

Factors and models of economic security of industrial enterprises in a depressed region in the context of digital transformation

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Abstract. The problem of digital transformation of enterprises is explained by the need to ensure long-term sustainable economic security for domestic industrial producers in the context of digitization. The transition to digital rails creates an opportunity to reorganize the production process and form effective interaction among all participants in the digital ecosystem. This necessitates the study of the process and possible directions of digital transformation to ensure an increase in the level of economic security of enterprises. The aim of the article is to present the results of the study of the process and directions of digital transformation of enterprises as a condition for sustainable economic security. The research methodology is based on the analysis and idealization of the process of digital transformation, the logical substantiation of the essence of this phenomenon, and the identification of the main directions of digital transformation. Generalization of data from consulting companies allowed for the formation of the main trends in digital transformation. A structural model of digital transformation of a depressed region enterprise has been proposed, which includes three components: basic spheres of activity, digitization processes, and conditions for ensuring economic security. The obtained conclusions contribute to the development of ideas about the processes of digital transformation of enterprises as a condition for ensuring their economic security. They allow for an assessment of the overall state and identification of vulnerable areas that reduce the level of economic security of a depressed region enterprise. The results of the study will help enterprises in depressed regions make targeted decisions regarding methods of ensuring economic security, taking into account differences in the level of digitization.

1 Introduction

The traditional format of economic system development, influenced by the sixth technological order and accompanied by the fourth and the beginning of the fifth industrial revolution, is moving to a new stage of digital transformational order of functioning of public

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life as a whole. The processes of digitization and digital transformation acquire the essence of future mega-trends. The introduction of digital technology into established development movements fundamentally changes the usual paradigms of economic relations structures at the global level, as well as in the context of the state and enterprises in depressed regions. Hence, certain questions and tasks arise that need to be addressed at the legislative level. This urges enterprises in depressed regions to adapt and structurally transform the conduct of their economic activities as a whole based on digital platforms and technologies. Enterprises in depressed regions that aim for widespread digitization of business processes seek to ensure high management efficiency and the ability to endlessly gain competitive advantages based on cultivating promising development methods. It is precisely digital transformation that moves economic entities to a new highly profitable level of competitive struggle [1].

2 Methods

In order to examine the possibilities of digital transformation and its impact on enterprises, it is necessary to form an understanding and content of this term through the presentation of various approaches, as shown in Table 1.

Table 1. Approaches to defining the digital transformation of a depressed region enterprise. Source: compiled by the authors from [2-6]

Source	Definition
Forrester	Achieving operational efficiency and flexibility using digital technology
KPMG	The use of modern technology to increase the productivity and value of a depressed region enterprise in today's world. There are three main effects of using digital technology: reducing costs, improving the quality of services and products, and increasing productivity
Boston Consulting Group (BCG)	Maximize the full potential of digital technology in all aspects of a depressed region's enterprise
OECD	Using data and digital technology to create new or change existing activities
A Guide to Digital Transformation of Manufacturing Enterprises	Changing the way we do business (business model) by integrating innovative technology into all aspects of business operations, requiring attention to fundamental transformations in technology, culture, operations and principles for creating new products and services to ensure comprehensive success in the new digital economy
Novolipetsk Steel (NLMK)	Implementation of full-scale technologies, affecting the change in business processes, development of working tools to achieve the strategic goals of the company in the field of operational efficiency: cost control, debottlenecking, as well as improving product quality and safety, reducing the impact on the environment
Severstal	Assumes a strategy that includes a large number of elements and systems: ERP, robots, electronic document management systems, omnichannel, various types of analytics
Sibur	A procedure for implementing a digital platform that allows operators of industrial plants to assess current technological processes that affect the economic efficiency of production based on accurate mathematical calculations online, displaying the resulting parameters on digital panels, and also allows you to improve the safety of the work process
The State as a Platform: The (Cyber) State for the Digital Economy. Digital Transformation	Deep reengineering of business processes with extensive use of digital tools as a mechanism for the execution of processes, which leads to a significant improvement in the characteristics of processes (reducing their execution time, disappearance of entire groups of subprocesses, increasing output, reducing the resources spent on processes, etc.) or the appearance of fundamentally new qualities and properties (decision-making in automatic mode without human involvement, etc.)
Rosseti	Changing the logic of processes and the transition to risk-oriented management of the company based on digital technology

