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**THE IOT BASED SERVICES DEVELOPMENT IN DIFFERENT  
SPHERES OF RUSSIAN ECONOMY**

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**Abstract**

The Internet of things technology provides a basis for improving existing and creating new products and services, and also allows to optimize the business processes of enterprises in different spheres of Russian economy. The purpose of the current study based on the definition that formation of a new market space requires a separate study and research of its segments. Identifying of the specifics of interaction between subjects of the IoT services market and to form a communication model of interaction between these subjects is considered as the main results of this study. The IoT-based projects implemented in the Russian market analysis allowed us to identify key segments of the development of products and services based on IoT, as well as to reveal that the absolute majority of projects are implemented on the initiative of the Government, while the state itself is a major consumer of IoT-based services. Russian Government plays the most important role in IoT-based services local market formation because of its' role as the main consumer of this services and regulator of economic and political environment. In the case of a well-thought-out and systematic approach, IoT can become one of the factors of growth of the Russian economy in the long term.

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## 1. Introduction

The formation of the Internet of things market forms a new economic space based on the development of new and transformation of existing types of services. Studying and understanding the operating conditions of these services is the basis for optimizing the business processes of enterprises operating in IoT market. IoT technology is one of the technologies with the greatest potential for application. One of the reasons for this is the fact that the necessary infrastructure for IoT operation has already been partially created (Di Martino et al., 2018).

By creating new consumer value, services based on IoT technology expand the boundaries of a traditionally existing market. Services provided on the basis of IoT penetrate not only into manufacturing enterprises, but also into the homes of private consumers. Some of the services that were previously performed by people in the form of normal life processes are replaced by services that can be managed using a regular smartphone (Firouzi et al, 2020). Thus, it is necessary to study the specifics of the IoT-based services development in different sectors of Russian economy and market segments.

## 2. Problem Statement

IoT technologies have a number of application features and limits in Russian market regarding the specifics of the economic, legislative, technological and other spheres. Usually IoT services market is divided into three segments: B2C (consist of the private customers and also so-called mass market), B2B (include commercial companies) and B2G (including different kind of the state-owned companies and government agencies).

End-users are more likely to make purchases on impulse and much more influenced by innovative trends. According to the PwC (2019) data, the income of the population in Russia is 75% less than the income of the population in Europe. This fact makes it necessary to purchase basic goods and essential services, while the purchase of new products and more expensive goods is postponed for the future.

The corporate segment (B2B) is more inert than B2C, since decision-making in companies regarding the introduction of innovations is a more complex and lengthy process, and also requires a significant amount of costs for their implementation.

The state, as a subject of the market and the Provision of services, plays a special role in it. On the one hand, the state manages a significant number of infrastructure facilities in the field of construction, energy, transport and others. On the other hand, the state regulates the IOT market through legislation and encourages it through budget allocations. The (B2G) segment is considered the most attractive for implementing IOT-based services, since it is here that you can expect the greatest economic effect from the introduction of these technologies, which is primarily due to the potential scale of implementations. But, on the other hand, this segment is the most inert in terms of implementing this kind of innovation, compared to other segment (PwC, 2019).

## 3. Research Questions

The key research questions of this article are to study the specifics of the market for services based on IoT technology. Research of any market is reduced to solving a sufficiently specific range of tasks. So,

the first task is to assess the capacity of this market. The second task is to study the segments of this market and identify their features. The third task is to analyze the areas of application of IoT technology and how to implement services based on this technology. The fourth task is to assess the economic effect of the IoT technology implementation in different spheres of the Russian economy. The solution of research questions will contribute to achieve of this study goal.

#### **4. Purpose of the Study**

The current issue purpose is to study the main areas of application of IoT technology in different sectors of the economy and reveal the services development specifics in different segments. In general, the Internet of things market is usually divided into two large segments: industrial and consumer. We can state that difference between the IoT variants concern the main goal and final user of the IoT. Customer IoT includes smartphones and tablets, wearable fitness and outpatient medicine sensors, smart house technology etc. Industrial IoT is used widely then customer IoT. IIoT combines' M2M technology, BigData analysis and production automatization technology (Evtodieva et al., 2020). There is no unified approach to determining the number of industries that belong to these segments, especially industrial, till now. This makes it difficult to assess the market as a whole and each segment in particular.

#### **5. Research Methods**

Scientific research is carried out by certain techniques and methods, according to certain rules. The objectivity of obtaining knowledge is primarily due to the choice of research methodology. To achieve this goal and solve the problems of this study, General scientific and private scientific methods were used. During current survey there were used following methods: analysis and synthesis, matrix methods, system approach and descriptive research. Descriptive research is marketing research aimed at describing marketing problems, situations, and markets. The selected research methods are mainly aimed at applying new theoretical knowledge and to achieve practical goals and solve specific problems. The complex of used methods confirms the validity of the study conclusion.

