

Chapter 3

INNOVATION AND MODERN TECHNOLOGIES IN THE ECONOMIC SYSTEMS MANAGEMENT

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**MODERN
FUNDAMENTALS
OF THE
CONCEPTUAL
MODEL OF
DIGITALIZATION
OF BUSINESS
PROCESSES OF
ENTERPRISES**

The global trend is the transformation of industrial society into post-industrial, which occurs in the context of increasing globalization, expansion of services and intangible production as a result of scientific and technological progress, including large-scale, deep and dynamic penetration of information and communication technologies (ICT) in all spheres of life of the person, society, business entities and the state. The developed countries of the world at the turn of the XX-XXI centuries have set themselves the goal of accelerating the transition to a new stage of development – the information society, which will ensure the level of social welfare, the transition from fuel economy to knowledge-based economy threatens to national security, to involve citizens in all the benefits of the information society.

Today, the environment, as well as the “internal life” of enterprises and organizations is formed by the globalization of markets, rapid changes in customer preferences and shortening product life cycles. This development is supported by a variety of networking opportunities for companies based on new technologies. These new technologies support the global exchange of data and information in the production of goods in almost real time, which greatly facilitates companies to work with

other partners through an Internet connection and the possible so-called “break in the value chain”: each partner in the value chain focuses on their core competencies and uses the skills and abilities of partners to provide goods or services to customers.

Accordingly, now we are talking about creating added value. The basis for this was laid in recent years, now the main areas of work of companies should be focused on the development of new products and services, improving efficiency and implementation of the first completely new business models.

Currently, the most common approaches to managing an organization in Ukraine are functional and process. The functional approach to management is based on the principle of division and specialization of labor, formulated by Adam Smith and developed in the works of representatives of the School of Scientific Management (FW Taylor, G. Gantt, G. Emerson, G. Ford) and the Administrative School (A. Fayol).

The functional approach to management is reduced to control by the head of performance of functions by subordinate workers from whence the basic parameter of efficiency of structural division – professional qualification of the head follows [1; p. 134-135].

The main purpose of the process approach is to create horizontal connections in the enterprise (the functional approach implements vertical connections), through which employees involved in one process solve problems within the process without the participation of senior management, which allows you to more quickly influence the result. In addition, in this approach, the organizational structure of the enterprise corresponds to the current business processes, and does not exist in parallel with the enterprise, which allows the company to have the required number of employees, and in case of business processes – easy to optimize the number [2; p. 28-30].

However, the general theory of business processes and process approach requires specific adaptation to the specific conditions of a particular sector of the economy in a particular economic system, especially in a digital economy, which is now rapidly developing [3; p. 245-247]. ICTs are now playing an increasing role in the business processes of the digital age. ICTs can take on different roles, which we can classify as follows:

- support of existing processes (joint use);
- inclusion of innovation processes (innovative use).

First of all, ICT can be used to support existing processes in order to

increase efficiency – especially when it comes to streamlining largely standardized and unified processes. Examples include forms of multimedia support for existing work organization processes (for ordering office supplies), support for internal or external collaboration (introduction of group software or video conferencing) or support for classic advertising and sales processes (creation of electronic product catalogs).

Since every activity in the value chain uses and produces information, it is not surprising that today at all stages of the enterprise value chain there are modern ICTs, which make special sense if they are used in terms of process orientation, as they integrate interagency and long-distance processes. As for the key differences between process orientation and business process, the process describes only the transformation of material, information, activities and decisions. While a business process has a certain beginning, a certain end and certain services or results. As part of the business process, the transformation is performed in several stages and, accordingly, in a structured manner, which allows for control and measurement [5; p. 62-63].

To obtain information important for management decisions, you need indicators, quantitative and / or qualitative parameters that characterize the business process, its outputs. Important characteristics of the business process are: cost, duration and quality of outputs. The cost of the business process should be kept to a minimum, the duration of the business process should be as short as possible, and the quality of outputs should satisfy consumers of the business process. However, the key criteria of business processes remain unchanged: the level of communication, the degree of interaction with other processes, the degree of interaction between participants, complexity, modularity and propensity to decompose, measurement scale and performance indicators, the level of process development [7-9].