Based on the above approaches, it can be noted that the flows of the digital revolution fundamentally capture current trends in the development of the economy as a whole. The processes of forming the platformization of digital transformation of enterprises in depressed

regions are reflected in the works and methodological guidelines of large consulting companies, at various press conferences and briefings, strategic development plans of large enterprises, as well as the consolidation of the need for the implementation of such processes at the legislative level.

In all the definitions considered, the main idea of digital transformation of enterprises in depressed regions is traced, which consists of the development and implementation of digital tools and technologies that ensure the reorganization of production processes to form comprehensive success of the enterprise in the long term. An expert in digital transformation at Severstal PJSC notes that a digital enterprise can be called digital when there is effective interaction between human resources and automated systems [7]. At the moment, it is not possible to fully automate the work of an enterprise in a depressed region, as robotic technology is not capable of fully replacing a person. It is important that the management of the enterprise in a depressed region understands the significance of implementing digital transformation, is open-minded and has a healthy drive to apply technologies and practices for digitizing enterprises. The holding company Sibur also shows that to ensure competitive advantages, a high degree of commitment to digital platforms is required. This is due to the fact that the implementation of projects to introduce digital technologies gives a boost to the colossal growth of the capitalization of assets of an enterprise in a depressed region. The holding company conducts total "smart" control using a digital system that ensures the correct operation of production based on the calculation of optimal operating modes. This allows for the visualization of current indicators and their reflection on the functioning of the company [8].

Enterprises in depressed regions that strive to meet the requirements and trends of the digital world need to fully rebuild the entire infrastructure to provide for the formation of digital operations. At the same time, the basis on which "digital" will initially emerge is mobility, the acquisition of digital skills by workers and administrative staff, the analysis of the possibility of optimizing internal processes, the establishment of a digital format for document flow as one of the main drivers of digital transformation, the computerization of financial accounting at the enterprise and business analytics that allows for the study of a large volume of data for the possibility of obtaining broad information on customer analysis, current products on the market, interest in product characteristics, etc. It acts as necessary fuel for deploying digital transformation of an enterprise in a depressed region as a whole [9]. On such a basis, it becomes possible to introduce more complex, combined and progressive digital tools and technologies, creating the basis for acquiring the characteristic of an enterprise in a depressed region as digital, which in turn provides additional opportunities for the formation of an integrated platform that allows for creating a new reality in the context of the digital ecosystem [10].

3 Results

The formation and development of digital technologies create key and common trends in the digital transformation of enterprises in depressed regions. These trends are presented in Fig. 1.

