

## **A CAPSULED APPROACH TO ANALYSIS OF THE PROFITABILITY OF DIGITALIZATION OF BUSINESS PROCESSES OF TELECOMMUNICATIONS COMPANIES IN UKRAINE**

*Uma abordagem em capsula para análise da rentabilidade da digitalização de processos de negócios de empresas de telecomunicações na Ucrânia*

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### **ABSTRACT**

Digital progress fundamentally transforms social reality, changing not only the key principles of social life but also all social institutions and spheres in which social interaction takes place, without neglecting the fundamental basis of the world's existence – the economy. Therefore, the problem of digitalization of the enterprise's business processes in the conditions of the digital economy becomes extremely urgent, given the need for high-quality management of the development of private capital. The purpose of the article is a multi-aspect system modeling of the encapsulated approach of the enterprise's business processes to find adequate justified management of flow processes in the conditions of digitalization of the economy. Research methodology – methods of digital analytics, based on the analysis of financial statements of enterprises and mathematical modeling of investment flows, including comparative analysis of indicators of comprehensive diagnostics of the effectiveness of digitalization of telecommunications enterprises. Findings - the key flows of business processes of enterprises are defined: material, innovative-intellectual, information-marketing, financial, the effectiveness of which management consists in the synchronization of flows with the possible assumption of temporary variations in the investment of one or another flow. Modeling made it possible to recognize the dominant flows – financial and innovative-intellectual, which allowed the authors to scientifically substantiate the need for systematic balanced management of the enterprise's business processes depending on the changing external environment, which is forced to transform intensively under the influence of the realities of the digital society. The theoretical constructs applied by the authors using the general and innovative theory of systems, the process approach of managing the quality of flows in combination with an interdisciplinary approach and analytical methodology made it possible to highlight the peculiarities of business processes in the conditions of digitalization as a general complex system that can be effectively managed using modern digital technologies. The study of key indicators and analysis of flow management is proposed to be carried out with the help of an encapsulated approach, which provides scientists with the basis for analytical analysis of the effectiveness of business processes at a modern enterprise in the conditions of a digital society. Research limitations – obtaining the analytical dependence of the key flows of the enterprise's business processes is a platform for making management decisions but requires the use of a more modern methodology using digital tools. **Keywords:** Digitalization. Flow. Business processes. Mathematical model. Diagnostics. "Process mining".

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## ABORDAGEM EM CAPSULA PARA ANÁLISE DA RENTABILIDADE DA DIGITALIZAÇÃO DE PROCESSOS DE NEGÓCIOS DE EMPRESAS DE TELECOMUNICAÇÕES NA UCRÂNIA

*A capsuled approach to analysis of the profitability of digitalization of business processes of telecommunications companies in Ukraine*

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### RESUMO

O progresso digital transforma fundamentalmente a realidade social, alterando não apenas os princípios-chave da vida social, mas também todas as instituições e esferas sociais nas quais a interação social ocorre, sem negligenciar a base fundamental da existência do mundo – a economia. Portanto, o problema da digitalização dos processos de negócios da empresa nas condições da economia digital torna-se extremamente urgente, dada a necessidade de gestão de alta qualidade do desenvolvimento do capital privado. O objetivo do artigo é uma modelagem de sistema multi-aspecto da abordagem encapsulada dos processos de negócios da empresa para encontrar o gerenciamento justificado adequado dos processos de fluxo nas condições de digitalização da economia. Metodologia de pesquisa – métodos de análise digital, baseados na análise de demonstrações financeiras de empresas e modelagem matemática de fluxos de investimentos, incluindo análise comparativa de indicadores de diagnósticos abrangentes da eficácia da digitalização de empresas de telecomunicações. Constatações - são definidos os principais fluxos dos processos de negócios das empresas: material, inovador-intelectual, informação-marketing, financeiro, cuja eficácia de gestão consiste na sincronização de fluxos com a possível suposição de variações temporárias no investimento de um ou outro fluxo. A modelagem permitiu reconhecer os fluxos dominantes – financeiro e inovador-intelectual, o que permitiu aos autores fundamentar cientificamente a necessidade de uma gestão sistemática e equilibrada dos processos de negócios da empresa em função do ambiente externo em mudança, que é forçado a se transformar intensamente sob a influência das realidades da sociedade digital. Os construtos teóricos aplicados pelos autores utilizando a teoria geral e inovadora de sistemas, a abordagem de processos de gestão da qualidade de fluxos em combinação com uma abordagem interdisciplinar e metodologia analítica permitiram destacar as peculiaridades dos processos de negócios nas condições de digitalização como um sistema geral complexo que pode ser gerenciado de forma eficaz usando tecnologias digitais modernas. Propõe-se que o estudo dos principais indicadores e an análise do gerenciamento de fluxo sejam realizados com a ajuda de uma abordagem encapsulada, que fornece aos cientistas a base para a análise analítica da eficácia dos processos de negócios em uma empresa moderna nas condições de uma sociedade digital. Limitações da pesquisa – obter a dependência analítica dos principais fluxos dos processos de negócios da empresa é uma plataforma para a tomada de decisões gerenciais, mas requer o uso de uma metodologia mais moderna com ferramentas digitais.

**Palavras-chave:** Digitalização. Fluxo. Processos de negócios. Modelo matemático. Diagnóstico. “Process mining”.

## INTRODUCTION

The intensive development of the economy in the 21st century, provoked by the spontaneous introduction of innovative information technologies, led to the transition of society to a fundamentally new – digital level of social interaction in all, without exception, spheres of social life. The digital economy and e-commerce play an increasingly important role in achieving sustainable development of the world economy, opening new opportunities for society and posing new challenges to business. Information and communication technologies already have a direct impact on the methods of production, consumption, and the exchange of goods and services. Countries that take advantage of e-commerce opportunities not only benefit from their economies but also from global markets by selling their goods and services online, while those countries that are unable to take advantage of such opportunities miss out on their profits.

