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INTERNET OF THINGS AS A TOOL FOR DEVELOPMENT OF RUSSIA'S DIGITAL ECONOMY

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ABSTRACT

In the modern world, the technologization of various spheres of life is becoming a growing trend. The consumer properties of goods are radically changing. The article examines the emergence, the dynamics of the growth and the development prospects for technologies, related to the concept of the "Internet of things" along with the development specifics of the "Internet of things" concept as one of the drivers of the fourth industrial revolution.

Keywords: Internet of things, digital economy, digitalization, Internet, modern technologies.

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1. INTRODUCTION

Information and telecommunication technologies are not only an integral part of the everyday life of a modern person but also a necessary technological platform for organizing modern business processes. Today the active development of smartphones, the creation of mobile applications for gadgets allow to quickly monitor, record and save various aspects of a person's life: from the list of constant contacts, a sequence of the performed work functions, conducted bank transactions, recent purchases to the state of physical and emotional well-being. However, new information technologies bring the collection, aggregation, and exchange of the accumulated information to a fundamentally different qualitative level with a minimal role and degree of human intervention [1-6]. These technologies become the drivers of the fourth industrial revolution.

The "Internet of things" can one of the most effective tools in achieving a new level of digitalization. This concept becomes the practical basis of life and business. Many countries put high hopes on the digitalization of the economy, which is understood as various elements of automation. The number of "connected" devices across the globe is growing (according to the industry analysts, by 2020 there will be around 20-50 billion units), and with it the list of examples of application of the "Internet of things" is also growing in the economic sectors: energy, industry, housing and utility services, transport, healthcare, etc. [7-12].

2. LITERATURE REVIEW

The review of the scientific literature on technology research, related to the concepts of "digital economy" and the "Internet of things" showed the relevance of this topic, which is widely discussed in the scientific community, as well as widely represented in the media.

The concept of "digital economy" emerged in 1995 and was associated primarily with the rapid improvement of information and communication technologies. The improvement of communication, as well as mobile communication, is the "base technology of digital economy". However, eventually, this work affected all sectors of the economy and social activities, including manufacturing, healthcare, education, financial services, transport, etc.

According to the World Bank, digital economy (in the broad sense of the word) is the relationship of economic, social and cultural relations, collected on the use of digital information and communication technologies.

One can find the following definitions of the term the "Internet of things" in modern literature:

1. The "Internet of things" is a single network of physical objects that can change the parameters of the external environment or their own, collect information and transfer it to other devices [13].

2. The "Internet of things" is a wired or wireless network that connects devices with autonomous software, that are managed by intelligent systems equipped with a high-level operating system, independently connected to the Internet, can run their own or cloud applications and analyze the collected data. In addition, they can capture, analyze and transmit (receive data) from other systems [14].

3. The "Internet of things" is a network of physical objects equipped with technologies for interaction with each other and the external environment.

The ideology of the "Internet of things" is aimed at improving the efficiency of the economy by automating the processes in various fields of activity and eliminating human participation [15].

The authors believe that the most complete definition of the term "Internet of things" is as follows: it is the methodology of a computer network of physical objects ("things") equipped with embedded technologies for interacting with each other or with the external environment, considering the organization of such networks as a phenomenon that can restructure economic and social processes, excluding the need for human participation from part of the actions and operations.

3. METHODS

This study examines the experience of introducing technologies of the Internet of things in Russia and in other developed countries of the world community, and the results of the potential expansion of the "Internet of things" technologies for the economy as a whole. In the analysis, the authors used expert opinions of industry experts.

When selecting the industries for analysis of the "Internet of things" technology, the authors focused on the industries with the greatest potential from introducing these technologies. The preliminary selection of such industries was based on the analysis of international experience [16-19]. This made it possible to compile the most objective picture and consider the advantages and disadvantages of the "Internet of things" technology. In the forecast, the authors used macro indicators from the Forecast of the long-term socio-economic development of the Russian Federation for the period up to 2030.