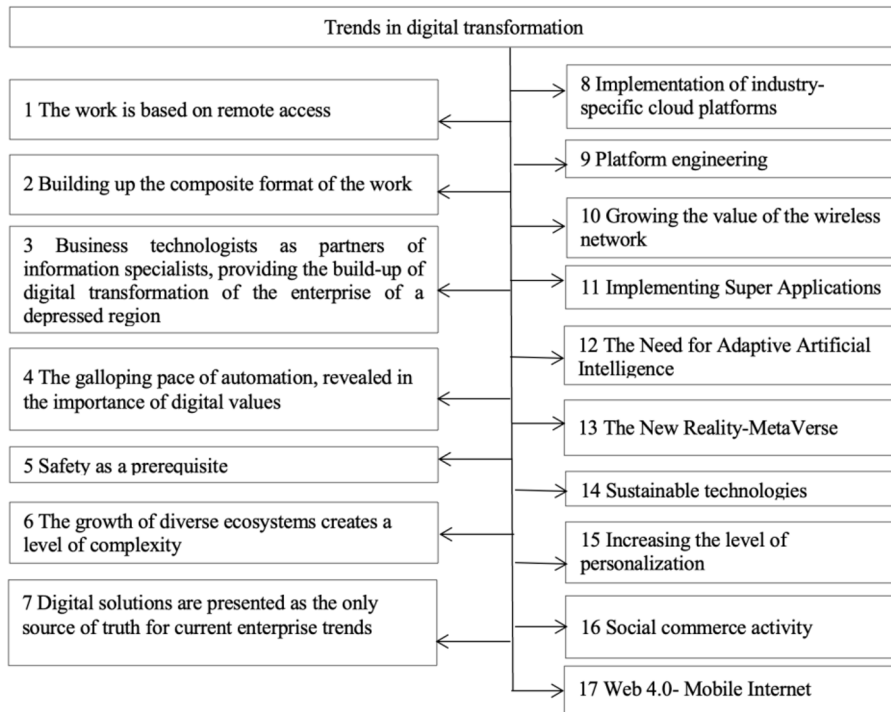


Fig. 1. Trends of digital transformation. Source: compiled by the authors from [11-15]

1) Digital technologies allow for the evolution of the format of employees' workplaces for possible productivity improvement and also allow for retaining specialists by providing more flexible working conditions.

2) The processes of digital transformation create pressure on innovation, which must be more flexible and have the ability to be structurally composite. Meeting the rapidly growing expectations for organizations involves turning into a full-scale composite business built on an application programming interface (API). API allows for quick exchange of information between programs through modularity, which forms effective orchestration by the enterprise.

3) Revolutionary technological changes lead to colossal tectonic shifts, both in the format of fundamental understanding and in the practical significance of digital transformation. IT specialists cannot adapt to digital processes due to the lightning-fast use of digital tools. Therefore, it is important in the digital landscape of innovative solutions to preserve and accumulate tools for achieving digital business results. The information technology market research and consulting company Gartner found that organizations that successfully use business technology opportunities accelerate digital business results 2.6 times more often.

4) The growth of automation processes increases the scale of operational efficiency of work. Integration of technological platform solutions provides production processes with software robots that increase the flexibility and purposefulness of vector development. According to the consulting company Deloitte, 93% of organization leaders expect to use RPA (robotic process automation) technologies by 2023. MuleSoft found that most organizations either already use or plan to implement automation initiatives to achieve strategic goals, such as increasing productivity (96%) and operational efficiency (93%), as well as creating a more quality connected customer experience (93%).

5) The digital space forms a field in which automated systems can potentially be attacked. Therefore, along with the development of software solutions, it is important to pay attention

to security processes. Here, the work of business technologists becomes an integral part in the context of protecting the enterprise in a depressed region.

6) The digital platform is filled with various multi-cloud environments and the management of a business in a depressed region needs to create an individual cloud system that will allow them to have the key to success in progressive transformation and thus bring the economic entity to a higher level of sustainability, providing competitive advantages. In the future, the digital ecosystem should create a multi-cloud strategy that allows for the acceleration of the digital whirlwind.

7) Consumers in a large amount of data will try to find information that is informative, accurate, concise and fast enough to search. In order to form a competitive advantage, business leaders need to create a platform that will be a single source of reliable analytical data. According to the consulting company Accenture, which provides services in the field of outsourcing business processes and strategic planning, we have that the annual growth of truly data-driven businesses exceeds 30%. However, 81% of companies still do not have a reliable data management strategy that allows them to maximize the full potential of data, and a similar number do not have a suitable platform to support their goals.

8) The increase in the volume of digital flows and the scale of entities transitioning to the rails of digital transformation creates a problem of ineffective work on individual cloud services, which in the future pushes the formation of complex and comprehensive cloud platforms that can be adapted to the needs of individual industries. Thus, these platforms will create the basis for business platforms where technological innovations will directly serve as a tool for business innovation. Consulting company Gartner suggests that such solutions will lead to depressed region enterprises forming some ecosystem clouds in which logistics management processes, payment processing, innovative research capabilities, etc. will take place. All of this will create flexibility in working to respond in a timely manner to progressive changes in the digital landscape. An example of a customized solution from the financial industry is the ITGLOBAL.COM cloud for one of the leading Russian commercial banks. The bank's feature is remote customer service and remote work for most of its employees. Gartner expects that by 2027, depressed region enterprises will use industry-specific cloud platforms to accelerate more than 50% of their key business initiatives, while this figure was less than 10% in 2021.