These criteria are clearly traced in the enterprises operating in the field of material production, which in the XXI century is undergoing large-scale changes associated with the replacement of methods, tools and technologies of production; there is a change in fundamental concepts, methods of organizing production and production management. Cumbersome and wasteful industrial production of consumer goods is rapidly being replaced by the latest concept of current production of custom products – the concept of “lean production”. It unites the efforts of all employees of the enterprise from senior executives to key production workers, uniting them into a single

whole – a flexible production integrated system capable of timely response to consumer and customer demands, increase productivity, increase production at existing production areas while improving quality, reducing energy consumption and cost of manufacturing products [10; p. 80-83]. Ultimately, the vast majority of “lean manufacturing” approaches involve changing business processes, which requires technical means [11]. Some principles that somehow intersect with the philosophy of “lean manufacturing” can be implemented with the help of information technology (hereinafter – IT), which is a key part of the concept of “Digital Manufacturing”, because the main purpose of any business process – is not only to increase the efficiency of commercial activity, but, to a greater extent, the search for optimal trajectories of rational use of the existing resource base not only in the internal environment of the organization, but also in terms of interaction with the external environment.

It is digitalization and is considered a manifestation of neo-economics, ie a new type of economy, the digital economy, which describes the changes in the socio-economic system that is happening today through the introduction of technological developments in the post-industrial economy.

Digital transformation is the introduction of modern technologies into the business processes of the enterprise. This approach involves not only the installation of modern hardware or software, but also fundamental changes in approaches to management, corporate culture, external communications. As a result, the productivity of each employee and the level of customer satisfaction increase, and the company gains a reputation as a progressive and modern organization. Currently, the integration of digital technologies into production processes, or digitalization of industry, is a priority of the state industrial policy of the country, which was defined in the Concept of Digital Economy and Society of Ukraine for 2018-2020, approved by the Cabinet of Ministers № 67 of January 17, 2018.

Since capital is a wealth that can generate income, as well as a long-term resource used to effectively organize the production of more goods and services and income, in a digital economy, we can argue about the existence of digital capital and the feasibility of its separation in classification of types of capital of the enterprise and the sphere for further research.

New ideas and principles of organization of “digital production” and management are completely opposite to the usual models and methods,

which are already firmly rooted in the mass consciousness of people in all sectors of the economy. The situation can be changed only by eradicating the former ideology of industrial production management, and this is possible only with an active and stable position of the government, academic science and business [11].

According to Gartner, Inc., global IT spending in 2019 was expected to be \$ 3.76 trillion, up 3.2 percent from 2018 [10]. Despite the uncertainty created by rumors of recession, Brexit, trade wars and pricing, IT spending in 2019 only increased. However, there are many dynamic changes in which segments will stimulate growth in the future. Costs range from saturated segments, such as mobile phones, PCs and local data center infrastructure, to cloud services and Internet of Things (IoT) devices.

In the 21st century, IT is not just a platform that allows organizations to do business, because it is IT that is the engine that moves business forward. The fact of development and implementation of tools of the so-called digital business and ecosystems of digital business is also clearly traced. At the same time, in the development of the enterprise and the formation of its competitiveness, IT is the tool that connects business processes into one whole.

The IT industry in Ukraine currently competes successfully in the world market and is a reliable source of foreign exchange earnings, which helps maintain the hryvnia exchange rate. The importance of IT services in the structure of exports is also growing. The IT market in Ukraine in 2018 was characterized by the following indicators:

- revenues from the export of IT services in 2018, according to the NBU: \$ 3.204 billion, an increase of 29% compared to 2017;
- revenue from exports of IT services in 2018, according to the State Statistics Service: \$ 1.578 billion, an increase of 20% compared to the previous year [13].

According to experts from the consulting company Kreston GCG, Ukraine's share in the global IT services market is 0.5%, with the bulk of Ukrainian IT services being an outsourcing model, and outstaffing and product development models accounting for a small share of programmers.

An important study to confirm the relationship between investment in IT and organizational and human capital was done by E. Brinyolfson, L. Heathie and S. Young. They used the term “organizational assets”, understanding them as a set of organizational practices adopted in the

enterprise, which include: principles, rules and models of doing business, management system, organizational forms and structures, as well as the production culture of the organization. They showed that a modern efficient enterprise should be considered as a set of complementary assets, so that increasing the volume of any of them contributes to the profitability of others. Thus, the combination of IT and certain organizational practices creates more value than each of them separately [14].

