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STADNYK Valentyna

Khmelnytskyi National University

<https://orcid.org/0000-0002-2095-3517>

e-mail: stadnyk_v_v@ukr.net

YOKHNA Vitaliy

Khmelnytskyi National University

<https://orcid.org/0000-0002-0109-7935>

e-mail: vyokhna@gmail.com

NASKALNYI Serhiy

Khmelnytskyi National University

<https://orcid.org/0009-0009-4958-0636>

e-mail: Ns.armax@gmail.com

CHELIY Taras

Khmelnytskyi National University

FORMATION OF AN INTEGRATED MANAGEMENT INFORMATION SYSTEM FOR INNOVATION-ORIENTED ENTERPRISES ON THE BASIS OF MARKETING MANAGEMENT

The purpose of the article is to establish scientific and methodological foundations for building an integrated system of information support for the management of production enterprises operating in markets with high dynamics of consumer needs and which must be innovation-oriented. The paper addresses the issue of increasing the efficiency and competitiveness of domestic industrial enterprises in conditions of high variability of consumer markets. Attention is drawn to the fact that the key factor for solving this problem is a management information support system relevant to the strategic development goals, which allows increasing the productivity of managerial work and the validity of decisions. The advantages and disadvantages of existing scientific and methodological approaches to information support for management activities (systemic, process, resource, innovation and socio-economic) and information technologies designed to support the adoption of management decisions in various functional areas of management are analysed and systematized. The importance of correlating the functional capabilities of the information support of the management system with the value of individual structural elements of business processes to maintain the overall competitiveness of the enterprise is emphasized. Given that in the conditions of high variability of modern consumer markets, such elements are innovation management, a model of information support for the activities of an innovation-oriented industrial enterprise has been developed. The emphasis is on the leading role of the marketing function, which integrates key information blocks of functional subsystems into a single whole, thereby forming a common information space for making and implementing strategic decisions in terms of the strategic goals of the innovative development of the enterprise. The developed scientific and methodological approach corresponds to the principles of value-oriented management and is based on the advantages of the marketing function in working with arrays of information about the state of the market and requests of target consumer groups. It has a universal nature and practical significance for increasing the efficiency of the processes of digitalization of domestic business structures.

Keywords: marketing-management, functional integration, customer value, business process, productivity, value-based management, innovation.

СТАДНИК Валентина, ЙОХНА Віталій, НАСКАЛЬНИЙ Сергій, ЧЕЛІЙ Тарас

Хмельницький національний університет

ФОРМУВАННЯ ІНТЕГРОВАНОЇ СИСТЕМИ ІНФОРМАЦІЙНОГО ЗАБЕЗПЕЧЕННЯ МЕНЕДЖМЕНТУ ІННОВАЦІЙНО-ОРІЄНТОВАНИХ ПІДПРИЄМСТВ НА ЗАСАДАХ МАРКЕТИНГ-МЕНЕДЖМЕНТУ

В роботі актуалізовано проблему підвищення ефективності і конкурентоспроможності вітчизняних промислових підприємств в умовах високої мінливості споживчих ринків. Акцентовано увагу на тому, що ключовим чинником для вирішення цієї проблеми є релевантна стратегічним цілям розвитку система інформаційного забезпечення маркетинг-менеджменту, яка дає змогу підвищувати продуктивність управлінської праці і обґрунтованість рішень. Проаналізовано і систематизовано переваги й недоліки існуючих науково-методичних підходів до інформаційного забезпечення управлінської діяльності (системного, процесного, ресурсного, інноваційного та соціально-економічного) та інформаційні технології, що призначені для підтримки ухвалення управлінських рішень в різних функціональних сферах менеджменту. Підкреслено важливість співвіднесення функціональних можливостей інформаційного забезпечення системи менеджменту із цінністю окремих структурних елементів бізнес-процесів для підтримання загальної конкурентоспроможності підприємства. З огляду на те, що в умовах високої мінливості сучасних споживчих ринків такими елементами є управління інноваціями, розробили модель інформаційного забезпечення діяльності інноваційно-орієнтованого промислового підприємства. Акцентовано на провідній ролі функції маркетингу, яка інтегрує ключові інформаційні блоки функціональних підсистем у єдине ціле, формуючи тим самим спільний інформаційний простір для ухвалення і реалізації стратегічних рішень в розрізі стратегічних цілей інноваційного розвитку підприємства. Розроблений науково-методичний підхід відповідає принципам ціннісно-орієнтованого управління та опирається на переваги функції маркетингового у роботі з масивами інформації про стан ринку і запити цільових груп споживачів. Він має універсальний характер і практичне значення для підвищення ефективності процесів діджиталізації вітчизняних підприємницьких структур.

