PROSPECTS FOR INNOVATION-DRIVEN GROWTH OF D IFFERENT COUNTRIES THROUGH EFFECTIVE FINANCING FACILITIES

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ABSTRACT

Currently, the competitiveness of industrial bodies is determined by a high degree of effective innovation activity. The purpose of this paper is to identify the key prospects for innovation-driven growth that contribute to the formation of the digital industry through effective financing facilities. Expected results: to offer solutions for stimulating innovation-related processes in companies through digitalization, an effective financing facility and introduction of the results of intellectual performance. Based on this target, the following were analyzed: the ranking of innovation economies of the world (Bloomberg Innovation Index); the Global Competitiveness Index 4.0, digitalization pattern; the main ways of transforming economic performance using digital technologies; the characteristics of the Networked Readiness Index are shown; issues in the transition to digital technologies were revealed; the country-wise structure of R&D funding sources (National Science Board) was analyzed; the general components of the digital economy in developed countries were identified such as significant amounts of investment in digital infrastructure, as well as favourable conditions for the introduction of innovations, since the effective use of digital solutions in innovation is impossible without a stable dynamics of technological development of the country; and a deterrent factor - financing that hinders the growth of industry - came to light as well.

Keywords: Digitalization, Innovation, State, Growth, Technology, Rating, Economy, Industry, Production, Financing.

INTRODUCTION

A measure of national incentives for innovation is widely used in Russia. Countries protect the rights of participants by creating a regulatory and legislative framework, facilitate government orders, put financial incentives in place, and develop venture financing and leasing (Repnikova et al., 2019).

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According to experts, it is necessary to pay close attention nationwide to factors that contribute to the country's innovation-driven growth, and to ensure the implementation of measures aimed at building the country's innovation activity. In this regard, it is equally important to study the factors that hinder the development of innovation (Bykova, 2012).

Given Russia is subject to comparing with Japan, which has a good infrastructure for introducing innovations into the economy, the factors that contribute to the successful advancement of innovations shall be analyzed. Therefore, it is necessary to mention the availability of factors that hinder the advancement of innovation in the Russian Federation (Grilli et al., 2018).

The authors believe such factors are:

1. Insufficient national incentive for innovation in the country.
2. Incomplete innovation-related regulatory basis.
3. Insufficient financing of innovation activities.

The country does not operate an integrated system for managing the evolution of intellectual property, legal protection and commercialization of intellectual property (Morkovkin et al., 2020).

These issues are listed below:

1. Russia uses the experience of other countries applicable to intellectual property management without taking into account the specifics of our country.
2. Lack of formation of the intellectual property market.
3. Non-availability of experts in intellectual property.
4. Use of obsolete technologies.

In the current climate, it is possible to ensure the competitiveness of the undertaking only based on innovations. Innovation builds an integral part of the modern undertaking. A number of scholarly papers are devoted to the innovation-related issues, among which are the papers of Gureev et al., 2020; Grilli, 2018, Katz & Koutroumpis, 2013; Morkovkin et al., 2020; Varian, 1997, Li, 2018. However, these studies are mainly aimed not at long-term, but at short-term solutions to growth issues, which, in turn, is due to the specifics of the fourth industrial revolution and the production of high-tech products.

METHOD OF RESEARCH

A systematic approach lie at the root of the methodological background for the study of financial and credit levers to stimulate innovation processes. It provides the complexity of financial and credit levers, the causal link between all elements of the economic system, the scale of socio-economic phenomena, the variety of characteristics of components, and the cyclical nature of economic processes.

DISCUSSION

Currently, 50-70 key applications, such as energy, medicine and construction can be distinguished. Each application requires a wide range of products with thousands of features. The estimation of the average product range in the industry is based on 2000 production items. For

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this purpose, the product nomenclature should include 100,000 to 140,000 positions in order to cover all applications.

To maintain the competitiveness of each type of product, different organizations ought to produce at least three positions. Therefore, it is necessary to produce at least 300,000 products (Repnikova et al., 2019).

The service life of the product under modern conditions ranges from several months (IT) to 10 years (e.g., construction). For reference, the product slate can be completely updated for a period of 5 years. Therefore, 300,000 new products should appear in 5 years. This means that an average of 60,000 new product solutions should appear every year (Gureev et al., 2020).

Each product is developed by a team including developers, engineers, marketers, and economists. With a typical team size of 5 persons per product per year, 60,000 teams or 300,000 persons should work in the country to maintain a competitive product range. Due to the rapid aging of current technologies, personnel are subject to rotation every 10 years. Thus, the average annual need for new personnel of all kinds specializing only in creating new products is 30,000 persons.