Until now, the development of scientific thought systematized exclusively traditional methods and principles of managing business processes in the economy. The methodology of the organization of business processes in the information society, which was developed based on the results of the practical activities of large corporations, concerns, and consortia, made it possible to create a whole series of scientific paradigms that, with the help of multidisciplinary theories, highlighted the complexity of transformations in the economy, but under modern conditions became ineffective. The active digitization of society forced a radical change in the principles of managing business processes at enterprises in all, without exception, branches of the economy, actualizing the issue of creating a radically new scientific approach to the study of certain economic phenomena and processes.

Considering business processes as a system of continuous, interconnected, appropriately ordered, and managed actions (processes, operations, functions performed), and is an integral element of the mechanism of formation of added value (consumer value of goods, services, products) through transformation organizational resources focused on achieving one comprehensive goal, aimed at ensuring the productivity and efficiency of the business as a whole, and ensuring the delivery of added value (consumer value) to the target market through the business model of the enterprise, it is necessary to pay special attention to the complex of transformations that occur with the distribution financial flows in the conditions of the digital economy.

In our opinion, the general process management system at the enterprise should be studied in the context of stream synchronization and the creation of a single business management system, which allows for obtaining a systemic vision and analyzing the correctness of the decisions made. For the organization of a comprehensive economically justified system of diagnostics of the efficiency of business processes of enterprises, digital technologies are implemented in the form of expert systems, for the creation of which complex neural algorithms and special models of software systems are used. Usually, digitalization at enterprises is carried out by creating a subordinate complex mutually coordinated management system for all business processes and flows of the enterprise based on process-by-process automatic information support. Therefore, the creation of an encapsulated approach to the digitalization of business processes of an enterprise in the conditions of the digital economy is becoming extremely relevant and requires in-depth scientific study.

### 1 ANALYSIS OF THE MAIN RESEARCH AND METHODOLOGY OF THIS PROBLEM

Academic circles and practicing economists have reacted differently to the development of the digital economy and the related problems of e-commerce. Companies that have already started the digital transformation to some extent during the COVID-19 pandemic have achieved more success than those that have not. Some businesses, especially network operators and digital platforms, have played an important role, affecting the opportunities available to others who profit from e-commerce or use it to reduce the losses associated with traditional business models. The permanent search for optimal management of business processes of the enterprise involves a complex analysis of many economic theories, the use of scientific experience of which in the field of managing complex systems, provides an opportunity for a complex analysis of innovative business models, considering the latest developments in the field of information technologies. The scientific and theoretical trajectories of the study of systems, the process approach to management quality management, structural

functionalism, theories of competitive advantages and innovations, as well as the analysis of the "Process mining" technology became the paradigmatic basis of our research.

**1.1 The process approach**, the founders of which are considered to be F. Taylor, H. Fayol, and H. Emerson, who laid the practical basis of management operations, allows to highlight the functional structuring of management activity and the management process (Fayol, 1949; Taylor, 1911). What made it possible to form the author's idea of a digital encapsulated approach to the digitization of the enterprise's business processes.

According to H. Fayol, the author of the book "General and Industrial Management", the management of business processes should combine forecasting, organization, planning, coordination, and control, which allows acting on the principles of unity, continuity, flexibility, and accuracy in the management of financial flows (Fayol, 1949). Since the organization performs a wide range of tasks at the same time, it is necessary to coordinate efforts, maintain confidence that the efforts of a specific unit are interconnected with the efforts of the enterprise as a whole, and are ultimately aimed at achieving a common goal – obtaining excess profit. Coordination is achieved, in particular, by ensuring the circulation of information and the introduction of innovative technologies.

Structural functionalism, as a self-organizing system (a general theory of action), was founded by Talcott Parsons and is used to describe the systems of economy, politics, law, education, and the study of the features of society. The main patterns of the theory are formed theoretical constructions that allow us to understand social realities; functions performed by individual individuals and social institutions as a whole, based on social norms and values, mental traditions; the relationship between statics and dynamics, which is reflected in the transformations of the social system and the social structure of the system. Structural functionalism made it possible to identify and consider the peculiarities of the application of the encapsulated approach proposed by the authors to the digitization of business processes of the enterprise and to predict consumer behavior in the market of digital goods and services. The substantiation and detection of transformational changes in the structure and functions of society allow timely correction of the strength, the fullness of flows, and the degree of their digitization and automation in the proposed approach. Adjustment should considering the possibility of adaptation to the external environment, the presence of a goal, and the degree of coordination of all elements of the system while preserving the values of society. Thus, the effectiveness of the approach depends on considering the social environment and its key characteristics. (Parsons, 1961).

**1.2 M. Porter's theory of competitive advantages** was created in the early 90s of the 20th century and determined the following components of successful management of business processes: classical theories are not able to characterize modern competitive advantages; revolutionary changes in technology will be the key to a successful business; the emergence of newly industrialized countries will lead to a revision of the markets of goods and services; expanding the internationalization of production will accelerate globalization processes.

In his book "International Competition", M. Porter claims that the latest technologies force businesses to compete more fiercely on the global market, to develop global strategies (Porter, 1990). Thus, according to M. Porter, competitiveness determines success or failure in specific industries and the place a country occupies in the world economy, and national competitiveness is determined by the ability of the industry to constantly develop and produce innovations. First, national companies achieve a competitive advantage by changing the space in which they compete. The constant improvement of the product, the method of production, and the principles of trade allow them to maintain their advantage, and quickly so that competitors cannot catch up and overtake them.

At the heart of the explanation of competitive advantage lies the role of the country in stimulating updates and improvements (that is, in stimulating the production of innovations). Thus, it turns out that the process of creating and maintaining competitiveness is extremely localized. His theory is based on the four most significant factors that can be represented in the form of a rhombus (the national rhombus, as the author called it) and which are determinants of competitive advantages. A country has a competitive advantage only when it actively implements the latest technologies and stimulates business innovation.