9) The growth of digital data requires well-coordinated work on their processing and analysis, so service providers have begun to develop operational platforms that work as an intermediate link between users and support services. Such platforms create the basis for optimizing work and thereby increase the speed of delivering digital data. The main message of this trend is to ensure self-service for business units, partners and customers, which in turn leads to increased work profitability, reduced production costs, and increased sales volumes. Gartner notes that 80% of developers will use industrial clouds to accelerate their development by 2027.

10) To implement effective work of the production system of a business in a depressed region, there is a need to organize integration of wireless technologies based on Wi-Fi networks, 4G and 5G mobile data transfer. Analysts and speakers from leading consulting companies suggest that corporate networks based on wireless technologies will be able to transform into a full-scale platform for implementing digital transformation processes. Gartner also notes that by 2025, 50% of wireless communication points will use additional capabilities provided by technology integration.

11) To increase digital connections between various counterparts, there is a need to develop a sophisticated platform in the context of a super application that allows for the formation of several application lines with the provision of various services, thereby directing the creation of an ecosystem with a set of different services. According to research, 50% of the world's population will use several super applications daily by 2027.

12) The digital transformation of a business in a depressed region leads to an increase in the speed of bringing digital products to the market, while marketing processes do not have time to analyze and evaluate consumer preferences. Therefore, in order to keep up with the customer's evolutionary needs, there is an urgent need to introduce adaptable AI that can instantly analyze, study market trends with subsequent adaptation relative to the specific activities of a depressed region enterprise and develop project solutions to optimize business value for improved corporate analytics and overall performance. Gartner notes that adaptive AI systems will be 25% more effective than non-adaptive systems by 2026.

13) Digital technologies change the paradigm of the world's organization, creating a trend of convergence between the digital and physical worlds. This creates opportunities for increasing creative interaction between employees of different departments and counterparts. Currently, the initial form of the metaverse is the use of cryptocurrency as a payment digital tool. This was facilitated by the transition to a new level of Internet development, in which participants without third parties can monetize their activities and thus reach a new level of interaction. The metaverse creates prerequisites for the formation of virtual communities, networks and economies as a whole, which can acquire quasi-group characteristics in the digital world. Spatial computing in the implementation of digital twins will improve the quality of industrial work. 40% of corporations will use Web3, spatial computing, and digital twins by 2027.

14) The development of digital technologies in the future will be based on ESG principles, which contain aspects of ecology, social responsibility, and corporate governance. Investors will approach more strictly and demandingly the issue of directing their investment resources in the context of digital startups, technologies at the enterprise, as sustainable development that meets the needs of the future and with the possibility of minimal probable damage to future generations becomes an important moment for them in deciding on the vector of infusion of funds. Therefore, it is necessary to develop digital initiatives aimed at the strategic goals of the business with sustainability, which will directly increase economic security in perspective. According to research, Gartner IT directors will work within KPIs linked to the sustainability of a depressed region enterprise by 2025.

15) To attract more consumers of any product, digital marketing continuously offers its digital goods from a multitude of channels, but the modern consumer does not want to dig through a large amount of data to choose the desired content. Therefore, there is a need to use artificial intelligence for the purpose of increasing the collection of incoming information from social networks and other digital sources to form personalized marketing processes. This will greatly increase the attractiveness of digital products for a specific consumer.

16) The formation of super applications based on broad platform solutions will allow increasing the number of customers using various services several times. This trend, in turn, pushes domestic manufacturers to move towards social commerce, which allows quickly tracking trends, customer preferences, and efficiently interacting with buyers directly through specific applications, which will further increase the profitability and profitability of the organization.

