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Main directions of development of infrastructure in digital economy

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Abstract. Nowadays digital technologies penetrate deeper and deeper into all human activities. Digitalization influence not only business organization but changes the whole society. The article analyses the essence of term “digital economy”. The study objective is to investigate the current state of digital economy and determine the direction of its infrastructure development. Here we determine the main traits of digital economy, information-technological structure of digital economy, digital economy platforms functioning mechanism. Along with information infrastructure an important element of digital economy – digital security (cyber security) is outlined. Cyber security is a protection of information infrastructure systems and it should provide safe work in global and local networks, safe operation of applications and digital platforms. Infrastructure of digital economy in Russia is analyzed: proactive security technologies, target object domain analysis, higher competitive level of the country. An issue of developing a modern economic theory of digital economy is being discussed.

1. Introduction

Modern society is developing in the context of global change. Progress in electrical engineering, information technologies and telecommunications cause digital transformation of all fields of our life activity. For Russia digital economy is a great opportunity to redirect the country economy to effective steady development. Digital economy is first of all a totality of economic operations and services which are implemented and provided through digital technologies and communications [1].

Digital communications is an important sector of economy. This type of economic management influences not only the development as a whole but changes the ways of social interactions and structure of economic relations. Besides the development of digital economy in the country is not only the issue of increasing the competition level of national companies but is the key aspect of national security and state independence. Digitalization, which is understood as the use of online capabilities and innovative digital technologies, ranging from an individual to large companies, is an important condition for maintaining the country's competitiveness [2].

The level of digital technologies introduction to various fields and areas of our life activity is an integral part of such type of economic activity. According to the decree of the President of the Russian Federation No 203 dd. May 9, 2017 “On strategy of development of information society in the Russian Federation in 2017–2030” digital economy is an economic activity considering digital data to be a key production aspect as well as processing big data and using analysis results of which compared to conventional economic management forms allows to materially increase effectiveness of various production, technologies, equipment, storage, sales, delivery of products and services [3]. Today there are the following basic distinctive features of digital economy [4]:

- economic activity is focused on platforms of digital infrastructure;



- introduction of personalized service models;
- direct interaction of manufacturers and final users;
- lack of theory basis and system of parameters of digital economy development.

Objectives of the article are a) studying the current state of digital economy; b) analysis of the composition of digital economy platforms' modern infrastructure. This study is relevant as it is necessary to substantiate those main directions of enterprises and organizations activity in the nearest future will be oriented to requirements of new digital economic models considering a need to expand the infrastructure of digital economy [5].

2. Study trend

2.1. *Determining the essence of digital economy*

The main characteristic of digital economy is a redirection of economic activity to software and hardware complex of digital media including the set of functions and services meeting the demands of economic system entities and providing the direct interaction between them [6]. That means it is such a type of economic activity that is based on digital platforms joining the participants of production process in a joint information media reducing transaction expenses through digital technologies. There are quite a lot of examples of companies the activity of which is based on principles of platform business model. Providing banking services online is a striking example of such platforms.

An important feature of digital economy is an existence of personalized service model. Considering the modern globalization and extension of digital channels the submitted services and goods are standardized. That is why the leading market players pay much attention to development of technologies providing the demands, needs and requirements not of an average consumer but of particular clients. Targeting and targeted marketing are strongly related to goods personification processes. They are the mechanisms enabling to mark the target audience and to attract the particular clients [7].

An important feature of economy digitalization is the influence of the Industry 4.0 and information and communication services to immediate interaction between manufacturers and consumers. The role of distributors in goods and services chains is decreased and an approach to supply chain management changes. So, a material growth of digital technologies and capabilities modify conventional linear supply chains to connected, smart, scaled and quick supply chains [8].

A great contribution to building of digital economy is made by individual participants of economic activity. The segments of trade relations are changing: widespread commercial interaction between companies and final user (business-to-consumer) now is supplemented by business relations of "consumer-to-business" kind (C2B). An example of such interaction is the activity of freelancers and start-upers which act in the context of outsourcing [9].

