

Digital Technologies in the Global Economy: Technologies and Innovations

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Abstract: *The article defines the prerequisites for the formation of the digital economy, examines the relationship of digital development and technological, socio-economic, and spatial factors, as well as justifies the features of the digital technologies developed in the world. The authors define the features of the information systems' application at the enterprises in various sectors of the economy, as well as offer recommendations for the Russian enterprises, which should be considered when implementing information systems.*

Index Terms: *digital technologies, digital economy, technological innovations, corporate information systems.*

I. INTRODUCTION

The unimpaired operation of the modern economy is impossible without the active use of digital technologies (hereinafter – DT) at all stages of the economic cycle that is a direct consequence of the scientific and technological process. The role of DT in the development of international economic relations is manifested in a significant increase in labor productivity, diversification of forms of international exchange of goods, services, and capital, as well as in increase of the integration level of companies on international markets.

The relevance of this topic is determined by the fact that DT, as the products of the digital economy (hereinafter – DE), become catalysts for positive changes in all branches and sectors of the global economy, while its basis is the Internet, mobile communications, and global electronic networks. Special attention should be paid to the development peculiarities of the important DE elements, such as the infrastructure of the information and communication technologies (ICT) market, e-business, and information systems. Their interaction leads the world economy towards higher efficiency, that is, there is an opportunity to spend less effort and resources on the production of a certain product (commodity or service),

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as well as to increase the efficiency of certain decisions. In addition, it is believed that the modern economy, based on the ecosystem of consumers, partners, and developers will become the foundation of a new technological revolution that further confirms the importance of studying this subject. Moreover, the dynamic nature of DT development generates a need for constant monitoring of indicators of global economy informatization [1]. Today's requirement is the need to move to more complex information and software systems, to create such information systems, in which the enterprise, the consumer, and the supplier become regular entities of the information exchange process. The aim of the present study is, firstly, to deepen the theoretical and methodological foundations of the DT development as an important factor in the development of the modern global economy, and, secondly, to substantiate the need to implement information systems for modern industrial enterprise management.

II. PROPOSED METHODOLOGY

A. Digital Technologies in The Global Economy

In today's global economy, DT are the most dynamic area in terms of its development. In particular, today the number of mobile connections significantly exceeds the number of residents worldwide, while the number of people, who have the opportunity to use a mobile phone, exceeds the number of people, who can meet elementary basic needs. In addition, the volume and direction of information flow among countries, their associations and continents are constantly growing. As a result, the amount of such information during 2014-2018 provided more than a third of global GDP [2]. These trends are particularly striking against the background of a certain slowdown in the growth of international trade in goods and services, as well as international capital flows.

These circumstances affect the continued complexity of the interaction of public institutions based on the modern DT both domestically and internationally. As a result, large-scale data flows become the basis of the DE, which is able to fully and effectively provide all aspects of using information. In particular, according to some researchers, today it is important not only to have a certain resource but to possess comprehensive information on such a resource, as well as the ability to use this information in the planning of activities and making important decisions [3].



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In the course of this study, it is important not only to identify current trends in the development of DT and their impact on the global economy but also to analyze them as a special, basic resource for the innovative development of contemporary society. In consequence of the change in the very nature of economic relations in terms of the DE, one should note the most important areas of its transformation in the technological sector, spatial, and socio-economic development.

In particular, some scientists [4, 5] note the close relationship and interaction between the employment patterns and IT-based management. This is manifested by the growth of employment in the digital sector of the economy due to a decrease in the proportion of employees in material production. Therefore, the very fact of employment growth in the service sector, especially information, already indicates the transition to the DE, in which physical labor is replaced by information-based service.

A number of statistical observations show that in developed countries (especially in Western Europe, the USA, and Japan), the proportion of employment in the service sector, or in sectors related to data processing, reaches 70%, or even more. At that, the most dynamic sectors are information, computer, telecommunication technologies, and a number of industries that use DT products for data processing. However, some difficulties may arise when identifying the exact number of employees engaged in the DT sector, because they have penetrated to some extent into all realms of the world economy [6].