5. RESULTS

5.1. Strategies and development prospects for the "internet of things" technology

The digital platform is a new business model, typical only for the digital economy, which aims to provide businesses and people with specific services to coordinate the activities of various market participants. The platform provides the participants with a range of amenities, automatically generates ratings of trust between them, and most importantly, allows sellers and buyers of goods/services to quickly find each other, promptly make a deal and conduct calculations. The functioning of the platforms fastens and cheapens the processes of production and exchange, eliminates unnecessary intermediary links, dramatically increases the efficiency of markets and labor productivity [20]. At the same time, most platforms can serve the participants of transactions without any geographic restrictions, almost throughout the planet. The examples of these digital platforms are Uber, Airbnb, Amazon, Alibaba, and many others.

Today, various digital platforms merge into interconnected, data-sharing "ecosystems". The creation and launching of a new generation of digital platforms, covering a huge number of different markets and enterprises, is on the agenda. The use of the "Internet of things" technology offers great opportunities in the production of new goods and services [21], as well as the improvement of already existing products. The introduction of the "Internet of things" technology enables companies in various industries to create new products and services which, thanks to the new technologies, acquire properties and qualities that fundamentally change the principle of their operation or suggest new opportunities for consumers.

In the sphere of healthcare, the "Internet of things" technology will enable the launch of intelligent remote systems of health monitoring that help to collect and analyze information on the course of treatment and the patients' condition, while analyzing this data in real time [22]. To date, several devices on the market already allow identifying and instantly warning of changes in the indicators that may mean complications such as a stroke or a cardiac failure. Such data is collected using the latest technologies of the "Internet of things" – devices – microsensors,

nanosensors, and nano-scale biochips. The use of the "Internet of things" technology in healthcare allows switching to a new level of disease diagnostics, the accuracy of treatment and monitoring the health status of patients using micro- and nano-sensors and other "smart devices". As a result, the efficiency of medical institutions will increase. In particular, remote monitoring decreases the risk of unplanned hospitalization and reduces the load on hospitals, while simplifying the interaction between doctors and patients "at a distance". The economic effect from the introduction of the "Internet of things" technologies in the field of healthcare is estimated at 536 billion rubles until 2025.

A significant part of the "Internet of things" technology-solutions is aimed precisely at improving the existing products and services in various industries and fields of activity by ensuring the continuity of their work, preventing troubleshooting, optimizing the use of raw materials and reducing the influence of the human factor [23]. Ultimately, these decisions are aimed at creating a more positive consumer experience.

Cost reduction is one of the key drivers of the "Internet of things" technology market. The introduction of new technologies in the industry allows to cut costs and reduce losses, and along with the increasing productivity – to reach a fundamentally new level of work in terms of efficiency. For the end users, cost reduction is also an important factor when installing, for example, "smart meters", since it helps to use water more intelligently – as well as electricity in the future. Reducing costs in optimizing the load on personnel will be equally important (both in production and in the maintenance of "smart urban infrastructure").

At present, the capacity of the global market for the "Internet of things" technology-solutions is estimated differently. Until 2020, it may exceed $ 1.2 trillion, while the volume of the Russian market is still relatively small. The range of estimates is related to the person who performs the calculations and the segments that are considered in the market structure. Nevertheless, according to the authors, the most important indicator is not the size of the market for technological solutions and consulting in the field of the "Internet of things" technology, but the multiplicative effect that these technologies have on the economy by increasing productivity and reducing costs [24-29].

It should be noted that the achievement of the multiplicative effect depends on the systematic state approach to implementation of the "Internet of things" technology in Russia: updating the regulatory framework, elaborating support mechanisms, creating conditions for developing human resources, promoting the Russian experience abroad, consolidating and coordinating industry communities. Currently, an increase is noted in the number of state initiatives in this direction, but not all of them have yet been implemented in practice. In the case of a thoughtful and systemic approach, the "Internet of things" technology can become a significant factor in the growth of the Russian economy in the long-term perspective.

Most executives believe that the investment in the "Internet of things" technology will reduce costs, this answer was the most popular among industrial companies. Corporate executives in the area of financial services, technologies and consumer goods primarily expect improved customer service, and financial companies predict risk reduction. Most chiefs of technology companies also hope that the introduction of the "Internet of things" technology will increase the revenue from services.

In 2010-2016, the share of digital economy in the GDP of developed countries has increased from 4.3% to 5.5%, in the GDP of developing countries – from 3.6% to 4.9%. In the G-20 countries, this indicator has increased from 4.1% to 5.3% over these five years. The world leader in the share of digital economy in the GDP is the United Kingdom – 12.4%.