Besides a specific feature of it are risks and problems related to introduction of digital and information technologies to our life activity:

- threat of country independence in a transborder world of digital society;
- broken principles of citizens privacy rights;
- vulnerability of information data;
- change of labor market and higher unemployment level for low-and medium-qualified specialists;
- necessity to make changes to administrative and tax laws of the country;
- restructuring of business models and interaction patterns of economic agents [5].

2.2. *Information-technological structure of digital economy*

One of key tasks to build a digital economy is to develop an information and technological infrastructure, its stable, safe and regulated operation. In digital practice the use of communications and channels of information distribution to a large extent determines the economic development.

The digital economy infrastructure development plan is given in the document approved by the Government of the Russian Federation No 1632-r dd. July 28, 2017 "Digital economy in Russian

Federation” [10]. This plan contains over 300 events on development of 5th generation of communication networks, data storage and processing infrastructure, development of “digital” infrastructures, providing fair access of citizens to digital services. Special attention is given to building of an infrastructure level of a new type – digital infrastructure platforms the main advantage of which is ability to apply them in various field of economy [11]. But it’s worth mentioning that existence of such platforms and other kinds of information infrastructure on its own does not determine the digital economy. They are just the way to implement these or those jobs and organize the processes. Only together with ability to use, change and introduce new parameters to these systems the information and technological infrastructure can be demanded by digital economy.

But the introduction of the platform is not the only factor to provide digital meaning to business. Before estimating development factors of business processes the essence of this term needs to be determined. Digital platform is a software media, algorithmic functional system including digital data, models, tools providing interaction of market participants and management of target subject area [5]. This term in the context of developing economics of modern type can be understood by determining the factors stimulating to develop and use digital platforms [12]. One of such factors is to increase the data quality. Here we speak of dependence of information system functioning on quality, quantity and kind of data which is available to process the specific task. The reducing of data quality in digital economic space causes direct reduction of quality of services rendered to clients (figure1).

The next factor stimulating in the context of informational exchange to redirect the business to develop and use digital solutions is to analyze the target subject area. Competition causes economic entities to continuously study the subject area where the business operates and to search for solutions which allow to statically and dynamically study, build and automate business models in a respective activity field.

An important issue is to introduce proactive technologies to provide business information security [13]. The proactive security means a system of methods and technologies to provide blocking of user system infection if the detected activity is a real threat. This factor determines the necessity of operative support of data and transactions security providing a high loyalty level.