Three thousands of them are managers of innovation projects. In addition to creators of new products, there is a need for people who specialize in introduction, building distribution networks, operation, and investments. And all of them shall be completely professionally qualified (Varian, 1997).

A national innovation system related to science and technology is available in the country, an important element of which is fundamental scientific research, the creation of infrastructure necessary for research and development. Significant progress has been made in science and technology, such as the independent development and production of integrated microcircuits, the design engineering of 3rd generation mobile communications, the production of high-quality synthetic materials, and the creation of high-tech NC machine tools. For example, China relies on its economic potential and the richest mineral and biological resources, as well as on a combination of economic knowledge, including information technology, bio - and nanotechnology, pharmaceuticals, nuclear power, clean coal and hydrogen energy, and space research. Breakthroughs are expected to occur in the innovation sector (World Economic Forum, 2016).

Among the most important parameters that define the country's scientific resources, the knowledge content of the economy are investment in science and education, financing of innovation processes, in particular, the share of R&D expenditures in GDP. Although there is no close correlation between the level of development of scientific potential and the country's economy in tote and the share of R&D expenditures in GDP, this correlation is usually much higher in developed countries than in developing countries (see Table 1) (Silberglitt et al., 2006).

TABLE 1
KNOWLEDGE ECONOMY DEVELOPMENT INDEX

Country	Place among 27 Countries	Summary Index	Subindices			
			Innovativeness	Economic Incentive	Education	Information Infrastructure
USA	1	8.81	9.91	7.97	8.28	9.09
Japan	5	8.41	9.78	7.42	8.09	8.35
Israel	6	7.44	7.44	7.31	6.78	8.21
Russia	10	6.26	8.88	3.34	7.88	4.91

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Mexico	12	5.77	7.37	5.79	4.43	5.51
Brazil	13	5.82	8.08	3.94	5.75	5.50
RSA	14	5.21	6.54	4.55	4.47	5.26
China	18	4.95	9.00	2.55	3.74	4.50
India	23	3.97	8.59	2.91	2.33	2.06
Kenya	24	2.62	5.31	1.29	2.07	1.83
Cameroon	27	1.41	1.78	0.55	3.93	1.38

Calculated by the World Bank on a ten-point scale using approximately 200 indicators that characterizes the transition to a knowledge economy. The indices of China and India appear to be somewhat understated due to the use of per capita indicators. Here it is important to pay attention to the innovation indices of these countries, which reflect the R&D capacity.

If Russia is subject to analysis, despite the solution to many challenges, the planned indicators of the quality of economic growth corresponding to the modern (knowledge-intensive, information-based) economy were not achieved. Thus, the share of GDP in the service sector declined, and the share of R&D in GDP did not reach the planned growth (0.2%) (Jamrisko et al., 2019).

In 2016, China's R&D spending was 1.71% of GDP, compared to 2.92% in the US and more than 3% in Japan and South Korea. China lags far behind developed countries in spending on basic research. In the United States, from the early 1950s to the mid-1960s, annual growth was more than 10%. In the 1990s, the growth rate was even higher (in 2000, 18% of R&D was spent on the basic sector). According to the Swedish Institute of Management, 10.8 inventions accounted for 10,000 persons were patented in Japan, 1,737 patents in Germany. South Korea has 1,534 patents, while China and India have 50 and 40 times more patents, accordingly (Bykova et al., 2009).

But in recent years, the situation has begun to change rapidly. The authorities recognized that borrowed technologies cannot guarantee stable and competitive growth in China and turn it into a major force in the world. The country began to take a leading position for the key parameters related to the development of science and technology (Bykova et al., 2015).

Investment in R&D increased significantly. Having reached $ 37.7 billion in 2018, China ranked fifth in the world in terms of this indicator. Science parks and business incubators are being created at a lightning pace (China is now second only to the United States). Chinese science parks are organized abroad to attract foreign scientists.

In terms of the number of researchers, China is also close to the United States. It accounts for 14.7% of researchers in the world, the US - 22.8%, Japan - 11.7% and Russia - 8.9%. The number of certified information technology professionals increases by 200,000 each year, five times faster than in the United States (Ministry of Economic Development of the Russian Federation, 2011).

China's current economic growth model is based on the market environment, macroeconomic regulation, direct allocation of resources, dependence on foreign capital (technology upgrades, export expansion, accumulation of foreign exchange resources), and the state of the export-oriented economy. China's market economy is largely formed. By the end of the tenth five-year plan, the share of intangible assets in GDP was 49.7%. The share of non-governmental employees in the total number of employees in the downstream industry and the service sector increased to 79% (2015) (Li, 2018).