Studies by P. Milgrom and D. Roberts have confirmed the close relationship between IT investment and organizational practices: decentralization of work, delegation of decision-making rights and powers, teamwork, staff development [12]. The main condition for the effective development of the enterprise, they consider the consistent creation and development of complementary practices, including IT, organizational management, human capital. A similar result was obtained by A. Barua, K. Kraibel and T. Mukhopad, who concluded that the effect of IT automation primarily affects the improvement of operational performance of the process, and then the effect manifests itself in the form of improving performance of business goals, such as market share or profitability. Using these results as a starting point for a new study, as well as the research of scientists such as N. Melville, K. Kremer, W. Gurbahani, it is advisable to show a model that would link the mechanism of IT influence on business results (Figure 3.1) [16, 17].

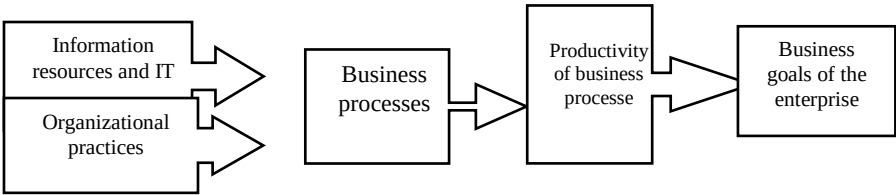


Figure 3.1 The logic of the relationship between the mechanism of influence of IT on the business results of the enterprise

Source: formed by the author

In our opinion, IT resources and technologies in combination with modern organizational practices can lead to more efficient implementation of business processes, which will positively affect the productivity and quality of processes, improve operational results, contribute to the business goals of the enterprise. The introduction of IT,

which is accompanied by profound changes in organizational practices of the enterprise, confirms the positive impact of business processes on improving productivity in the company, achieving its business goals and the success of the introduction of information technology [15].

As part of digitization, companies typically go through six subject areas and phases, most of which develop on top of each other (Figure 3.2).

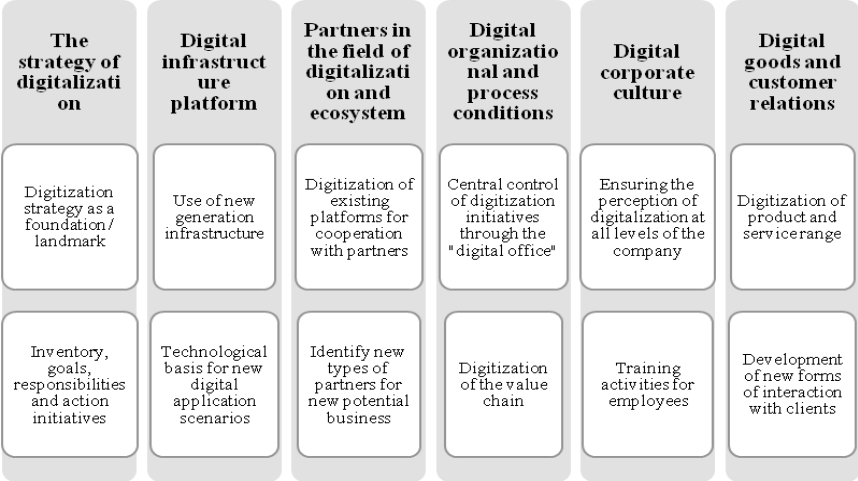


Figure 3.2 Stages of formation of the digital value chain of the enterprise

Digitization of processes is relevant not only at the level of individual enterprises: entire industries choose for themselves this path of development as the only opportunity to meet the rapidly changing conditions of the world around them. Thanks to this, the digital transformation of industry, retail, public sector and other areas is already changing the lives of every person and every company.

Figure 3.3 presents a structural and logical scheme of methods of development and transformation from Industry 3.0 (technologies and approaches of the last century) to Industry 4.0, which was proposed by experts of the Association of Industrial Automation of Ukraine. This technique is universal and can be used for strategic planning at the national, regional, sectoral levels or at the level of an individual enterprise.