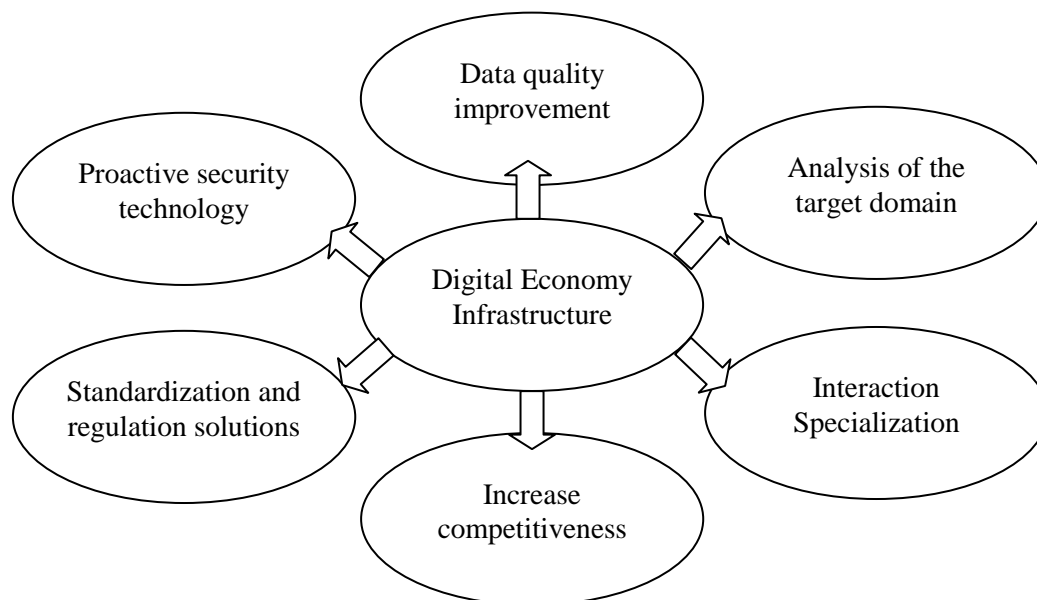


Figure 1. Digital economy infrastructure.

Digital economy infrastructure should contribute to the following:

- Higher competitive level;
- Higher data quality;
- Development of proactive security technologies;
- Interaction specialization;

- Decisions standardization and adjustment.

Besides the digital platforms allow to develop new, more effective forms of interaction of economic entities on the basis of programmed commands as well as enable the users to choose not only the supplier but the parameters of the submitted product or service.

2.3. Mechanism of functioning of digital economy platforms

Considering the general mechanism of digital economy platforms three main components can be distinguished: client services, manufacturer economic system and connecting communicative core (figure 2). Each of structural parts implements some definite functions and can exist irrespective of other components of digital platform [5].

The main function of client services is to provide the most comfortable and functional system use and to meet all needs of platform user. Communication, news, leisure, purchase, education is a small part of client ecosystem directions. A vivid example is a transnational public corporation Google the main product of which initially was a search system. Today the company not only processes billions of search requests but has many online products which are not related to search functions: mail service, social network, office applications, browser, instant messenger, musical services, etc.

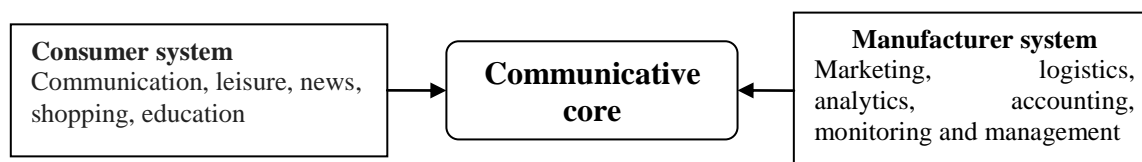


Figure 2. Structure of the digital economy platform.

On its turn the manufacturer system includes services enabling effective solving of business problems, reduce the threshold of business sphere entrance and reduce expenses at various levels of production and management. It includes accounting, logistics, marketing, business analytics, etc.

The communication core of the platform is required not only to implement interaction of consumers and manufacturers but to provide infrastructure and technological basis. Here it is worth speaking of cloud technologies considering storage, processing of data at remote servers as ability of shared access to this data. Besides the infrastructure functional of the core are payment systems, Big data sources and cyber security systems. A nice example to understand the core of digital communications is Uber digital platform which provides services of online call for taxi and taxi driving. This application does not include the elements of consumer system or manufacturer system but connects a “client” and a “driver” [5].

Structural elements of general composition of digital platform can exist irrespective of each other. But still exactly in the result of integration and merge of these parts to a joint model the effectiveness of economic activity increases materially.

Along with information infrastructure the second element of digital economy – digital security is worth mentioning. Cyber security is one of key conditions to build a digital economy both on national and regional levels. The main threat of cyber security is to the markets depending on the World Wide Web: industrial, financial, governmental fields.

In 2014 a concept of cyber security in Russia has been published [14]. According to this strategy cyber security is a set of conditions when all components of cyberspace are protected from maximum number of threats and impacts with undesired consequences. The stress is made to necessity to hold and invest to scientific research and programs in information security, enhancement of regulatory and legal base, arrangement of regular estimation and analysis of protection level of state and municipal information systems and information and telecommunication networks from cyber threats [15–16].