Attraction of foreign capital is the main way for China to acquire leading-edge technologies. For companies in China, the income tax rate is 24%, while it is 14% for foreign-

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owned companies, which is generally contrary to the WTO principles. Foreign-owned companies account for 3/4 of the amount spent on the acquisition of new technologies. Over the past five years, more than $ 70 billion of foreign investment has been attracted by high-tech industries. Foreign-owned businesses produce more than 50% of exports, and its share reaches 80% among high-tech products that make up 20% of China's total exports (World Economic Forum, 2018).

Despite the large amount of foreign capital attracted to China, its macroeconomic efficiency and scale remain relatively small. More than 70% of existing joint ventures are profitable, and up to a third of them are unprofitable or economically inefficient. The share of the joint venture in total industrial production is 14%. Per capita spending on business investment has exceeded the average in developing countries by up to $ 36, but is significantly lower, especially compared to the new industrial economy (Repnikova et al., 2019).

The implementation of indicators and solution to urgent challenges are expected to reduce long-term government lending and borrowing to construction and cut the state budget deficit. At the same time, one of the primary drivers of high economic growth at the beginning of the 21st century is market demand, which forms an economic incentive for production. China solved the issue of expanding domestic demand by increasing the money supply (Ministry of Industry and Trade of the People's Republic of Donetsk, 2016).

The five-year program of China's national economic and social development has been put in place and is designed to focus on the formation of a "moderately prosperous" society, the implementation of scientific development concepts, and the transition to a resource-saving model of economic growth (Repnikova et al., 2019; Ministry of Industry and Trade of the People's Republic of Donetsk, 2017).

Reducing resource intensity and strengthening environmental protection is driven by improving the structure of production, developing high-tech industry and scientific and technical policies aimed at current services and infrastructure. The main thing in solving these challenges is to create an innovation capacity for a market-oriented system of engineering and technological innovations, within which there is cooperation between industrial bodies, universities and research centres (Varian, 1997).

This identifies a number of factors that hinder the development of research and development, including the following factors:

1. Weak incentives for innovation between state-owned businesses. Current reforms, including backing with national and foreign capital, will undoubtedly solve this issue.
2. Lack of orientation of state-owned commercial banks to loan support for innovation and even venture capital activities. A more flexible system of private financial institutions is required.
3. Companies are experiencing an acute shortage of highly qualified personnel capable of conducting R&D and obtaining research results. This is because the companies do not invest enough in training workers, and state-owned businesses are much less likely to attract talented managers and researchers than foreign ones.

China has a long and difficult road ahead of building a national innovation system. As countries move forward, the role of international cooperation in science and technology, especially with China's neighbour - Russia - will grow (Katz & Koutroumpis, 2013).

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Now the discussion will cover the important areas of innovation-driven growth, scientific research being financial levers to stimulate innovation processes. In the world practice, new tax methods for innovation incentive are becoming increasingly popular. Tax incentives can also be offered to companies that do not participate in the production of innovative products, but contribute to the R&D process and apply to the final product. Currently, education is regarded as an effective form of investment in human capital, and this hypothesis is confirmed by Finland, Sweden and Norway - countries where building the national innovation system began with the educational reform (Mikhaylov, 2020).

According to experts of the Bloomberg Innovation Index, one of the largest news agencies, South Korea has been ranked first in the global innovation economy for the consecutive sixth year (Figure 1). Germany takes the second place, up two positions compared to the previous period. Finland rounded out the top three and moved up four positions compared to the previous year due to the impact of higher education. 60 countries took part in the assessment (Bykova & Repnikova, 2019).

It is worth noting a sharp increase in Israel (from 10th to 5th) due to patent activity, but in Sweden it decreased by 5th place compared to the previous period (from 2nd to 7th), Ukraine lost seven positions compared to last year (from 46th to 53rd) due to reduced productivity and increased R&D. Singapore and Japan dropped to third place in the ranking due to a decrease in research concentration. Russia dropped from 25 to 27 in the ranking due to lower patent activity (Silberglitt et al., 2006; Jamrisko et al., 2019).