Table 1. The increase in the share of the digital economy in the GDP of the G-20 countries in 2010-2016 (the share of the digital economy in the GDP)

Countries	YEARS	
	2010	2016
Great Britain	8,30%	12,40%
South Korea	7,30%	8,00%
China	5,50%	6,90%
India	4,10%	5,60%
Japan	4,70%	5,60%
USA	4,70%	5,40%
Mexico	2,50%	4,20%
Germany	3,00%	4,00%
Saudi Arabia	2,20%	3,80%
Australia	3,40%	3,70%
Canada	3,00%	3,60%
Italy	2,10%	3,50%
France	2,90%	3,40%
Argentina	2,00%	3,30%
Russia	1,90%	2,80%
South Africa	1,90%	2,50%
Brazil	2,20%	2,40%
Turkey	1,60%	2,30%
Indonesia	1,30%	1,50%

According to the study conducted by the analysts of the International Data Corporation, published in 2016, the total global costs of digital transformation technologies will grow by 16.8% annually and will reach $ 2.1 trillion by 2019. According to the forecasts of the consulting company Accenture, the use of digital technologies should add $ 1.36 trillion in 2020 or 2.3% of GDP in the total GDP of dozens of the world's leading economies. The GDP of the developed countries will grow by means of the "digital economy" by 1.8%, and the GDP of the developing countries – by 3.4%. The Boston Consulting Group (BCG) predicts that by 2035, the volume of the digital economy could reach 16 trillion US dollars.

In Russia, the share of the digital economy in GDP accounts for 2.8%, or $ 75 billion (according to the BCG). The major amount – 63 billion US dollars – accounts for the sphere of consumption (online commerce, services, online search and offline purchases). If in 2010, the share of online commerce in all sales was 1.7% (12 billion US dollars), then in 2016 it increased to 3.2% (43 billion US dollars). The export of IT technologies amounted to $ 7 billion. The inter-sectoral effect of digitalization has increased by 5.5 times since 2010: from 5 to 27.7 trillion rubles. This was due to the introduction of electronic trading platforms, the growth of bank card transactions, the increase in ROPO segments and online advertising.

At the same time, Russia is 5-8 years behind the leading countries of digitalization. With the current growth rate of the digital economy, by 2020 Russia will remain at the same level; due to the high speed of global changes and innovations, this gap will amount to 15-20 years. At the same time, in recent years, the state of infrastructure in Russia has improved, primarily in terms of distribution of wired Internet (70.4% of the total population). Major advances have been noticed in the availability of broadband and mobile Internet, as well as in the distribution of smartphones.

6. DISCUSSION

When analyzing the dynamics of the innovative technologies development associated with the concept of the "Internet of things" in Russia, one can notice an increase in the "digital gap" (the gap in digital education, in terms of access to digital services and products, and as a result – a gap in welfare) between citizens and businesses inside the countries as well as between the countries. Let us note some objectives for 2019 in terms of digital state government, which should be performed by the government and the regions. The government will improve the work of basic, key information resources: the unified state register of real estate, the unified passport base, the unified register of the population and the unified state register of legal entities.

Today, the digital economy is named one of the priorities in Russia's scientific and technological development strategy. Full-fledged consistent digitalization of the Russian economy will become a platform for a qualitative change in its structure and long-term opportunities [30-36]. The government of the Russian Federation is preparing the "Digital Economy" program for the intensive development of digitalization in Russia. This program focuses not only on the basic components of the digital economy but also on the growth of investments of the private and public sector in such promising areas as the "Internet of things", big data, development of IT products and services with high export potential. This will enable an increase in the share of the digital economy to 5.6% of GDP, as well as create large-scale inter-sectoral effects and real added value in the industries up to 5-7 trillion rubles per year.

7. CONCLUSION

The "Internet of things" technologies are not only the technology itself, but also the basis of a new production system / production philosophy for companies in different industries. Like any production system, the "Internet of things" technologies require significant transformation of methods, internal business processes, production and companies' management culture. Therefore, the main objective in implementing the "Internet of Things" technology is not only the transition to new technology and IT solutions but also a change in business models. The "Internet of things" technologies, according to many experts, are recognized as the development leader in terms of potential for the changing business models of companies and entire industries.

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