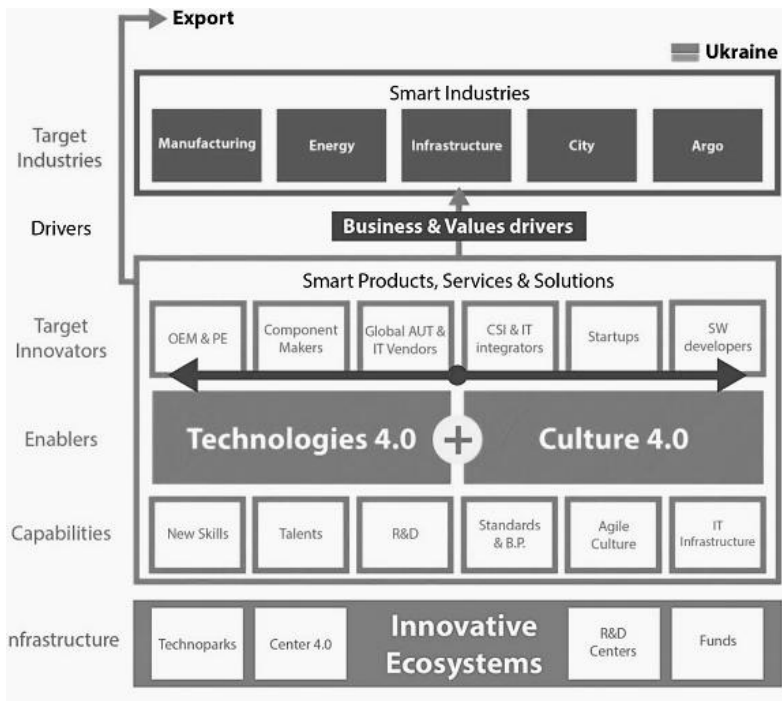


Figure 3.3 Methods of development and transformation from Industry 3.0 (technologies and approaches of the last century) to Industry 4.0

The scheme consists of three interconnected blocks – six categories of elements that reflect the nature and logic of interaction in the implementation of innovative solutions:

- 1 – consumers (Smart Industries); target industries;
- 2 – manufacturers of “smart” products and solutions (Smart Products, Solutions and Services), produced in the country in the relevant sectors and organizations;
- 3 – infrastructure that reflects the innovative ecosystems (Innovative Ecosystems), which are necessary to maintain and accelerate the development of higher levels [14].

The logic of the interaction of elements in the dynamics involves the movement of “bottom-up-down”, ie industries become “smart” and scale the demand for “smart” products when the manufacturers of these

products and solutions are sufficient and maintain market balance, but which, in turn, depend on the existing ecosystem. In other words, it is impossible to create “smart” products and solutions in Ukraine, when 4.0 technologies (already available) are not balanced with the higher culture of enterprises, are not based on developed organizational capabilities and depend on the ecosystem. In this case, the role of the ecosystem is equated to the key, ie is the foundation and foundation.

However, analyzing the current state of affairs in the Ukrainian industrial market and reviewing the conclusions of experts, for most manufacturing enterprises of Ukraine they have a completely different look, and the structural and logical scheme proposed by APPAU experts will be completely changed due to lack of specific elements caused by socio-economic and political situation in the country (Figure 3.4).

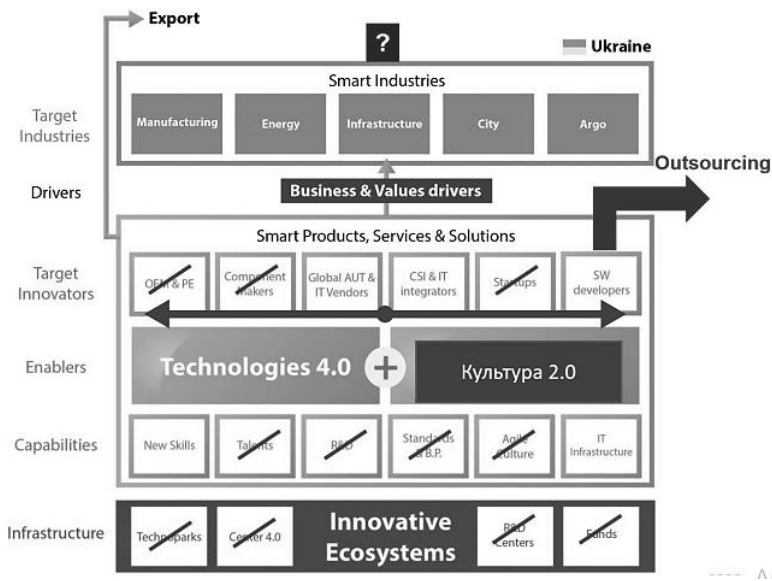


Figure 3.4 Modified scheme of development and transformation from Industry 3.0 (technologies and approaches of the last century) to Industry 4.0 in Ukrainian realities

The prospect of digitalization of business processes is primarily aimed at increasing efficiency, profitability and productivity, as well as reducing costs. A business process is defined as “a set of interconnected

or interacting actions that use input to achieve an intended result” (DIN EN ISO 9000 2015). The purpose of the business process is to increase added value.

