PREREQUISITES FOR THE DEVELOPMENT AND IMPLEMENTATION OF DIGITAL INNOVATIONS IN TAJIKISTAN

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Abstract *In the modern world, global processes of strengthening the information component in socioeconomic relations are taking place. The relevance of a systematic study of digitalization and the development of digital innovations is a priority at the global and regional levels. The purpose of this study is to analyze the prerequisites for the development and implementation of digital innovations in Tajikistan. To achieve this goal, the following research tasks were identified: to assess the current level of development of the digital economy in Tajikistan; to study the problems of the development of domestic digitalization; to conduct a statistical assessment of the level of digitalization of the economy and innovative development of Tajikistan as a whole; and to study the prerequisites for the development and implementation of digital innovations in Tajikistan. The methodology of the research conducted by the authors is based on general scientific methods of cognition: analysis and synthesis; historical and comparative methods; as well as on mathematical and statistical methods of study. The research conducted by the authors on the state and development of the digital economy made it possible to identify and determine the prerequisites for the development and implementation of digital innovations in Tajikistan. It is very important for countries like Tajikistan to create conditions for increasing the innovativeness of the economy, to form mechanisms and institutions that will make it possible to take advantage of the benefits of digitalization in the best possible way, and to ensure sustainable innovative development. In order to eliminate the technological gap in Tajikistan and accelerate the introduction of digital innovations in the country's economy, it is necessary to create conditions: for the accelerated renewal of production capacities in industry; the effective operation of special institutions that contribute to the creation of knowledge and its dissemination; the introduction of innovations; and the adaptation of digital technologies to particular production needs.*

Keywords: *digital innovations, digital economy, innovative development, digital technologies, innovative susceptibility, information and communication technologies*

Introduction

The expansion of globalization processes, the formation of the information space, and the increased intensity of information flows have contributed to the development of the digital economy in different countries of the world, which is being structured under the influence of accelerating waves of innovation.

The development of digital technologies is one of the most important factors in innovative development, which becomes possible due to the automation of existing processes and the introduction of fundamentally new, breakthrough business models and technologies, such as digital platforms, digital ecosystems, in-depth analytics of large data sets, Industry 4.0 technologies, robotization, and the Internet of Things.

Digital technologies serve as a mechanism for social uplift, contributing to an increase in the availability, quality and convenience of receiving services in such areas as medicine, education, state and municipal services, and culture. Digital transformations make it possible to create comfortable and safe conditions for city life based on smart technologies, and digital platforms

create new employment opportunities for people, help develop additional skills, and improve qualifications, especially for people who previously did not have such opportunities due to social or geographical restrictions. They also contribute to the emergence of new digitalization-related professions and high-paying jobs.

The digital economy and the innovative development of Tajikistan

Tajikistan currently ranks 111th in digital readiness, lagging behind Central Asian countries such as Kazakhstan and Kyrgyzstan and entering the group of low-income countries (Table 1). In terms of the economic and innovative results of the use of information and communication technologies, Tajikistan ranks 123rd, with an index of 30.7 (Figure 1).

Table 1. The Network Readiness Index 2021. Top 3 countries by income group

Source: Dutta & Lanvin (2021, p. 30).

High-income	Upper middle-income	Lower middle-income	Low-income
1. Netherlands (1)	1. China (29)	1. Ukraine (53)	1. Rwanda (101)
2. Sweden (2)	2. Malaysia (38)	2. Vietnam (63)	2. Tajikistan (111)
3. Denmark (3)	3. Russian Federation (43)	3. India (67)	3. Gambia (113)