**1.3. General theory of systems.** The founder of the theory is Ludwig von Bertalanffy (Ludwig von Bertalanffy, 1950), who developed general principles, isomorphisms, and structural characteristics of general and theoretical models that are unified and can be applied in various fields of science with the possibility of creating interdisciplinary machine-human, machine-machine, open system models in engineering and practice.

Large and medium-sized businesses, one way or another, regularly face certain problems in their activities, the breadth, and interrelationship of which require a complex approach to their solution. This necessitates the development of a complex of methods capable of optimizing the processes of effective planning and implementation of innovative technologies, with the aim of adequate management. To solve their problems, they must use a systemic approach and a systemic paradigm. Therefore, in each specific situation, it is necessary to considering the social prerequisites of local optimization of activities and determine specific limitations of further development. Thus, the general theory of systems development in our work made it possible to determine a set of criteria necessary for conducting the modeling procedure.

**4. Innovation theory.** J. A. Schumpeter introduced innovation as an economic category that, in conditions of cyclicity and dynamic technology competition, determines the main impetus for the development of an enterprise. In contrast to the static analysis developed by representatives of the neoclassical scientific school, Y.A. Schumpeter became the founder of the theory of innovation, substantiating its main provisions. In particular, he described five key cases of innovation:

– the introduction of either a new product, unknown to consumers or a new type of product (consumer novelty);

- use of a new production method;

- the opening of a new market where this branch of industry has not been represented before;

- the discovery of a new source of raw materials;

– the use of a new organizational structure in any branch of industry (Schumpeter, 1939).

Y. A. Schumpeter's theory of innovative development makes it possible to consider the economy as a specific system of combinations of production factors and resources, each of which has an exceptionally unique way of connecting productive forces, thanks to which a new product is created. Thus, this concept allows considering innovative activity in the economy exclusively as a means of obtaining excess profits and minimizing costs.

**5. Technology "Process mining"** is the realization of the achievements of information and communication technologies, which allows analyzing business processes based on accumulated data. A technology construct aimed at improving operational business processes, which is facilitated by the permanent process of forecasting and building various scenarios of future consumer behavior and indicators of the efficiency and productivity of the enterprise's business processes. Intelligent digital tools for managing business processes provide an opportunity to collect and analyze the results of their implementation and generate new ideas, taking into account the previous pool of knowledge and data, taking into account risks, and controlling changes. Thus, the technology allows us to react in real-time to problems that should potentially arise, to avoid fatal consequences. Visualization and analysis of business processes are based on information systems research. The degree of automation and intellectualization of business processes allows the "Process mining" technology to provide a realistic and timely picture (Wang et al., 2021).

The authors used this technology as a tool for improving the enterprise's business processes regarding formalization, automation, and intellectualization.

The methodological basis of our article can be divided into two blocks:

– an analytical block that allows you to establish clear ratios of system components, depicting the fundamental bases for analyzing the characteristics inherent in business processes; comparative analysis of indicators of comprehensive diagnostics of the effectiveness of digitalization of enterprises;

– expert-diagnostic unit, which includes the application of modeling methods, involving a comparative analysis of short-term, medium-term financial, and economic indicators of enterprises.

## **2 JUSTIFICATION OF THE SYSTEM OF INDICATORS OF COMPREHENSIVE DIAGNOSTICS OF THE EFFICIENCY OF DIGITALIZATION OF TELECOMMUNICATIONS ENTERPRISES**

### **2.1 Encapsulated approach to digitalization of business processes using "Process mining" technology**

In our opinion, the most complete analysis of the effectiveness of management of business processes and flows is possible under the condition of applying an encapsulated approach, which is focused on a comprehensive study of the set of factors of the forecast field, focusing on the efficiency and adequacy of management, which allows finding a way to overcome the problem of suboptimization, which is a significant obstacle not only in achieving the efficiency of the enterprise but also in the effectiveness of the activity (fulfillment of the assigned tasks). The encapsulated approach to the digitization of business processes provides the possibility of systematic and effective monitoring of the entire chain of economic diagnostics, both of each link (sphere) of activity, and the entire process of business organization.

The first industry to apply a capsule approach to business process management using collaboration methods was the light industry – in particular, the fashion industry, where brand collaborations were created for the first time, which took the form of industry collaboration and involved scientists and the field of scientific research and discovery. At the same time, brand managers created basic wardrobe models with the possibility of mixing them.

The IT industry, in which collaboration between vendors and startups is taking place, deserves special attention. The main difference of the encapsulated approach to the digitization of business processes is a comprehensive study of all the flow of business processes of the enterprise, namely the coordination of the system of indicators and technologies of digitalization, which vary and adapt to the requirements of the development of society, economy and innovation.

Considering the business process in the conditions of the digital economy in the form of an artificially constructed virtual capsule, built from the components necessary to ensure maximum efficiency, adequate management, and optimal distribution of financial flows, with the ultimate goal of obtaining surplus profits, it is necessary to consider the features of digitalization of flow processes.

The encapsulated approach to the digitization of business processes is an approach to the organization of the economic activity of the enterprise, based on a systematic analysis of the combination of all flow processes with the help of digitalization indicators and technologies to increase the socio-economic efficiency of activities and forecast further development. This approach is implemented through a set of holistically oriented research principles and methods. The main principles of the encapsulated approach to the digitalization of business processes proposed by the authors are systematicity, goal orientation, and efficiency. At the same time, research methods are comparative-analogous, data extrapolation, and modeling.