Business process modeling is a high-quality management tool, such as Six Sigma, which is especially useful in change management.

To successfully master change, it is extremely important to understand the following interdependencies that must be adhered to (Figure 3.5) [15].

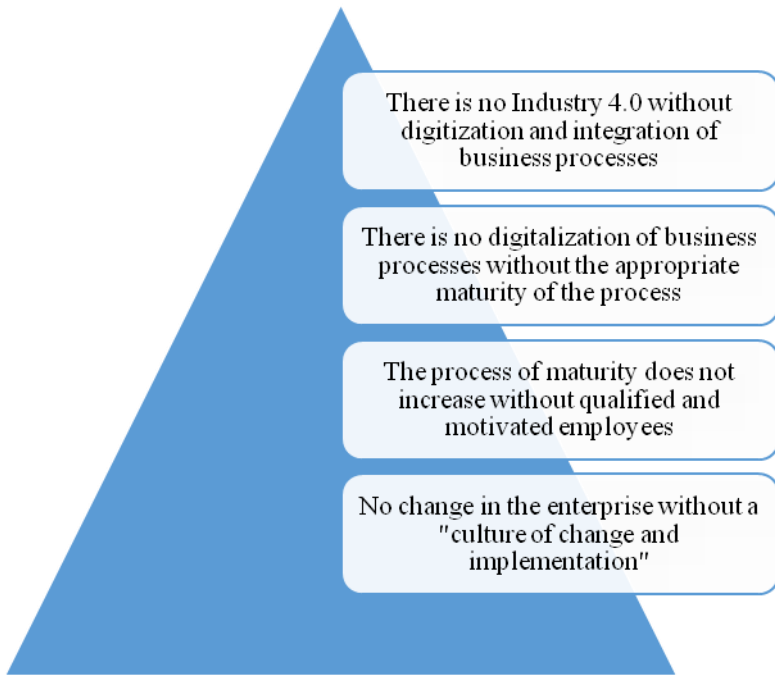


Figure 3.5 The logic of forming a vision of the process of implementing change in the enterprise

The logic of the proposed scheme is that the successful implementation of change creates significant potential for the company: in addition to improving efficiency, the company also improves its competitive situation and has access to new markets. However, to ensure success for the digital transformation, the company’s management needs the support of a team of managers and an effective “culture of change

and implementation”. According to a study conducted by the German company “A’PARI Consulting”, which specializes in finding the best IT solutions for logistics and technology companies, it is the lack of developed culture and attitude to change in the enterprise is a weakness: digitalization is relegated to the background due to failure managers to dialogue with employees, although the latter are often more open than their managers. However, digitization will only be successful when everyone in the company comes together [18].

Without qualified and motivated employees, the process of transition to Industry 4.0 will not be successful for most companies. The required qualifications will change: routine tasks will be replaced by technology, such as RFID or IoT (for example, order recording or manual configuration of status information). The need for employees with a high level of analytical competence (for example, for data analysis and data quality assurance required for digitization) will increase. The same applies to “joint procedural thinking”, including the participation of partners or subcontractors. When planning the digitalization of business processes, the competencies of employees should be directed not just to perform tasks, but mainly to the planning and control of processes, information analysis and exceptional data processing, which are necessary. As a result, methodological and social skills are becoming increasingly important.

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**RECOMMENDATIONS
CONCERNING THE
SUPPORT SYSTEM
CREATION OF
ECOLOGIZATION
THE INVESTMENT-
INNOVATION POLICY
OF UKRAINE²**

The problem of ensuring the environmental orientation of innovation development largely requires the development of recommendations to stimulate innovation development in the context of greening the economy in the context of globalization, integration and crisis management. In this case, there is a need, on the one hand, to overcome the complexity of justifying the ways of introducing environmental imperatives directly into economic activity. On the other

² “Research is performed within the RDW” Dominants of the investment-innovation policy of the nature management of national economy “budget program” Support for the development of priority areas for scientific research (CTCC 6541230)