Ключові слова: операційна діяльність, функціональна інтеграція, споживча цінність, бізнес-процес, продуктивність, ціннісно-орієнтоване управління, інновації.

GENERAL STATEMENT OF THE PROBLEM AND HOW IT RELATES TO IMPORTANT SCIENTIFIC OR PRACTICAL ISSUES

The difficulties caused by the war have made adjustments to the volumes and methods of consumption of many goods and services in Ukraine, which brings to the forefront among the priority tasks of management the issue of ensuring business flexibility - both in terms of identifying changes in the requests and requirements of target consumer groups, and in terms of quickly reformatting the operational activities of the enterprise for new tasks, taking into account the identified changes. Both types of tasks are those that require operational work with information - for a timely response to new circumstances. This makes it possible to both minimize the risks caused by the development of events on the market that are unfavourable for the enterprise, and to use favourable opportunities for rapid business development as effectively as possible.

Therefore, effective information support for the management of economic activities is a key factor in maintaining the competitiveness of modern enterprises operating in conditions of dynamic market changes. And this is of particular importance for the business sector, which can be successful precisely thanks to the ability to use information asymmetry.

ANALYSIS OF RECENT RESEARCH AND PUBLICATIONS

Analysis of recent research and publications on the development and improvement of the efficiency of the business sector of Ukraine in conditions of high security risks shows that digitalization occupies one of the leading places in them [1-7]. And there is logic in this - after all, modern developments in the field of IT are able to significantly increase the efficiency of business processes, improving not only interaction with consumers, but also the architecture of business models itself [1; 3; 4]. Information technologies increase the possibilities of outsourcing part of production and sales processes, thanks to which the business can diversify its structural forms, implementing various integration concepts [5; 6]. This improves the company's ability to attract the necessary types of highly specific resources into existing value chains, which are often key to the formation of competitive innovations and the achievement of sustainable competitive advantages by the enterprise [2; 5; 7].

Information is a necessary component of any production activity, which in its significance is increasingly equated with various kinds of physical resources [6; 8]. However, to achieve the maximum beneficial effect from the use of modern information technologies in the management of the activities of the enterprise (in the form of software specialized for certain tasks), they must take into account the features of the formation of competitive advantages in a specific type of business or in specific scenarios of its development. The importance of achieving compliance of information technologies with the specifics of creating consumer values in specific business models determines the relevance of this study, determines its goal and objectives.

FORMULATING THE ARTICLE'S OBJECTIVES

The goal of the study is the formation of scientific and methodological foundations for building an integrated system of information support for the management of the activities of manufacturing enterprises operating in markets with high dynamics of consumer needs and must be innovation-oriented.