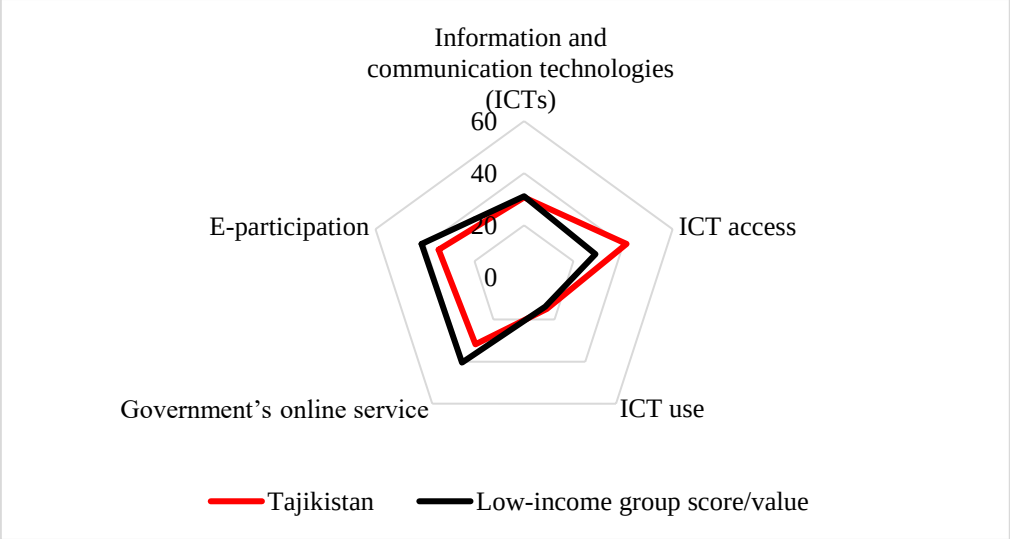

Figure 1. Innovative results of using information and communication technologies in Tajikistan and low-income countries

Source: WIPO (2021)

An analysis of the overall level of digitalization indicates that Tajikistan in 2020 managed to achieve certain successes in the development of the digital economy, namely the expansion of information and communication technology (ICT) infrastructure and the introduction of digital technologies in government structures, but still lags far behind the average values around the world (Figure 2).

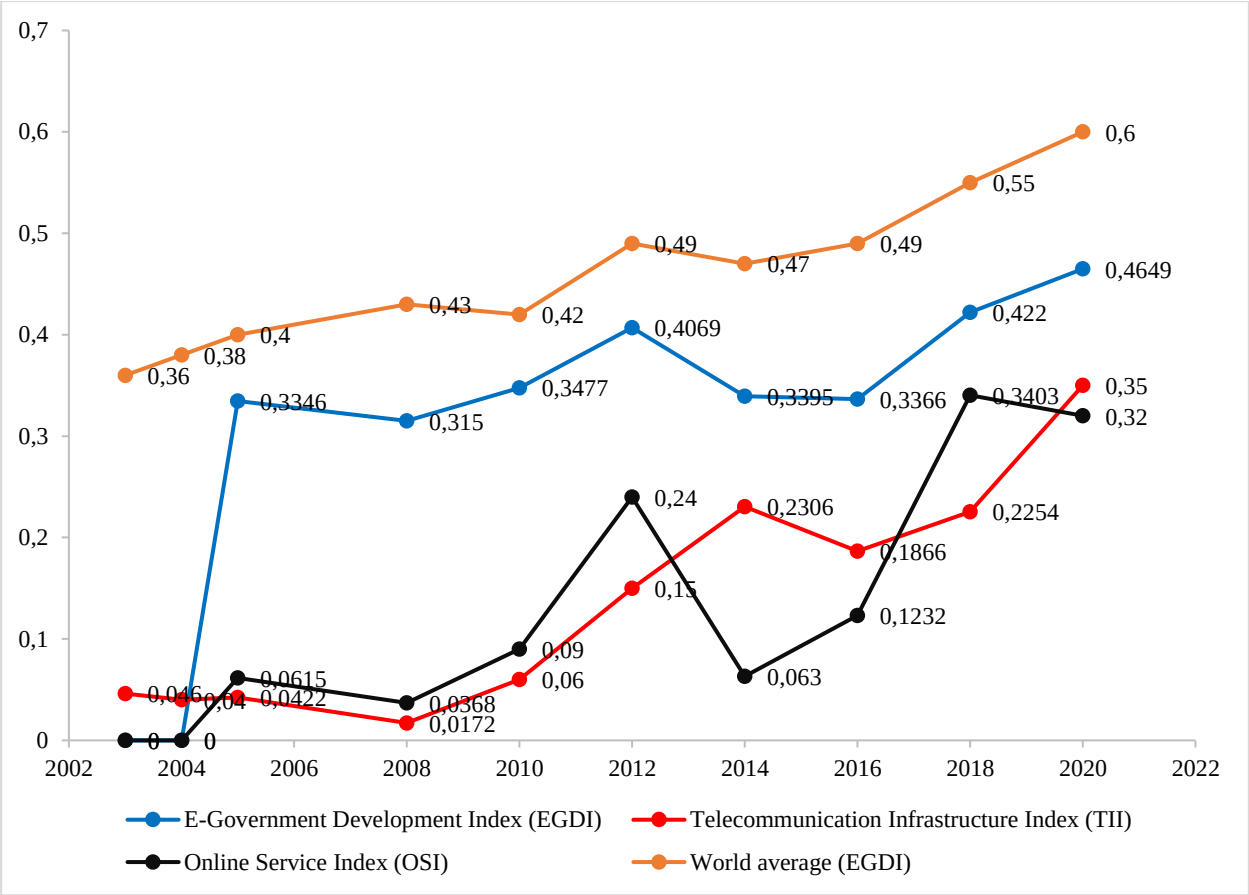

Figure 2. Dynamics of indices characterizing the development of the digital economy of Tajikistan for 2003–2020