In our opinion, the key characteristics of the essence of business processes in the conditions of the digital economy, which require regular forecasting using mathematical modeling methods, are the following:

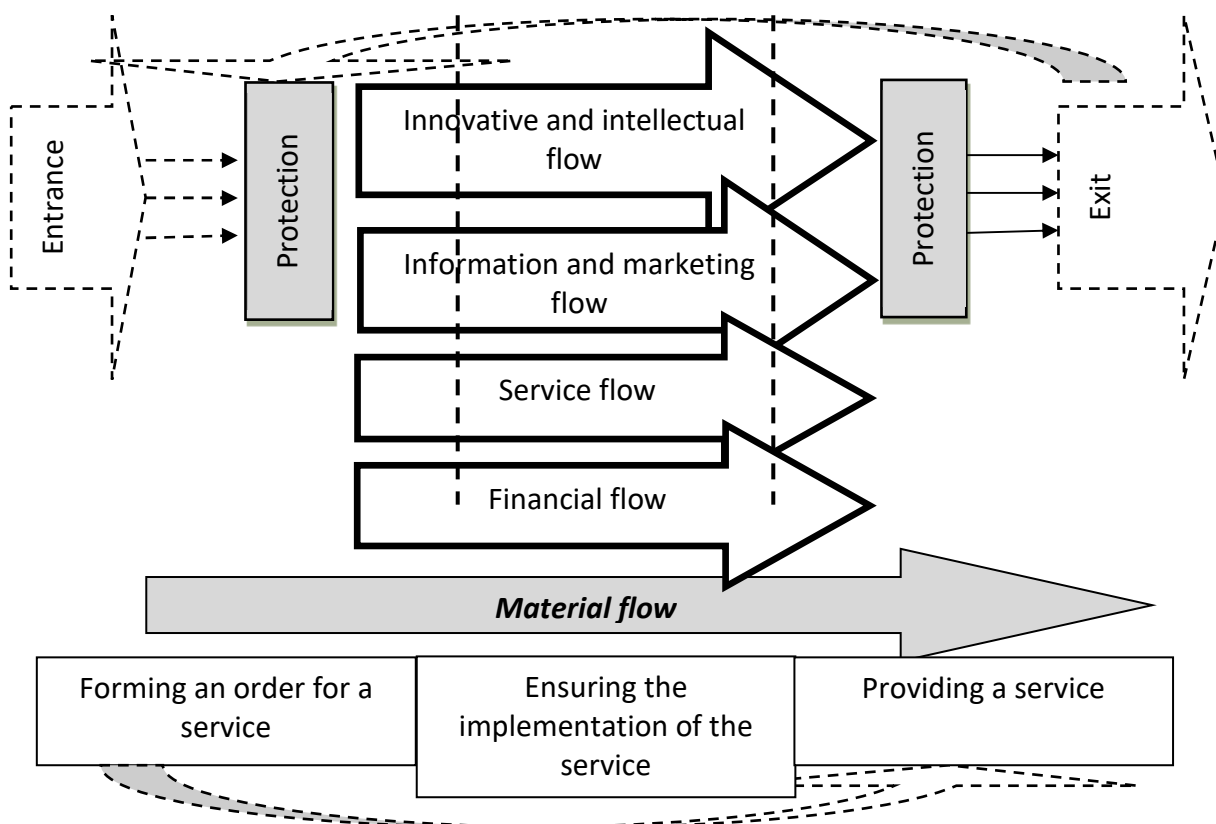
- business processes that form added value (consumer value) are the ultimate goal of business activity;
- the interdependence and interconnection of all business processes at the enterprise to achieve certain goals, which ultimately affects the performance of the entire organization, and the degree of dependence between business processes can be measured using the correlation of the value added indicator of the investigated process and the process that precedes it;
- the effective collaboration of material flows with innovative intellectual, information-marketing, financial, and service provision of them;
- the decomposition of business processes reveals their functional purpose and plays a leading role in the formation of added value (consumer value) since each of them is performed by a certain goal, the achievement of which (qualitatively and quantitatively) in the aggregate allows to achieve the desired result;
- a system of criteria and approaches to the study of the results of the execution of business processes in numerical terms;
- discreteness of business processes (the presence of a beginning - "input" and an end - "exit") considering the possibilities of organizational resources, which should be understood as material, human, intellectual, informational, financial, and other;
- the creation of end-to-end tasks in the system of digital chains based on the Spatio-temporal sequence of execution of flow processes in each link of these chains;

the effectiveness of "final" business processes in the form of goods or services that have sufficient consumer value to satisfy the needs of customers, and sufficient added value to ensure the profitable operation of the enterprise;

- continuity of business processes, which involves project and forecasting activities that must be repeated periodically;
- added value is the result of a skillful combination of resources in the enterprise's business processes and flow management;
- achievement of the synergy effect, thanks to which there is an increase in consumer value, which is not possible when the business process and flow management function separately from each other;
- combinatoriality of a set of indicators of the formation and economic direction of the development of each stream in the system of organization of the enterprise's activities to achieve the set goal;
- the possibility of choosing digitalization methods and tools for solving optimization problems based on a system-complex approach to the development of models and algorithms for the formation of flow processes and adaptation of the management system to market requirements (Roshchektaev, Roshchektaeva, 2020).

Thus, the effectiveness of business processes in the digital society is directly related to the algorithm for its achievement, which can be defined as a business procedure specific to each business model. The lack of a close connection between the business processes performed and the business model destroys the bridge between added value (the result of production, marketing, etc.) and its assessment by consumers (consumer value). Therefore, the level of efficiency of the enterprise is directly dependent on the degree of integration of business processes and the business model by improving the business procedure in the creation which the author proposes to implement based on the encapsulated approach (Figure. 1).

Figure 1 - The concept of an encapsulated approach to the digitalization of business processes of telecommunications enterprises



Source: developed by the authors



Digitization of flow processes at the enterprise forms an information-automatic process-by-process system consisting of information infrastructure (information and technology) and information-automatic support (means of obtaining processing, storage, and transmission of information – information and communication resources).