#### **6. Findings**

Currently, the capacity of the global market for IoT solutions is estimated in different ways. But the volume of the Russian market is still relatively small. The spread of estimates is related to who makes the calculations and which segments are taken into account in the market structure. But, in our opinion, the most important indicator is not the size of the market for technological solutions and consulting in the field of IoT, but the multiplicative impact that these technologies have on economic sectors by increasing labor productivity and reducing costs (PwC, 2019).

According to PwC calculations, the cumulative effect of IoT implementation will amount to about 2.8 trillion rubles by 2025 in the following areas: healthcare, agriculture, logistics, electric power, the smart city and smart home. It could be achieved by reducing cost and improving the efficiency of production processes (Zaheeruddin, 2020).

If earlier experts expected a 14.9% increase in global spending on IoT solutions in 2020, now they call the figure 8.2%. Taking this into account, the volume of the market under consideration may amount to \$ 742 billion. In the coming years, analysts predict growth of 11.3% per year.

As for the regional cross-section, China, the United States and Western Europe will account for approximately three-quarters of all costs in the Internet of things market in 2020. These three regions initially had approximately the same IoT investments, but in China they will increase faster: the average annual growth rate of the Chinese IoT market is expected to be 13.4% compared to 9% and 11.4% in the United States and Western Europe. In the Middle East and Africa, the annual dynamics will be +19%, in Europe - +18%, in Latin America - +16% (DailyComm, 2020).

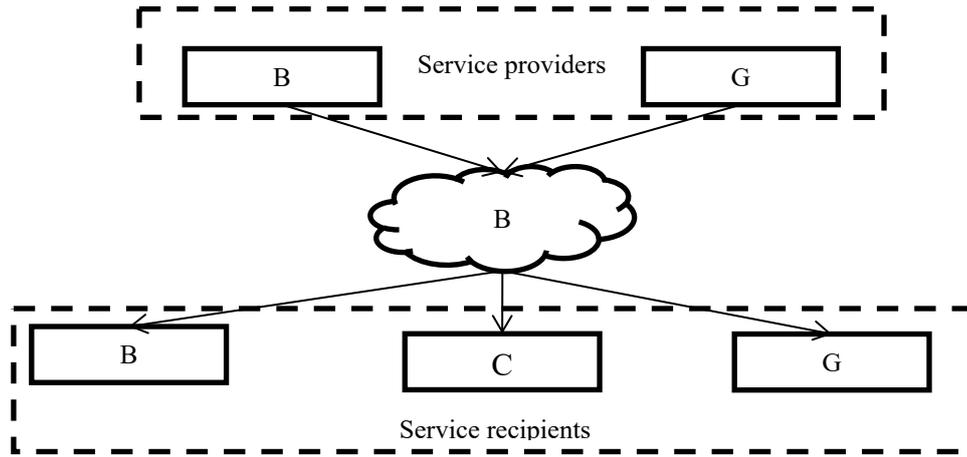
Currently, there are two segments, but, in our opinion, it is advisable to distinguish IoT market into three segments depending on the subjects of interaction: B2C, B2B and G2C. In the B2B segment, we can also differentiate companies that operate on the basis of insourcing.

In our opinion, it is also advisable to allocate the G2B and G2G segments. Since business is a major consumer of services provided by the state, and the number of projects of the Internet of things in Russia implemented through public-private partnerships (for example, "Platon", the introduction of online cash registers and the national system of digital marking "Honest sign"), we can identify the sub-segments G2B2B and G2B2C where intermediate business link is a partner of the state. The state is also a consumer of services and services provided by itself. In this study, we will understand in a broad sense all categories of consumers of the Internet of things market, in particular, "consumer "(not only customer IoT segment, including smart home systems and wearable devices, but also other services that end users receive)," business "(not limited to industry and industrial IoT)," state "(including state and municipal authorities).

Given the specifics of the IoT market, that should be mentioned that the provision of services is carried out only within the IoT ecosystem, which changes the communication model of this market subjects, we can say that there is an intermediate business link, without which the process of providing services is impossible. This intermediate link includes Telecom operators, companies that install sensors, collect and process data, developers of platforms and cloud systems, etc. Interaction of IoT market entities is carried out according to the following picture (Figure 1).

We should note that the interaction of actors in this market is more complicated than this scheme, since the process of providing services based on Any multiple, however, in some sectors the participation of intermediate business partner is needed because, for example, in G2B and G2C segments. When providing services initiated by a business entity, the presence of an intermediate business link is not required. In fact, only this entity can provide services completely independently.