Source: https://knoema.ru/

The World Economic Forum estimates that digitalization holds enormous potential for business and society over the next decade, and could bring in an additional $30 trillion of income for the global economy by 2025.

The digital economy is a driver that determines the speed and direction of socioeconomic progress, and a determinant of the growth of the national innovative economy. Penetrating deeper and deeper into the production and non-production spheres of information and communication technologies, the digital economy is becoming the main tool in overcoming the technological backwardness of production processes, increasing the level of reliability of the Tajik financial and economic system, and reducing the raw material orientation of the national economy. The development of the digital economy is one of the main strategic tasks for the development of Tajikistan, and is carried out in accordance with the Concept of the Digital Economy in the Republic of Tajikistan approved by the Decree of the Government of the Republic of Tajikistan No. 642 dated December 30, 2019.

The innovation environment, which stimulates the creation of innovations and ensures the transformation of ideas and developments into marketable products, needs to be transformed in accordance with the needs of the digital economy.

The formation and development of digitalization processes can also be observed by: the degree of dissemination of mobile technologies among the general population (112 mobile subscribers per 100 people); the number of people using the Internet (21.96% of people have access to the Internet); fixed broadband Internet access per 100 people (0.0675655 subscribers per 100 people); the number of servers using encryption technologies when transmitting data over the Internet (663 units or 71 units/1 million inhabitants); and business development in social networks (e-commerce, mobile banking, online education, etc.) (Table 2). Currently, the pace

of market capitalization of companies operating in the field of information technology is higher than that of companies in the commodity sector.

Prerequisites for the development and implementation of digital innovations in the country.

History is full of examples of when new knowledge radically turned the mode of production upside down and made it possible to raise the economy to a fundamentally different level. However, only since the end of the 18th century has the application of scientific knowledge and innovative developments become a systemic and mass phenomenon. The integration of production, science and invention became the basis of the industrial economy that arose as a result of the industrial revolution of the early 19th century. Such integration has made it possible to significantly accelerate the pace of economic growth and raise the level of social welfare. Today we are on the way to the post-industrial stage of evolution, in which information, knowledge and science become the main drivers of innovative development within a high-performance knowledge industry. This will also entail a high share of digital and innovative services in GDP, with competition in all types of economic and other activities, focusing on digital communication technologies.

Table 2. The main indicators of the digital transformation of the countries of Central Asia and Russia for 2019

Source: The World Bank (n.d.)

Indicators	Tajikistan	Uzbekistan	Kyrgyzstan	Kazakhstan	Turkmenistan	Russia
Number of mobile cellular subscribers per 100 people	112	101.2	134.4	138.6	162.9	164.4
Access of the population to the Internet, in % of the population	21.96	52.31	38.0	81.88	21.25	82.64
Fixed broadband Internet access, number of subscribers per 100 people	0.06757	13.94	4.194	13.21	0.087	22.64
Number of secure Internet servers per 1 million people	71.13	452.52	287.91	2,358.98	20.03	9,339.0

It is very important for countries such as Tajikistan to create conditions for increasing the innovativeness of the economy in order to form mechanisms and institutions that will make it possible to take advantage of the benefits of digitalization in the best possible way to ensure sustainable innovative development.

The costs for the introduction and use of ICT in the overall structure of costs for research and development of research institutes and universities of Tajikistan increased from 1.2% to 15% in the 2005–2018 period, but there has been a general decrease since 2011 (from 21.2% to 15%) (Figure 3).