Information and communication resources are a complex of software and hardware, network, telematics, organizational solutions, and tools for transmitting, receiving, processing, and consuming information in combination with data and knowledge formalized in the form of documents and models of business processes. With this approach to the digitalization of business processes of telecommunications enterprises, the operational information used to make relevant management and organizational economic decisions is a product of high information technologies (Data Mining), which are characterized by high knowledge and complexity of implementation. The results of information monitoring are obtained based on intellectual analysis of operational reporting and forecast data. It is advisable to organize the construction of digitalization of business processes based on a process-based system approach – "Process mining".

Thus, the application of the "Process mining" technology in the economic activity of the enterprise allows you to manage business efficiency based on the analysis of flow processes in real-time, focusing resources in the right place at the right time, as well as promptly responding to changes in the competitive environment. Therefore, the modern digitalization of business processes of enterprises should be built based on the model of the system of indicators of the organization of complex diagnostics of activity efficiency.

## **2.2 Comprehensive diagnosis of flow management efficiency at telecommunications enterprises of Ukraine in conditions of digitalization**

For companies in the service sector, in particular, in the field of telecommunications, the efficiency of the material flow is very important, from the formation of the order, ensuring the implementation of the service, to the direct provision of the service to the consumer. The main indicators that can depict and characterize the material flow from the economic and managerial aspects are indicators of the efficiency of receiving and processing orders, the efficiency of order fulfillment, the efficiency of equipment use, the level of mono-concentration, the level of providing the necessary equipment based on a digital strategic partnership with its subsequent effective implementation (Figure 2).

The digital strategic partnership involves the unification of interaction parties (enterprises) to achieve a certain strategic goal, in particular, increasing the efficiency of activities, which involves the creation of a common system of value and processes based on the use of resources and competencies of partners on the basis of the creation of a single digital platform of business organization (Klymenko et al., 2021).

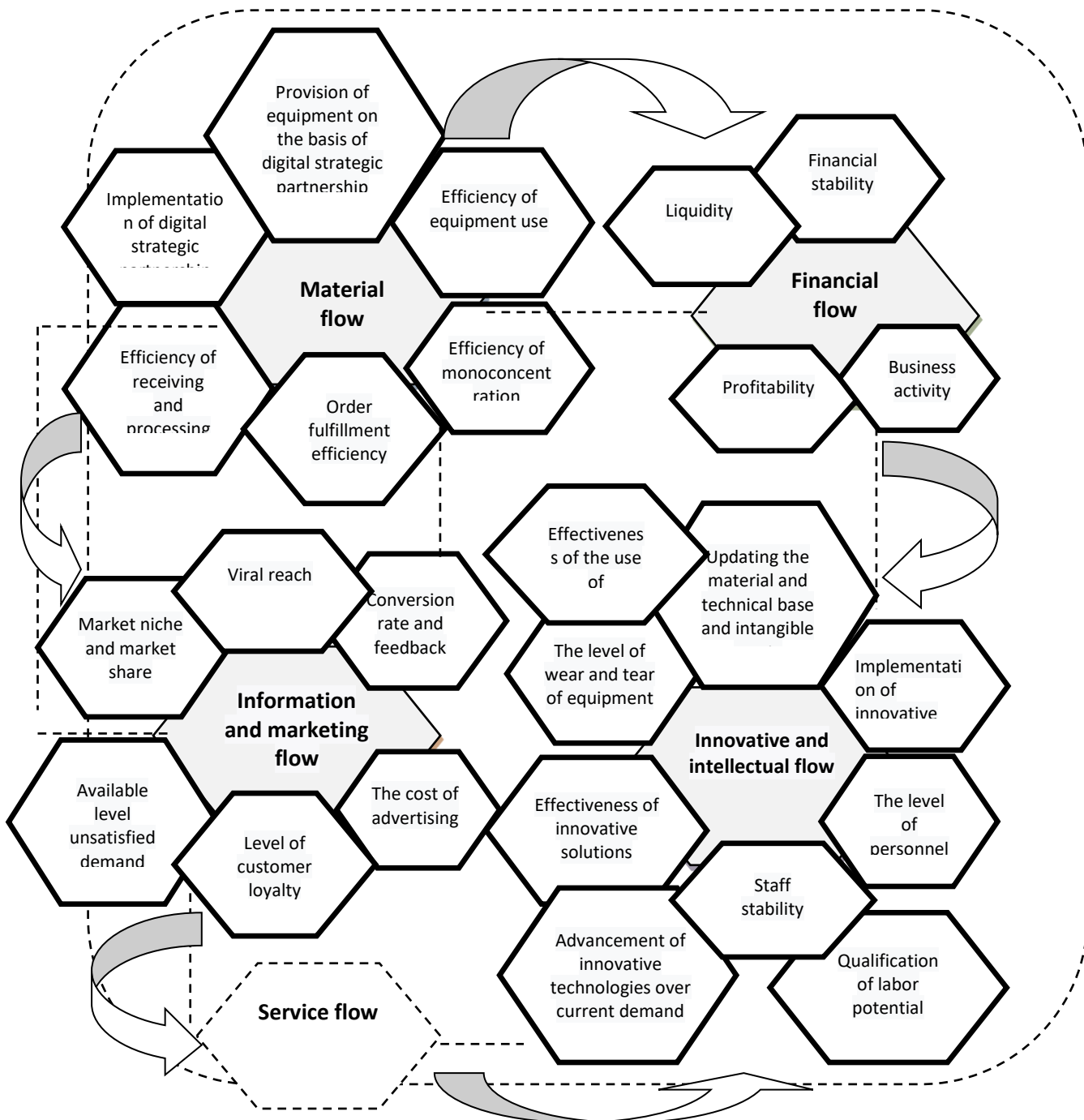
For telecommunications enterprises, the construction of a single digital platform can be organized on the basis of the creation of a single digital network of associations, namely, the targeted use of partners' equipment, the construction of a single site, an organizational and economic system of budgeting, accounting, diagnostics and management at enterprises. In the conditions of the digital economy, the strategic partnership enables businesses to gain a competitive advantage by obtaining a single open information network access to partners' resources, including markets, technologies, capital, and human resources (Khusainov et al., 2005).