THE MAIN MATERIAL STATEMENT

The issue of improving the information support of economic activity is currently becoming increasingly relevant - due to the growing volume of information, which every minute saturates the information space with new messages. Weeding out irrelevant information, selecting important information, assessing its reliability, systematizing it in a form convenient for analysis, making forecasts for the development of the situation in the continuum of possible scenarios - all this is extremely necessary for the prompt adoption of sound decisions and getting ahead of competitors in a strategic perspective. At the same time, in the internal environment of the enterprise, modern information technologies (in particular, automation of routine management processes, support for decisions through specialized software products) make it possible to optimize business processes, reduce costs and shorten the time for performing operations, improve control over the quality of work, ensure speed, transparency and relevance of interaction between structural divisions of the enterprise. All this forms a growing demand for modern business for digital technologies that can improve business process management and increase the competitiveness of enterprises. In response to these business requests, the IT sector develops new products that are quickly implemented, increasing the flexibility of enterprises and increasing their ability to improve their capabilities to meet consumer demands and increase their contribution to GDP creation. And every year the contribution of digitalized enterprises to global GDP is growing, reaching more than half of it in 2023 (Fig. 1, cited in [9]).

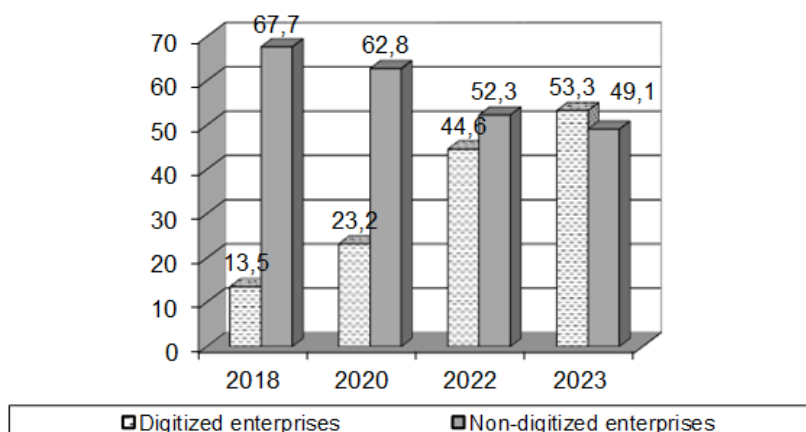


Fig. 1. Ratio of the contribution of digitized and non-digitized enterprises to the formation of global GDP, trillion USD

Source: constructed by [9]

Digitalization now covers all areas of economic activity, since working with information is an integral part of managing all processes of creating consumer values. However, it is of greatest benefit to those enterprises that form the information support of the management system taking into account the specific tasks of the business - in order to strengthen the ability of the enterprise to form competitive advantages in the key components of consumer value for a given type of business. And this depends on the information support of managing all operations for creating consumer values and their positioning in the market.

Information support of economic activity covers information flows within the organizational space (internal reports, analytics, document management) and external information flows (data about the market, suppliers, customers, competitors). Information support for the management of the operational activities of the enterprise should allow to operate with information about internal processes that accompany the creation of consumer values within the enterprise (technological regulations, production stocks, costs, analytical reports, key performance indicators, contracts, accounting statements, etc.), and information about work with other market participants – resource suppliers, consumers, contractors (volumes of supply, performance of work, sales, terms of cooperation, etc.). That is, for effective management of the economic activities of the enterprise, its information support should satisfy the information needs of all participants and contain blocks of information for strategic choices and operational management. These are the reasons to consider information support for management as a continuous process of accumulation and systematization of primary information and its subsequent analysis in the context of the tasks of each participant in the management hierarchy, as well as constant updating of the database. The functional interconnectedness of the management process requires an effective communication process between participants – to exchange information about the work performed, evaluate its results, coordinate and plan further actions and work. Information exchange should take place on the principle of "exactly as intended and in a timely manner" – for this, appropriate methods of building a database should be used and access to it should be provided to participants according to their place in the process of creating consumer values.

Analysis of scientific literature on business digitalization provides grounds for identifying a number of advantages related specifically to information support for operational activities [4; 8; 10]. In particular:

- automation of routine operations (accounting, resource allocation);
- reduction of information processing time;
- provision of relevant and more accurate data for analysis;
- control of operating costs and volumes of work performed;
- monitoring of the efficiency of employees and departments;
- provision of a single information space;
- elimination of duplication of work through the integration of information systems.