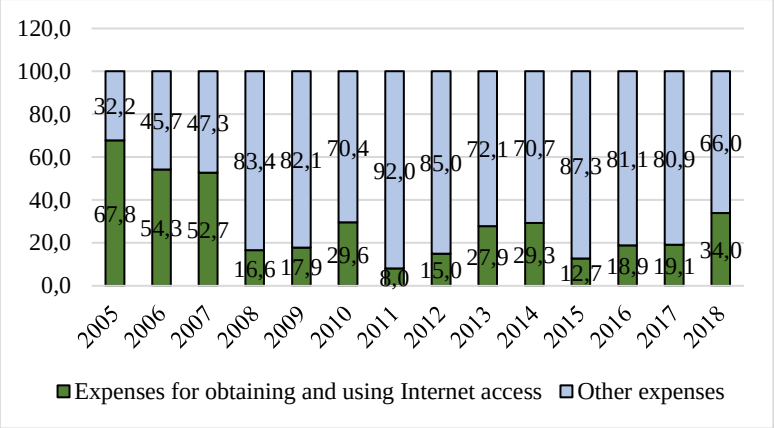

Figure 3. The cost structure for the introduction and use of ICT by research institutes and universities in Tajikistan

Source: Ismoilzoda (2020, pp. 66–70)

Thus, there are four main prerequisites for the development and implementation of digital innovations in the country.

The first is the *availability and accessibility of knowledge and technologies* that can improve production efficiency. Thanks to the rapid development of science and modern information technologies, at present, socially useful knowledge is being produced on a colossal scale that is incomparable with the past. What modern science can do in a year used to take centuries or millennia. Accordingly, there are fundamentally new opportunities for innovative development. From an economic point of view, human activity in the creation of knowledge is of interest. The creation of new knowledge is essentially a process of intellectual labor, which is the basis of innovative growth and development. Depending on the degree of favorable conditions, labor can contribute both to self-enrichment and the accumulation of a person's creative potential, and to its degradation. The main condition for the self-growth of human potential is labor free from coercion. It is clear that work under external or internal coercion, which does not bring pleasure and satisfaction, does not serve the development of personal potential, but, on the contrary, may limit its capabilities. In this case, potential is not accumulated, but only consumed (Marx & Engels, 1956, p. 563). In the process of free labor, when a person acts not as a "definitely trained force of nature," but as a "manager of his own productive forces" (Marx & Engels, 1969, p. 110), there is self-growth and development of their potential.

The first prerequisite is a necessary but not sufficient condition for the transformation of knowledge into a decisive force in the development of digital innovations. There are three more closely related prerequisites, the presence of which explains why not all countries are able to take advantage of the opportunities of the information revolution.

The second prerequisite is *innovation receptivity*. In order for knowledge and digital technologies to be introduced into the economy, it is necessary that the subjects of economic relations are able to find the necessary information, understand and perceive new knowledge, adapt it to their needs and put it into practice.

The low level of innovative susceptibility of society to the achievements of the digital economy and digital technologies inherent in Tajikistan contributes to the further deepening and growth of the technological gap between Tajikistan and other countries of the world. The World Economic Forum's (2021) Global Risks Report lists the concentration of critical digital assets and the digital divide among the most likely risks over the next ten years. Digital transformation, on the contrary, is experienced by countries that have a high innovative potential, but do not have effective innovation systems, yet are capable of searching for disruptive innovations and their implementation, completely changing the companies' infrastructure, introducing digital business thinking, etc. (Dzhurabaev & Mukimova, 2021, pp. 29–33). In this regard, it should be noted that building a methodology for researching the digital

economy should involve two components: industrial policy (since most of the innovations within the current technological order are generated in the field of material production) and the external economic component (due to the fact that external sources of competitiveness can be additionally used by countries due to the lack of internal competitive advantages in the development of the research system) (Smirnov, 2013a, p. 211; 2013b, pp. 97–102).

In order to eliminate the technological gap in Tajikistan and accelerate the introduction of digital innovations in the country's economy, it is necessary to create conditions for: the accelerated renewal of production capacities in industry; the effective operation of special institutions that contribute to the creation of knowledge and its dissemination; the introduction of innovations; and the adaptation of digital technologies to the needs of a particular type of production.

The third prerequisite is *the ability to generate innovation*. The innovation process is not limited to the simple application of existing knowledge. The innovative development model assumes that all production activities are saturated with innovation – that all employees of the enterprise have incentives and skills to generate and implement many micro-innovations. The fact is that innovation covers all aspects of modern production without exception. Accordingly, innovative susceptibility should be complemented by constant innovation and the daily improvement of production and organizational digital technologies. Here, a lot depends on the level of education and the peculiarities of thinking of entrepreneurs, managers and employees of enterprises, their inclination to invent and develop new micro-innovations, and their ability to think creatively.