In the conditions of digitalization, it is necessary to use the internal potential as efficiently as possible to ensure the efficiency of operations and create a competitive product for enterprises. The development of the business environment in the 21st century under the conditions of dynamic changes in the relevance of the use of technologies and resources dictates the need for participants in all economic sectors to constantly monitor, review and transform management approaches and mechanisms to ensure effective development. For enterprises in the service sector, the innovative and intellectual component is a source of gaining competitive advantages in economic activity. At telecommunications enterprises, the main indicators that can be used as indicators of the effectiveness of business processes are the level of wear and tear of equipment, the renewal of the material and technical base and intangible assets, the introduction of innovative technologies, the advance of innovative technologies over the



current demand, the level of qualification of the labor potential, the efficiency of use qualified personnel, their skills and competencies, the level of personnel service and the stability of employment of personnel at the enterprise, socially adequate management.

Figure 2 - Capsule of indicators of comprehensive diagnostics of the effectiveness of digitalization of telecommunications enterprises



Source: developed by the authors

The main principle of the digitalization of business is the openness of information resources. It provides secure entry and exit of information, which provides enterprises with the ability to quickly respond to any market

fluctuations. Therefore, considering the indicators of the information and marketing flow is very important in the comprehensive diagnosis of the efficiency of the enterprise. Digital management of enterprises and business processes is associated with the use of numerous indicators and characteristics of information and marketing flows, namely: nomenclature of transmitted information data, data types, documents, arrays; intensity and speed of data transfer; special characteristics (bandwidth of information channels, protection against unauthorized access). In the conditions of digitalization, to ensure the efficiency of the activities of enterprises, there should be no isomorphism between the information and marketing flow and the material flow, that is, the information and marketing flow should precede the material flow.

The main modern indicators of monitoring the information and marketing flow in conditions of digitalization are quantitative and qualitative characteristics of the market niche and the specific weight of the enterprise's activity in comparison with competitors, the level of existing unsatisfied demand in the studied market, the level of loyalty, satisfaction, awareness of customers and consumers, the effectiveness of advertising costs, the level of objective conversion and feedback, the virality of reaching consumers. Ensuring an efficient use of financial resources is one of the key values for any offline or online business activity. It should be noted that financial resources are a source of the introduction of innovative technologies and mechanisms of activity and at the same time are indicators of the expediency of economic and managerial measures of doing business.

The main goal of managing the movement of financial flows of the enterprise is to ensure the optimization of their formation, which is achieved by ensuring the movement of all flow processes with financial resources in the necessary volumes, in the appropriate terms, using the most effective sources of financing. This is achieved by effective management of financial flow processes, namely by accelerating the circulation of the logistics cycle and smooth movement of financial flows in the enterprise; maximization of income of financial resources; ensuring the efficient movement of internal flows at the enterprise, and high-quality profit distribution. Indicators of financial stability, liquidity, business activity, and profitability are defined as the main indicators for comprehensive diagnostics of enterprises in global practice (Lyu, 2007).

A special place in the synchronization of material, innovation-intellectual, information-marketing, and financial flows belongs to the service flow. Since it is the level of service flow based on quality indicators that is an indicator of the stable and effective development of enterprises in the service sector. The effectiveness of service measures and the convenience of organizing the entire material flow serve as the basis of stable and productive relations not only with consumers but also with partners and competitors. Thus, a comprehensive diagnosis of the effectiveness of flow management in telecommunications enterprises of Ukraine in the conditions of digitalization is a key component of business modeling, the main goal of which is to optimize the management of business flows and obtain maximum profits with minimal costs.

### **2.3. Modeling of profitability trends in the dynamics of investment flows of telecommunications enterprises**

The focus of our research is four types of flows that have the same monetary dimension, namely material flow ( $X_1$ ), financial flow ( $X_2$ ), innovative and intellectual flow ( $X_3$ ) and informational and marketing flow ( $X_4$ ). If each of the four streams is considered separately as a function of time, then there are not enough numerical data to obtain the analytical dependence of each of them as a continuous function of time (Björk, 2019). Therefore, there is the task of carrying out a comparative analysis of the interdependence of the development of flows. To obtain a qualitative characteristic of the flow distribution system, it is necessary to build graphs of the interdependence of their possible increase.

Therefore, we built models of the formation of flow dependencies that affect the profit for the telecommunications enterprise PJSC Vodafone for the period 2018-2021, which is shown in Fig. 3-4. The dynamics of the formation of PJSC Vodafone flows are given in Table 1.

**Table 1 - The dynamics of the formation of streams of PJSC Vodafone**

Indicators	2018, m=0	1st semester 2019, m=1	2nd semester 2019, m=2	1st semester 2020, m=3	2nd semester 2020, m=4	1st semester 2021, m=5
Material flow ( $X_1^m$ ), UAH	12531000	6869000	8069000	8076000	9126000	93111000
Financial flow ( $X_2^m$ ), UAH	25028061	24242000	24990035	37628000	37789650	37710000
Innovative and intellectual flow ( $X_3^m$ ), UAH	20969160	20533000	21895192	33163000	21566209	20570000
Information and marketing flow ( $X_4^m$ ), UAH	1532189	195000	1973225	187000	1834497	233000
Total amount of flows	61807623	52765000	58540764	79322000	71249678	153725000
Initial profit ( $V_i^m$ ), UAH	1747213	926000	1613312	268000	933322	2101000
Net profit share, $\alpha^m$	-	0,02	0,03	0,003	0,01	0,01

Therefore, it is advisable to consider in more detail the interdependence of the increase in flows not only in annual terms but also in the most unprofitable risk period for the enterprise – the first half of the year.