As can be seen from this list, we are talking about different management tasks - in the context of working with different types of resources (material, human, financial). Each task has its own specifics, which affect the structure of competitive advantages. Taking into account these advantages in building business processes and managing them, an information support system for managing the operational activities of an enterprise should be created.

Different scientists offer their approaches to building information support systems. Among them are: system, process, resource, innovation and socio-economic approaches.

In the system approach, information management support is considered as an integrated system that combines all information flows of the enterprise; as a complex of interdependent elements that form the information space of the organization, ensuring the interaction of structural units to achieve management goals [4]. Special

attention is paid to the transparency of the interaction of system elements and their ability to provide all information needs of the enterprise. In practice, this approach is implemented in the implementation of ERP systems [8] (for example, SAP or 1C), which integrate the financial, production and logistics processes of the enterprise.

In the system approach, information management support is considered as an integrated system that unites all information flows of the enterprise; as a complex of interdependent elements that form the information space of the organization, ensuring the interaction of structural units to achieve management goals [4]. Special attention is paid to the transparency of the interaction of system elements and their ability to provide all information needs of the enterprise. In practice, this approach is implemented when implementing ERP systems [8] (for example, SAP or 1C), which integrate the financial, production and logistics processes of the enterprise.

Within the process approach, information management support is a set of means to support the effective management of individual components of business processes through automation and the implementation of information technologies. Information support within the process approach is a key tool for achieving the efficiency of operational processes, in particular through the implementation of CRM and SCM systems [11; 12]. The process approach is used in warehouse operations management, where WMS systems automate inventory control and supply.

The resource approach gives information technology the status of a strategic resource of the enterprise, necessary for the effective performance of management functions. To ensure this efficiency, methods of data accumulation, processing and use are analysed and optimized - this allows you to increase the productivity of management activities and the performance of routine operations in the structure of the enterprise's business processes. This approach is used when implementing cloud solutions (Cloud Storage), which store and provide access to corporate data in real time. As noted by domestic researchers, the transition to cloud services will allow enterprises to significantly reduce the costs of maintaining their own staff of IT specialists and engineers, and reduce dependence on IT equipment suppliers [13].

The innovative approach to building a management information system focuses on the implementation of the latest information technologies to meet the information needs of the enterprise in key areas of its activity. The emphasis is on the use of artificial intelligence, big data, blockchain and analytical tools, the implementation of BI systems (for example, Tableau, Power BI), which analyse large amounts of data and provide managers with forecasts for making strategic decisions. In addition, they allow you to track the achievement of key performance indicators (KPI) at all levels of management. This helps to reduce the risk of errors and respond promptly to deviations from the plan [14].

Large enterprises are increasingly using a socio-economic approach, when information technologies are considered in the context of working with personnel - as tools for increasing labor productivity and improving the working conditions of personnel. Effective information support reduces the information load on personnel and improves the quality of performing operational tasks. This approach is used in personnel management through HRM systems that automate the processes of recruiting, training and evaluating employees. For example, BambooHR automates and monitors employee achievements and allows you to implement bonus systems based on KPI. This ensures objectivity and transparency of motivational systems [15]. Each of the approaches has its advantages and disadvantages, and the effectiveness of their use in the management system depends on how functionally they fit into the specifics of the enterprise's operational activities (Table 1).

Table 1

Advantages and disadvantages of various scientific approaches to implementing information systems