17) The transition of real-world processes to the virtual world implies a new era of digital transformation. A high level of a symbiotic network between humans and computers is expected. Artificial intelligence studies people and begins to understand them more accurately, offering services that robots believe are needed by humans at the moment. This will lead to an increase in the volume of sales of devices for possible transition to virtual reality. All this suggests that digital technologies will enrich the physical world with digital knowledge for successful progressive development.

4 Discussion

Digital transformation of a depressed region enterprise is preceded by processes to change the industrial paradigm, namely the main components that ensure the stable functioning of the enterprise in general, as shown in Figure 2.

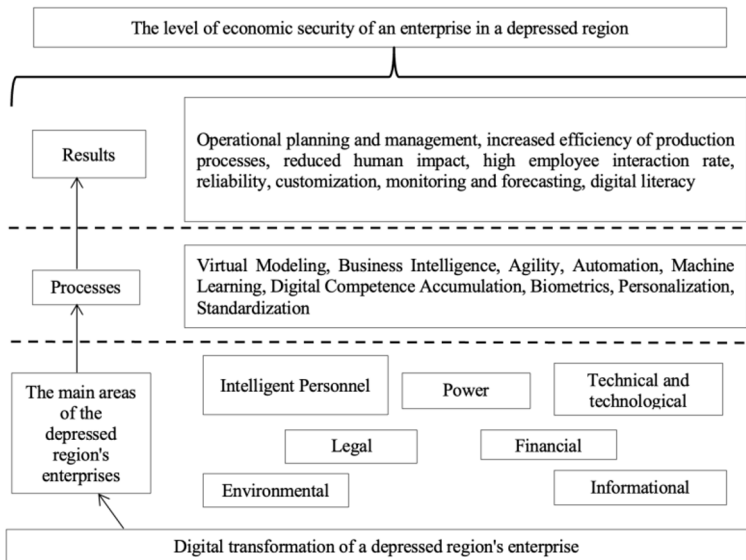


Fig. 2. Structural model of digital transformation. Source: compiled by the authors from [11-15]

Digital reform and transformation give impetus to the rethinking of the paradigms of enterprise functioning and make the information component one of the most acute issues in secure development. Information flows lead to market modification, a new attitude towards customers and the produced product. Platformization creates a trend towards restructuring the mind for transferring the "locomotive" to digital rails, thanks to artificial intelligence, which allows ensuring competitive advantages in this area. Digital transformation affects environmental issues in industry, which are the most relevant. Digital platforms allow for point and systemic analysis of current trends to develop solutions to increase equipment efficiency, and in case of deviation from the specified parameters of technological equipment operation, to record facts of incorrect operation and present a full sequence of work to eliminate potential emergency situations. The use of digital solutions in the field of environmental protection will directly affect the interests of various counterparties, as well as investors who want to increase the competitiveness of the depressed region enterprise in the context of their interests. Changes are also taking place in the legal sphere, as digital technologies require the development of fundamental legal decisions aimed at quality regulation in the context of their direct use in production. The formation of standardization processes simplifies the transfer of knowledge and promotes the further development of digital solutions. Standards serve as indicators of the effectiveness of the implementation of technological shifts.

5 Conclusion

Based on the studied approaches, it can be summarized that digital transformation is currently the determining factor in the progressive development of a depressed region enterprise, based

on the competent investment of financial resources to optimize production processes, improve interaction channels of different structural units, and change work models, which thereby causes a full-scale fundamental rethinking of the entire staff to achieve and acquire new innovative technological breakthroughs, ensuring conditions for sustainable competitive struggle in the long term [16].

Platformization processes form the development of a business model separate ecosystem of a specific economic entity. The management of the depressed region enterprise should understand the problem of rapid changes in digital processes to retain objects and subjects in the digital ecosystem to ensure continuous work on correlating individual elements of business models, as well as in case of the need for a full-scale reconstruction of the ecosystem as a whole. On this basis, stable and progressive evolution can be ensured in cases of entry of new digital counterparts or technological innovations, which will thereby allow ensuring a higher level of economic security of the depressed region enterprise.

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