Indicative values for the construction of flow interconnection models are the amounts of investments in the studied flow business processes. The input values are the corresponding indicators of the dynamics of earnings in 2018-2021. Herewith:

$X_1^m$  - Material flow, UAH

$X_2^m$  - Financial flow, UAH

$X_3^m$  - Innovative-intellectual flow, UAH

$X_4^m$  - Information and marketing flow, UAH

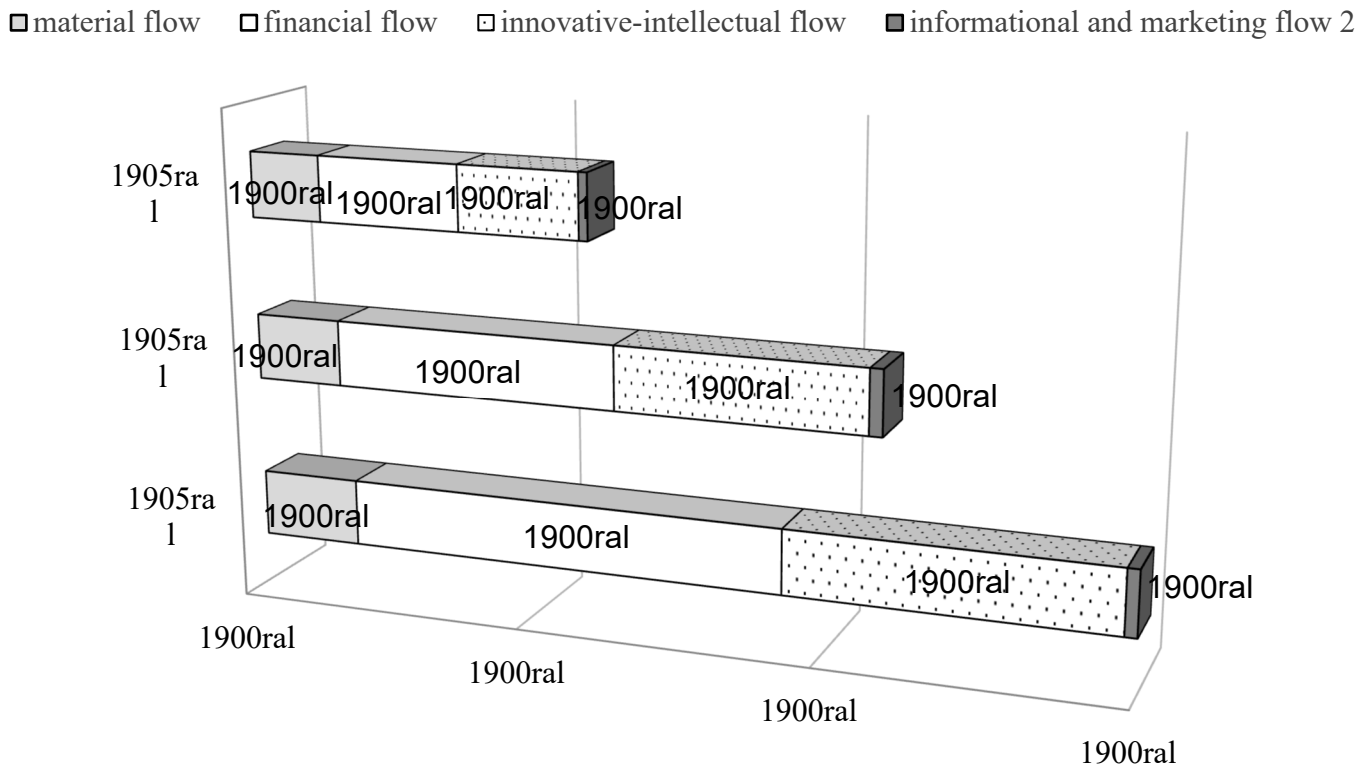
The data presented in Table 1 demonstrate the dynamics of the formation of flows over six months, which makes it possible to understand the most critical periods (the first half of the year) and the most favorable periods for financial income (the second half of the year). Such an imbalance is explained by the following factors:

Firstly, VAT refunds usually occur in the second half of the year.

Secondly, all tax obligations of the enterprise must be paid to the budget in the first half of the year, which affects the decrease in financial flows in this period.

Thirdly, most of the payments on counterparties' receivables are reimbursed in the second half of the year.

Figure 3 - The general dynamics of the formation of flows in the telecommunications company PJSC "Vodafone" for 2018-2020, in quantitative indicators in million UAH.



