2015 Quality management system. I demand. Requirements]. *DNAOP zakonodavcha baza: website.* Retrieved from http://khoda.gov.ua/image/catalog/files/%209001.pdf [in Ukrainian].
- 21. Kibik, O., Kotlubai, V., & Kornilova, O. (2022). Efektyvnyi menedzhment yakchynnyk innovatsiinoho rozvytku suchasnoho biznesu [Effective management as a factor in the innovative development of modern business]. *Rozvytok metodiv upravlinnia ta hospodariuvannia na*

- *transporti, 3* (80), 26-36. doi: 10.31375/2226-1915-2022-3-26-36 [in Ukrainian].
- 22. Sharko, V.V., & Nikitishyn, A.O. (2020). Upravlinnia biznes-protsesamy pidpryiemstva: protsesnyi pidkhid [Management of enterprise business processes: a process approach]. *Visnyk Khmelnytskoho natsionalnoho universytetu. Ekonomichni nauky, 4* (2), 268-273. Retrieved from http://journals.khnu.km.ua/vestnik/wp-content/uploads/2021/11/vknu-es-2020-n-4-t2-284 46.pdf. [in Ukrainian].
- 23. Olshanskyi, O.V. (2018). Osoblyvosti upravlinnia biznes-protsesamy pidpryiemstv torhivli ta metody yikh udoskonalennia [Peculiarities of managing business processes of trade enterprises and methods of their improvement]. *Naukovyi visnyk Uzhhorodskoho natsionalnoho universytetu, 22*(3), 22-26 [in Ukrainian].
- 24. Tur, O.V., & Matusevych, A. S. (2018). Upravlinnia biznes-protsesamy napidpryiemstvi [Management of business processes at the enterprise]. *Efektyvna ekonomika, 6.* Retrieved from http://www.economy.nayka.com.ua/?op=1&z=6415 [in Ukrainian].
- 25. Ilchenko, N.B. (2018). Mekhanizm upravlinnia biznes-protsesamy na pidpryiemstvi optovoi torhivli [Mechanism for managing business processes at a wholesale trade enterprise]. *Biznes Inform*, 6, 224-230 [in Ukrainian].
- 26. Prokopenko, M.O. (2021). Udoskonalennia klasyfikatsii biznes- protsesiv promyslovykh pidpryiemstv [Improving the classification of business processes of industrial enterprises]. *Efektyvna ekonomika, 12*. Retrieved from http://www.economy.nayka.com.ua/pdf/12_2021/204.pdf [in Ukrainian].
- 27. Yak tsyfrova transformatsiia zminiuie biznes? [How does digital transformation change business?]. (2021). *De Vizu: website*. Retrieved from

- https://devisu.ua/uk/stattia/yak-cifrova-transformaciya-zminyu-biznes [in Ukrainian].
- 28. Szukiec, K. (2020). The Importance of Business Processes Automation and Digitization. *Stepwise*. Retrieved from https://stepwise.pl/the-importance-and-challenges-of-business-processes-automation-and-digitization.
- 29. Melnyk, K.H., & Vorzhakova, Yu.P. (2020). Didzhytalizatsiia upravlinnia biznes-protsesamy [Digitization of business process management]. *Biznes, innovatsii, menedzhment: problemy ta perspektyvy: zbirnyk tez dopovidei I Mizhnar. nauk.-prakt. konf.* (pp. 52-53). Kyiv [in Ukrainian].
- 30. Shestakova, A.V. (2020). Stan ta napriamy rozvytku personalu ahrarnykh pidpryiemstv v umovakh tsyfrovoi ekonomiky [The state and directions of development of personnel of agrarian enterprises in the conditions of the digital economy]. *Biznes-navihator*, 2 (58), 27-29 [in Ukrainian].
- 31. MooreC. et al. (2017). Digital transformation with business process management. Toronto: Future Strategies Inc.
- 32. Six steps of business process management. *Power Automate Microsoft*. Retrieved from https://powerautomate.microsoft.com/en-us/business-process-management-steps/.
- 33. Tucci, L. (2022). What is business process management? An in-depth BPM guides. *Tech Target Network*. URL: https://www.techtarget.com/searchcio/definition/business-processmanagement.
- 34. Reijers, H.A. (2021). Business Process Management: The evolution of a discipline. *Computers in Industry*. doi: https://doi.org/10.1016/j.compind.2021.103404.