Approach	Advantages	Disadvantages
Systemic	Ensures the integration of all enterprise information flows into a single environment	Requires significant changes in the organizational structure of the enterprise
	Increases the efficiency of interaction between structural units	Requires a long period of personnel adaptation
	Reduces data duplication between departments and increases information accuracy	High complexity of implementation and maintenance
Process	Focused on optimizing specific business processes	May not take into account the relationships between individual processes
	Possibility of rapid implementation in specific departments	Difficult to scale at the enterprise level
Resource	The use of cloud technologies ensures real-time data availability	Dependence on cloud service providers and the risk of data confidentiality violation
	Reduces data storage costs by switching to cloud platforms	Requires a high level of information security
Innovative	Allows you to predict trends and make informed strategic decisions	High cost of implementing and supporting innovative solutions
	Provides quick access to analytics and automation of management decisions	Requires highly qualified specialists
Socio-economic	Focused on improving staff productivity	May not cover technical aspects of optimizing information flows
	Takes into account the human factor and the impact of information systems on employee motivation and quality of work	Focused more on staff than on business process integration

Source: systematized based on use [1; 8-15].

Information support for the management of the operational activities of an enterprise covers a number of functional components, each of which plays an important role in ensuring the efficiency of business processes. The functional components of management in information support are a set of basic management functions that are implemented using information systems and technologies for the effective management of the operational activities of an enterprise [3]. They cover the processes of collecting, processing, analysing and transmitting information necessary for decision-making from various functional subsystems of management – strategic, innovation management, personnel, marketing communications, financial flows, etc.

In particular, for effective planning of activities it is important to provide management with the necessary information for the formation of strategic, tactical and operational plans. Analytical modules of ERP systems based on artificial intelligence (for example, SAP HANA) generate forecasts and recommendations based on the analysis of big data, which is necessary for the preparation of production and financial plans. The integration of artificial intelligence into information systems increases the accuracy and validity of such decisions [16]. At the same time, in a favourable market situation, it is possible to expand the data set for analysis, taking into account not only the real resources of the enterprise, but also the possibilities of their additional involvement through outsourcing (integration with partners).

Integrated information systems are becoming increasingly widespread, which ensure the coordination of all divisions of the enterprise by combining data in the context of business processes. In particular, the use of corporate portals (for example, CREATIO) helps to simplify communications between departments, organize document flow, and manage current activities in the field of interaction with customers. CREATIO combines the capabilities of a customer relationship management system (CRM) and a business process management system (BPM) using no-code technologies.

In general, in conditions of highly dynamic markets, it is integrated information systems that act as a critically important resource for increasing the adaptability of enterprises, transforming them into innovatively active (innovatively oriented). Due to the interconnectedness of information flows operated by managers of functional management services, there is no need to form additional coordination mechanisms when justifying management decisions (Table 2). This means that the speed of their adoption increases, which is an important factor in the proactivity of the enterprise and often serves as a key advantage in competitive races.

Table 2

Functionalities of information support of the integrated management system of an innovation-oriented enterprise

Functional management subsystems	Information purpose of the functionality
Marketing subsystem	- analysis of the market situation and requests of target consumer groups - influence on consumer perception of the enterprise's value propositions and their choice
Innovation management subsystem	- analysis of market offers of innovations - analysis of the enterprise's resource and technological capabilities - analysis of the resource and technological potential of partners in the technological chain - technological audit of the enterprise's production system
Financial management subsystem	- monitoring and analysis of sales volumes and structure - assessment of the stability of financial flows and the financial condition of the enterprise
Strategic marketing-management subsystem	- analysis of trends in the development of consumer needs and the stability of market trends - assessment of the directions of technological trends in relation to the structure of the enterprise's business processes - formation of business development scenarios taking into account the updating of the enterprise's resource and technological capabilities and the stability of market trends - assessment of risks and economic effectiveness of scenarios and selection of a business development strategy in the coordinates of strategic goals - development of functional strategies taking into account marketing proposals regarding the directions of enterprise development and adjusting the structure of information support of the management system according to the new architecture of the KPI
Human resource management subsystem	- adjustment of goals and criteria for professional development of personnel in accordance with the strategic goals of the enterprise's development - monitoring of employee performance in accordance with the new KPI architecture

Source: author's development

Therefore, based on the information needs of an innovation-oriented enterprise, it is advisable to consider the information support of the innovative activity of a manufacturing enterprise as a system of mutually complementary information flows, the totality of which, on the one hand, forms a clear picture of the development of consumer needs and the innovation market in the strategic business areas of the enterprise (including promising ones), which allows us to correctly outline the main directions and determine the key aspects of innovative activity in the planning period, and on the other hand, it functionally unites the structural elements of the internal environment of the enterprise to coordinate actions to create innovations and implement innovative changes in existing business processes, which corresponds to the systemic and process approach in management and allows us to successfully implement innovative projects [3].