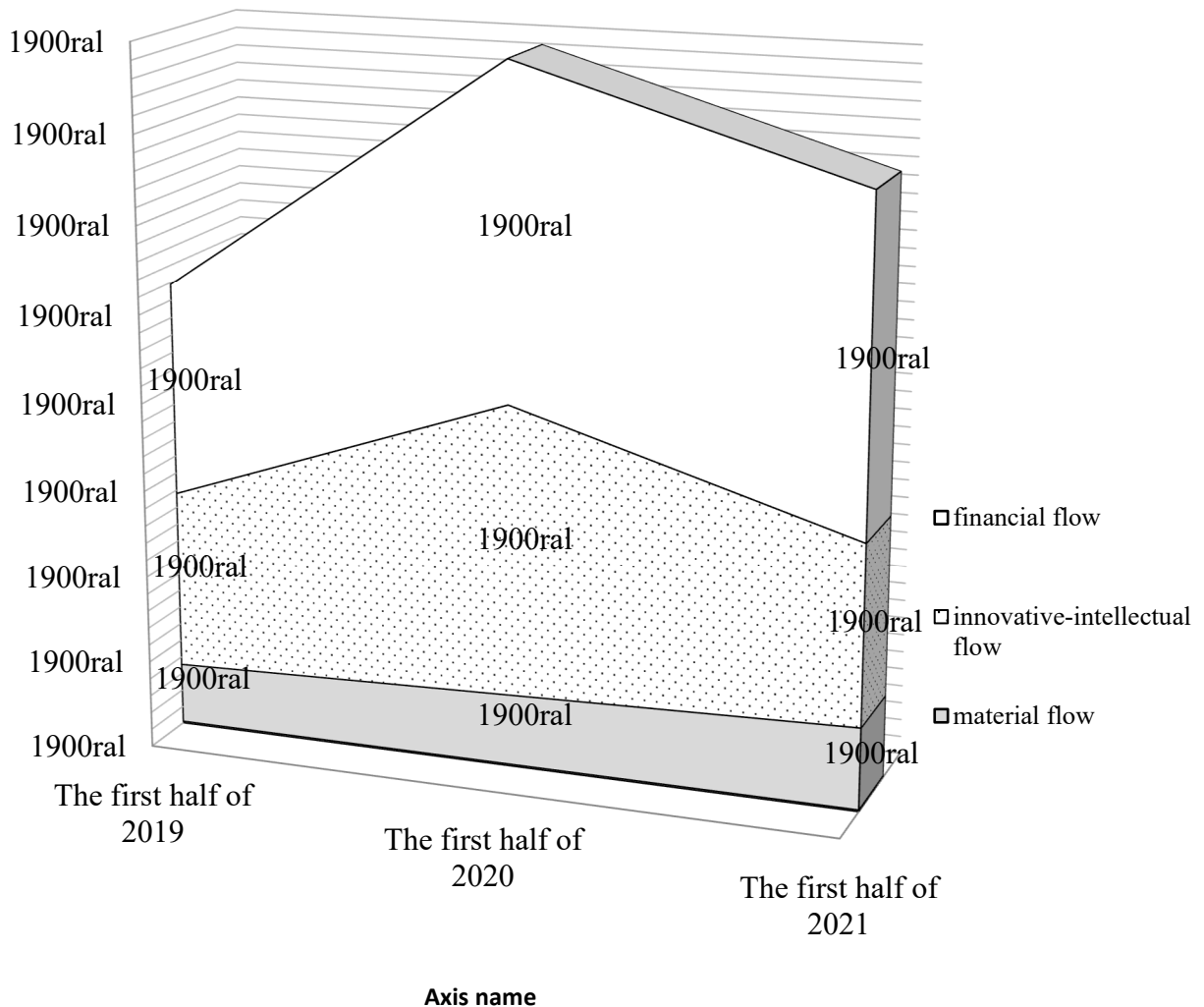
Source: Comparative analysis was carried out by the authors using statistical indicators of investments provided by PJSC Vodafone.

Source: Comparative analysis was carried out by the authors using statistical indicators of investments provided by PJSC Vodafone.

A comparative analysis of the formation of flows for the period 2018-2020 using the example of the telecommunications company PJSC "Vodafone" clearly demonstrated the interdependence of the increase in financial flows from investing in material and innovative-intellectual flow. In turn, it was found that the information and marketing flow is of minimal importance for increasing the profits of the telecommunications company. That is, in Ukrainian telecommunications enterprises of the economic sphere, information and marketing activities do not have a direct impact on increasing profits, since, in our opinion, the consumer makes his choice based on the experience of the traditional form of socio-economic interaction – "Price-Quality".

In section, the model of stream growth in the first half of the year may have the following form (Figure. 4).

**Figure 4 - Comparative analysis of the dynamics of the formation of flows in the telecommunications company PJSC "Vodafone" for the first half of 2019-2021, in quantitative indicators in million UAH.**



Source: Comparative analysis was carried out by the authors using statistical indicators of investments provided by PJSC Vodafone)

Thus, the peaks of excess profits of the telecommunications company PJSC "Vodafone" for the first half of 2020, due to the outbreak of the COVID-19 pandemic, which significantly increased the demand for quality telecommunications services in Ukrainian society. The forced restriction of social interaction forced society to move to live in the virtual world, simultaneously transferring all communications to online platforms, and thus actualizing the issue of obtaining mobile communication services in access to the Internet. At the same time, these social needs provoked an increase in the profits of telecommunications companies by increasing the number of consumers and the time of receiving services.

## CONCLUSION

A detailed study of the key streams of business processes of enterprises in the telecommunications industry identified by the authors was carried out: material, innovative-intellectual, information-marketing, and financial, which made it possible to reveal the dependence of management efficiency and the achievement of a positive result on the synchronization of flows with the possible assumption of temporary variation in the dynamics of one or

another investment flow The constructed model for calculating profitability with the dynamics of investment flows was tested using the data of the telecommunications company PrJSC Vodafone for the period from 2018 to 2021, which made it possible to single out the most influential flows by year and reveal the pattern of changes in leadership depending on the influence of external environmental factors and the internal conditions of the organization of the enterprise. Mathematical modeling made it possible to determine the dominant flows, which turned out to be financial and innovative-intellectual, which emphasizes the need for systematic balanced management of the enterprise's business processes depending on the changing external environment.

As a result of the research, the authors proved that the selected theoretical constructions: the process approach of quality management, the general theory of systems, the theory of competitive advantages and innovations, as well as the analysis of the "Process mining" technology allow to represent digital business processes as a general complex system that can effectively manage using modern digital technologies.

The process of global digitalization, which modern society is experiencing, requires flexible management of business processes, changes in business models, and timely decision-making with the help of the use of modern information technologies, in particular, "Process mining". In this regard, the authors proposed a capsule approach to the digitalization of business processes based on the flow of indicators, which provide a platform for analyzing current conditions and allow for adjusting the management of the enterprise's business processes to achieve maximum efficiency.

Considering the scientific value of the conducted study of the peculiarities of managing the business processes of the enterprise in the conditions of digitalization, using the achievements of theoretical and practical science, the prerequisites for the effective management of the business processes of the enterprise in the conditions of digitalization have been established, which allows us to assert the possible breakthrough development of the enterprise.

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