Cyber security is a protection of information infrastructure systems and it should provide safe work in a global and local networks, safe operation of applications and digital platforms.

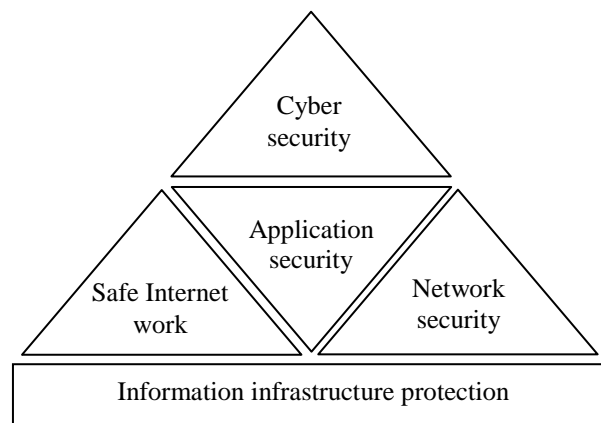


Figure 3. Cyber security in the system of information security spheres.

3. Results of study

Thus after analyzing the main factors of introduction of digital platforms and their operation mechanism we can conclude that one of key directions of economy digitalization today is to introduce key technologies of IT infrastructure. Orderly development of data transfer networks determines the capability to make safe, high speed and effective communications and transactions. It is necessary to organize the so-called technological companies which are characterized not only by existence of their own platform but by capability to service and develop it considering economic changes.

But digital transformation of our living activity, professions and kinds of interaction not only increases quality and quantity of economic activity but brings actual risks and threats. That is why along with building IT infrastructure it is necessary to provide information security of personal data, information of governmental bodies and commercial organizations as well as increased level of credibility of economic bodies in electronic activity field. To provide security in the context of digital economy at the governmental level new integrated solutions to forecast and to suppress offences against citizens in a digital media, implement business initiatives to build a system of automated exchange of information on threats in digital space as well as provide using local certified competitive technologies and solution on the territory of Russia need be developed [17].

4. Conclusions

1. Digitalization which is interpreted as using online and innovation technologies opportunities by all participants of economic system is a necessary condition to preserve the competitive level of the country. For Russia it is a unique chance to redirect its economy.

2. Digitalization process in Russia can be compared to dynamics of other countries using index BCG e-Intensity.

3. The current stage of digital infrastructure development is characterized by fast penetration of wider range of digital services, products and systems. In general considering the level of infrastructure development Russia is a leader in BRICS countries but it is 1.5 times behind the mean value for OECD.

4. The actual element of digital technological infrastructure are digital platforms which allow to develop new, more effective forms of interaction of economic entities on the basis of programmed commands as well as enable the users to choose not only the supplier but the parameters of the submitted product or service.

5. Structural elements of general composition of digital platform can exist irrespective of each other. But still exactly in the result of integration and merge of these parts to a joint model the effectiveness of economic activity increases materially.

6. The infrastructure of digital economy should promote higher competitive level of the country, higher quality of data.

5. Further study tends

Digital economy is a relatively new direction in a Russian economy. For an efficient performance of digital economy it is important to elaborate its infrastructure system which is based on scientific principles which should have theoretical substantiation. That is why one of key objectives of further study is to try to build a modern economic theory of digital economy and detect the principles to build the infrastructure of digital economy. Special attention should be drawn to an issue of building a modern economic theory. At the moment there is no distinct theoretical basis and indicators of development of digital economy. Stated in XX century economic laws of development of services and non-material production sector as well as theories of actual producing economy cannot any more be used for correct description of digital economy.

When forming the modern theory the trends of the latest decade should be considered. First of all it should be understood that today information is goods, welfare and living standards of the society are directly related to specific use of energy and the social status is replaced by social prestige and influence.

It is obvious that development of digital economy should be oriented not only to technological infrastructure. Sufficient attention should be drawn to building institutes which later will determine conditions of digital economy evolution: education, human resources and regulatory fields.

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