Another important aspect of DE development is the geographical distribution of digital networks. It is referred to the formation of a data communication network linking different points and thus forming a global economic space. Scientific concepts [7, 8] developed in this area, note the presence of data communication networks as the most important feature of the DE. At that, the peculiarity of the formation and development of such networks will depend on the technological or economic aspect of the digital economy. Thus, the economic criterion for the development of the DE can be taken as a basis, namely the growth of cost in the course of working with data. In the context of DE, the activity in the information realm is dominant. Specialized companies provide a wide range of services for the data collection and analysis in accordance with customer requirements, resulting in the fact that data themselves acquire a certain value.

In the case of using the provisions of the technological concept [9, 10], it is new technologies, innovations in the field of ICT that become the most important sign of the economic system transformation, while acting as economic driver. Thus, the increasing scale of technological innovations, especially in the field of communications, can transform the system of socio-economic relations, and promote the spread of digital technology.

It is the indicators of technological development that become the main indicators of quantitative assessment of the DE development. However, in this context, special attention should be paid to the complexity of determining the role of the technological factor in the course of changing DT-based

socio-economic relations. Thus, a number of studies offer a certain set of quantitative characteristics, which, upon reaching a certain level, give grounds to assert the dominance of the digital economy [11].

Thus, technological innovations make it possible to move to a qualitatively new level of economic management. The core of the DE is the production of digital goods and providing DT-related services.

At the same time, digital infrastructure is developing, becoming more accessible, and playing an increasingly important role in technological innovation. It is also worth noting the increase in the quality of communication networks.

At the same time, it is necessary to note about the emergence of new business models, the formation of network structures, which in a certain way transform the classical market relations towards the constant need for innovation. In this context, more and more countries are intensively developing DE, applying its preferences to combat key problems of socio-economic development.

Using various methods of production automation, and significant amounts of data, whose use was made possible due to DT, contemporary corporations are able to become creators of the rising trends in the world economic development. Most researchers note about the inevitable growth of digital, intangible production based on the automation of various types of work that can lead simultaneously to different consequences – from new horizons in using human capital to the deepening of social inequality.

Therefore, the issues related to the governmental regulation of digital technology development areas, as well as their scale are becoming quite urgent. In most cases, the state policy is aimed at a set of measures to encourage the development of DE in general, form and ensure the effective functioning of the digital infrastructure, construct new business models, develop electronic networks, and in particular, increase the level of DT mastering.

It is worth emphasizing that the legal regulation and the level of economic development to some extent are decisive in the creation of the country's digital industry and attractiveness in the world market. Thus, the EU digital market (accounting for 412 mln users) [12] is fragmented that requires from managerial authority its unification and formation of a single common DT market. After all, in many countries, certain Internet resources or digital companies are blocked by the decision of the government that generates uneven digital development among European countries. In general, the two largest world economies, namely, the USA (312 mln users) and Germany (79 mln users) (for comparison: China has 772 mln, India – 462 mln users) [12] today are faced the risk of moving from the category of nations leading in technological development to the category of countries with slow digital growth.



The same applies to Japan (118 mln users) [12]. For these countries, it is important to understand that they may soon find themselves in a "digital dead end", and therefore they should timely resort to decisive actions towards gaining new competitive advantages in the global DT market. Less experienced but more dynamic IT development may become quite useful.

III. RESULTS AND DISCUSSION

A. Digital Technology In The Management Of Industrial Enterprises

One component of DT is corporate information systems (hereinafter CIS), which are now widely used in the management processes of large industrial enterprises. Their development today is due to the need for more detailed information about the market and consumers, the collection and use of diverse information, the need for intense mutual contact with the consumer; that is, the establishment of internal communication, and intense development of information technology.

In Russia, many domestic business entities use a number of well-known CIS, such as the German R/3, Swedish Scala 5 business and finance management system, and American Oracle Applications enterprise resource management system.