For an innovation-oriented enterprise, it is extremely important to monitor the financial condition of the enterprise during the implementation of innovative changes – after all, the implementation of innovative and technological projects can cause a loss of financial and economic stability of the enterprise and nullify all efforts to technologically update the business [5; 17]. It is also important to correctly assess the dynamics of consumer trends – after all, not all of them are sustainable. And the desire to enter a new trend may be wrong if this trend is only a random surge in consumer interest. In this case, the marketing analysis of the market should be supplemented by an analysis of technological trends - how critical it is for business to ignore the emergence of new technologies.

For the industrial sector, modern IT developments make it possible to achieve higher economic efficiency due to: a) increasing the productivity of industrial production processes (digitalization of the technological component of consumer value chains); b) expanding market opportunities in meeting market needs through digitalization of communications with the external environment – by exchanging relevant information in terms of volume, content and time with different groups of stakeholders (digitalization of the cognitive component of consumer value creation chains).

Therefore, modern methods and directions for the development of information support for the activities of enterprises should complementarily fit into the business processes of the enterprise, increasing their efficiency and expanding the capabilities of management to purposefully and effectively interact with target audiences. That is, their functional content should correspond to the scientific and methodological approaches of marketing management, which assigns a key role in achieving the goals of innovative development of the enterprise to increasing its ability to bring new value propositions to the market. When forming integrated management information support systems, it is especially important to take into account the specifics of enterprises. Priorities should be given to those elements of information support that will increase the quality of implementation of key elements of business processes for the formation of competitive advantages. It is necessary to relevantly and fully use the capabilities of artificial intelligence and big data processing tools, take advantage of cloud technologies, expand the scope of application of BPM, CRM and ERP systems, etc.

CONCLUSIONS FROM THIS STUDY AND PROSPECTS FOR FURTHER RESEARCH IN THIS AREA

Information support is an integral part of the management of the operational activities of the enterprise, which ensures its efficiency, flexibility and competitiveness. Information technologies are not only the basis for the integration of enterprises into the global economy, but also a tool for optimizing the internal processes of the enterprise, which allows you to reduce costs and improve the quality of management decisions. In the conditions of intensifying competition for consumers, this helps maintain the competitiveness of enterprises and strengthen their market positions.

The effectiveness of the information support of the management system of modern enterprises depends on the validity of scientific and methodological approaches to building their architecture. It must functionally correspond to the strategic goals of the enterprise and their activity plans, taking into account the specifics of work in target markets. Each scientific approach (systemic, process, resource, innovative, socio-economic) has its own advantages and disadvantages. Their combination allows you to create a comprehensive and flexible information system that meets the needs of the enterprise.

An important step in building a management information support system is to correlate its functional capabilities with the value of individual structural elements of business processes to maintain the overall competitiveness of the enterprise. Given that in the conditions of high variability of modern consumer markets, such elements are innovation management, a model of information support for the activities of an innovation-oriented industrial enterprise has been developed. It integrates key information blocks of functional subsystems into a single whole, thereby forming a common information space for making and implementing strategic decisions in terms of strategic goals for the enterprise's development. The developed scientific and methodological approach complies with the principles of value-oriented management and is based on the advantages of marketing functionality in working with arrays of information about the state of the market and the requests of target consumer groups. It has a universal nature and practical significance for increasing the efficiency of digitalization processes of domestic business structures. The next stage of research should be devoted to the development of scientific and practical recommendations for improving information support for business development based on cooperation with specialized service enterprises.

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