The Internet of things technology is being implemented in many sectors of the economy, while consumers of products and services in these industries are various entities (end users, businesses, government agencies), so the service system formed on the basis of the use of IoT technology has an intersectoral character (Table 1).



**Figure 1.** Communication Model of IoT Market Subjects

Source: authors.

**Table 1.** Matrix of projects implemented on the basis of Internet of Things technology by various segments and sectors of the Russian economy allocation

Sectors of the Russian economy	Segments				
	B2C	B2B	G2C	G2B	G2G
Industry	-	+	-	+	-
Transport	+	+	+	+	+
Logistics	-	+	-	-	-
Electric power industry	+	+	+	+	-
Medicine	+	-	+	-	-
Agricultural industry	-	+	-	+	-
Construction industry	-	+	-	-	-
Utilities sector	+	+	+	+	+
Retail	+	-	+	-	-
Urban environment	-	-	+	+	+
Service sector	+	+	+	+	+
Ecology	+	-	+	+	+
Media industry	+	-	-	-	-

Source: authors.

According to table 01, we can assert that the highest degree of activation of the introduction of Internet of things technology is observed in segments where the state participates (in 2016, the share of the G2B segment was more than 80% of the market) (CRN, 2017), at the same time, most of all this technology is being implemented in such industries as transport, electric power industry and service sphere. However, there is a significant potential for the use of the industrial IoT, which is confirmed by the highest growth rates of this industry in 2019 (Ustinova, 2019). According to PwC by 2025 the introduction of IoT in six sectors of the Russian economy will have a combined effect of about 2.8 trillion rubles, while in logistics the effect will be 542 billion rubles, in healthcare-536 billion rubles, in electric power-532 billion rubles, in agriculture - 469 billion rubles, and in the urban environment-375 billion rubles (PwC, 2019).

This assessment of the potential effect of implementing IoT-based services is quite optimistic. However, as noted earlier, the development of IoT technology in the Russian market is largely influenced by government incentives. The state of the Russian economy under the crisis influence does not allow the

state to actively develop the implementation of innovations. A reduction in funding for projects based on IoT technology was reflected in 2019 in Russia. In particular, the results of 2019 budget execution of the national program "Digital economy" was the worst of all national programs – 53.6%. During the implementation of the program, the deadlines for major projects were violated, including the development of 5G communication networks, the creation of a state unified cloud platform, a typical automated workplace for a civil servant, a venture Fund to support educational projects, and other activities that are based on achieving results under the program. In particular, in the "Information infrastructure" direction, 11 out of 15 measures were not implemented in 2019. Sequestration may also affect the implementation of roadmaps, in particular, the development of the Internet of Things is expected to be reduced by 2 times-up to 50 million rubles.

To a large extent, the state of the global IoT market in 2020 was affected by the coronavirus pandemic, which is typical for Russia, but there is a fairly optimistic assessment of its development. In particular, by the end of 2020, growth is projected to decrease by about 5 percentage points (8.2 % instead of 14.9%), which in value terms will amount to \$ 742 billion. For 2021, there is an even more optimistic forecast-growth of up to 10%, in the future until 2024-11.3%. A number of experts consider IoT to be one of the key factors for business activation after the pandemic.

In those industries where the damage from the pandemic was greater than in others, growth will slow significantly to 0.1%. Most of this applies to the entertainment services industry. While medical, insurance and education services are projected to grow from 14% to 12% per year. It is noteworthy that the industrial IoT segment is projected to grow more slowly, but the cost of implementing IoT technology is higher than in other segments. Among consumer services in 2020, there is a positive growth forecast in the smart home sector – about 14%.

## **7. Conclusion**

IoT technology expands the capabilities of companies in the market and the boundaries of the market, contributes to the improvement of existing and creation of new products and services. The introduction of new technologies in industry allows to reduce costs and reduce losses, and along with increasing productivity – and reach a fundamentally new level of performance in terms of efficiency. For users, reducing costs is also an important factor when installing, for example, smart meters, as it helps to use water more wisely – and in the future, electricity.

IoT service providers operate in a heterogeneous market, where the demand for and success in applying new technologies largely depends on the company's activity field, whether it is energy, healthcare, agriculture or the consumer sector. This market is developing dynamically. The main driver for the development of IoT-based services in Russia is the Government. IoT-based projects are implemented on the initiative of the Government in Russia mostly.

Each of the IoT market segments and applications of this technology is characterized by different amounts of costs for its implementation and different growth rates. Thus, the consumer segment is characterized by higher growth rates – up to 14%, however, the volume of expenditures on IoT in the industrial segment is more significant.

In the case of a well-thought-out and systematic approach, IoT can become a significant factor of long term growth of the Russian economy as a result of multiplicative effect that these technologies will have on the economy by increasing labor productivity and reduce costs by optimizing business processes in various sectors of the economy.

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