In Russia, for example, R/3 is applied in JSC NK Rosneft, OJSC Chelyabinsk Metallurgical Plant, JSC Vostsibneftegaz, etc. Scala system is implemented at the Chelyabinsk Electrometallurgical Industrial Complex (ChEMK), York International Russia, a subsidiary of the York International Corporation, at some enterprises of NORD Group Holding, such as for example, JSC NORD Engineering and Construction Firm. Oracle's customers in Russia include enterprises, such as the United Metallurgical Company, and many other large corporations in various industries.

Table 1 presents the comparative characteristics of the mentioned CIS systems.

Table 1. Main CIS components

CIS	R/3	Scala 5	Oracle Applications
The main CIS components	Financial accounting and reporting system (Finance, financial accounting) - FI	Accounting scheme	Customer Relationships Management (CRM)
	Accounting for fixed assets (management, planning, and control of fixed assets) - AM	Ten reporting measurements	Material flow planning
	Project planning and management – PS	Reporting levels	Stock management
	Controlling – CO	Currency file	Financial consolidation
	Materials management – MM	Automatic cost sharing	Supply and sales management
	Maintenance and repair of equipment – PM	Periodization	Management information support system
	Sales and distribution (sales and shipping) – SD	Reconciliation of accounts	Financial analysis and planning
	Quality assurance system – QM	Request procedures	Payment management
	Production planning – PP	Simulation modeling	Billing and fundraising
	Human resource management – HR	Budgeting	Cash flow
	Investment management – IM	User reporting	Fixed asset management

As a rule, companies, smaller than the above-mentioned Russian companies, have systems that do not fully comply with the concept of "information management system". Many of them are mainly associated with information technology systems, through which the enterprise's management team carries out the current management of different scopes of activity. These are, first of all, resource planning systems, sales and supply management, customer relationship management, etc. The market volume of such software is constantly growing, and the cost of its acquisition and implementation becomes one of the most important items in the corporate budgets.

So, to overcome the existing problems, the information system for Russian enterprises should take into account the following aspects:

- understanding of enterprise's management team of the need to implement digital technologies;
- understanding that the information system is a management system rather than an accounting tool;

- compliance of the information system with Enterprise Resource Planning (ERP), i.e. planning of all enterprise's resources.

The ERP-system should have experience of successful implementation and the largest set of industry solutions, though one must remember that the approaches to management in Russia and the West countries are different. Thus, the differences between the information systems functioning in Russia and those functioning abroad are as follows:

- for foreign enterprises, the main problem is an excess of data, while for domestic companies, the main problem is their shortage;



- foreign companies solve the problem of data accumulation and analysis, while domestic companies are engaged in the data collection issue.

That is why, in our opinion, modern information systems should be developed in Russia and be most suitable for the automation of domestic enterprises, as well as comply with domestic legislation and management features.

Domestic companies follow the path of foreign companies with some lag. The latter have already realized that effective activity in the global or domestic market requires effective management of all scopes of activity, which to some extent depends on the implementation of DT.

IV. CONCLUSION

Summing up, we can conclude the following.

In the current context of global economic development, the DT sector is an important source of competitiveness of countries in the world market. At the same time, digital dependence among countries may lead to some lag in economic development among them. After all, creating a new competitive advantage, and going forward the path of economic development can only be based on the progress of the DT and their consistent use in the course of the functioning of socio-economic systems. Therefore, depending on the development level of DE, the key drivers of its development will depend on a set of socio-economic characteristics. Thus, developed nations should pay more attention to innovations, while developing countries should place emphasis on institutions. Countries with the least developed DE should effectively allocate and use limited resources towards the effective and inevitable development of DT.

The results of the present study allowed determining that, despite certain problems, information systems are an important management tool for modern enterprises. Performing the functions of data grouping, systematization, processing, and analysis, they help to successfully implement management functions in the enterprise and control the information flows.

Thus, modern innovative development of enterprises is impossible without the latest DT. One main condition for achieving success in this challenge is providing maximum integration of various information systems, which should help the management bodies to ensure the effective operation of the enterprise.

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