All global experience shows that, at present, the information and communication technologies sector – which includes the production of computer and telecommunication technologies, the development of software and the provision of a wide range of interactive services based on them – is becoming increasingly important in the global economy.

It should not be forgotten that the development of ICT directly affects the level of a country's competitiveness, allows collecting and summarizing huge amounts of information, and opens up wide opportunities for management at the strategic level.

Digital transformation brings a significant increase in productivity, cost reduction, and an increase in sales and market share through the implementation of digital technologies. Despite this, the digitalization of the economy does not affect new technologies to a greater extent, but the transformation of thinking and organizational culture.

The fourth prerequisite is *innovative demand*. Susceptibility to innovations and the propensity to generate them do not make sense without the demand for innovations – that is, the solvent need on the part of economic entities to apply certain useful knowledge and technologies.

The economic essence of the demand for scientific knowledge is explained by the operation of the law of supply and demand, where the determining role belongs to demand. In the words of V. L. Makarov: "demand and only demand decides whether knowledge lives or not lives on. It may be sad, but there is not the slightest doubt that a huge number of ideas, discoveries, inventions and other knowledge produced by people disappeared, so to speak, without really being born. The same can be said about the potential geniuses of mankind" (Milner, 2009, p. 15). Moreover, in each given period of time, the demand in the knowledge market will express only the relative consumer ability of society to use a scientific product. The absolute consumer ability of society in relation to the results of science in its essence has no boundaries – it is unlimited (Aleinik, 1991, p. 15). The historical and modern experience of the development of mankind indicates that the need for scientific discoveries and their usefulness for society is constantly increasing.

In crisis periods of economic development, the supply of intellectual products, as a rule, significantly exceeds demand. However, not only can the lack of financial resources of consumers be the reason for the insufficient demand for intellectual products, but the specific features of the knowledge market can also create certain difficulties in terms of their

consumption and commercialization. First, the manufacturer of an intellectual product cannot estimate in advance the market demand for new knowledge embodied in the product. Secondly, a potential buyer, before presenting a demand for a particular intellectual product, must initially have the necessary level of contextual knowledge about it. Thirdly, in the knowledge market, there is a high probability of unfair and illegal appropriation by some subjects of the transaction of benefits received as a result of the efforts of others, which may generally make the activity of creating new knowledge commercially unviable. Therefore, to ensure the market circulation of knowledge, the regulatory role of the state and the development of the institution of intellectual property are very significant. The demand for innovation acts as a factor stimulating scientific activity; on the other hand, the results of scientific work become determinants of aggregate demand, due to the continuous process of improving the economic and organizational conditions of production in an innovative economy (Tumanyan, 2008).

The relationship between inventive, innovative and economic cycles is disclosed in the works of N. D. Kondratiev, J. Schumpeter, G. Mensch, A. Klaiknecht, and Yu. V. Yakovets. Thus, Kondratiev (2002) noted that "the direction and intensity of scientific and technical discoveries and inventions are a function of the demands of practical reality and previous periods in the development of science and technology. However, it is not enough for scientific and technical inventions to take place. Scientific and technical inventions may be, but may remain ineffective until the necessary economic conditions for their application appear" (p. 382). Such conditions are economic and technological crises at the end of the medium-term, long-term (Kondratiev's one) and civilizational cycles. Before the beginning of the upward wave of each large cycle, there are profound changes in the technology of production and exchange, which in turn are preceded by significant technical inventions and discoveries.

Practice shows that market competition creates incentives to generate and implement innovations, which forces the manufacturer to fight to reduce costs and improve product quality. Accordingly, those entrepreneurs who are able to respond flexibly to market impulses and actively implement new digital technologies and organization methods survive in the market. Another important condition for innovative demand favorable for investment and innovation is the business climate. The lower the costs of market access and government interactions for entrepreneurs, the more opportunities they have to introduce new technologies and improve efficiency.

Conclusion

Ensuring a high level of innovation in the economy does not guarantee a technological breakthrough in the shortest possible time. Knowledge is accumulated gradually; innovative potential must be built up to a certain critical level in order for the spread of digital technologies to take on an explosive character. Given the low quality of human capital, it is impossible to meet the demand for qualified specialists and improve the efficiency of state regulation, the level of industrialization and the export orientation of small businesses.

Based on the experience of other countries, Tajikistan has the opportunity to purposefully create institutions and mechanisms that make it possible to use the potential of the information revolution for its development.

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