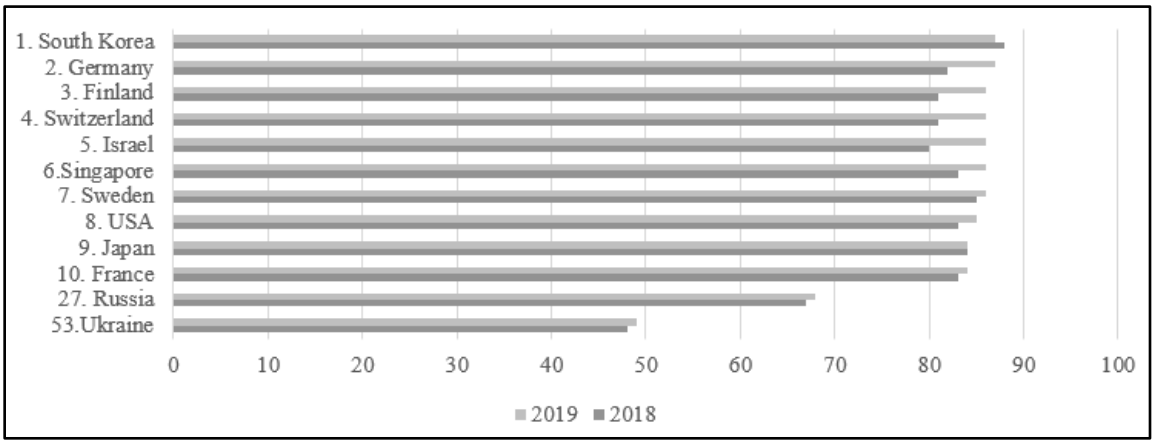

FIGURE 1

RANKINGS OF THE WORLD'S INNOVATIVE ECONOMIES AND THEIR CHANGES IN 2018–2019

Source: Jamrisko et al. (2019)

The leading position in the ranking is explained by the fact that the US is ahead of other economies in terms of innovation ecosystem (including entrepreneurial culture, its openness and flexibility), market size, and stability (Jamrisko et al., 2019; Repnikova et al., 2019).

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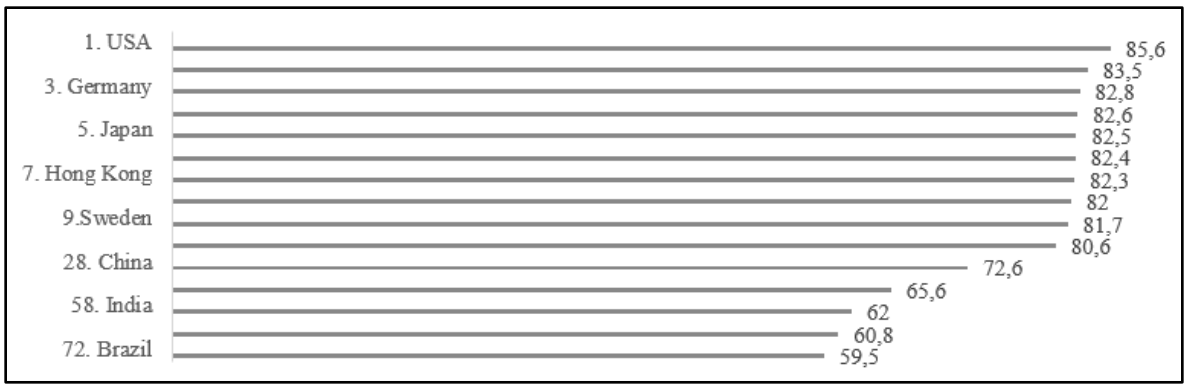

FIGURE 2

GLOBAL COMPETITIVENESS RANKING

Source: World Economic Forum (2018)

Digital innovations and technologies find way into all aspects of our lives and stimulate the growth of the economy and society, as well as contribute to developments in many areas, and as a result lead to transformation in the economy (Gibadullin et al., 2020).

There are a number of indicators that measure digitalization (Figure 2), namely the quality and ease of use of digital services, the degree of availability of these services, and the ability of users to integrate digital services into their practice and businesses (Profatilov et al., 2015; Jamrisko et al., 2019).

TABLE 2
STRUCTURE OF R& D FUNDING SOURCES IN THE WORLD

Country	GDP (PPP $ billion)	R&D expenditures by sources of funding, %			
		Business	State	Foreign Investors	Other
USA	496.6	62.4	25.5	5.0	7.1
China	408.8	74.7	21.3	0.7	3.3
Japan	170.0	78.0	15.4	0.5	6.1
Germany	114.8	65.6	27.9	6.1	0.4
South Korea	74.1	74.5	23.7	0.8	1.0
France	60.8	55.7	34.6	7.7	2.0
UK	46.3	48.4	28.0	17.6	6.0

Source: National Science Board (2018)

In R&D funding, business accounts for more than 70% in countries such as Japan (78%) and South Korea (74.1%), while the share of government spending on R&D funding does not exceed 35%. Active funding of innovation activities by businesses was achieved thanks to effective government policies and a favourable investment climate (Silberglitt et al., 2006).

RESULTS

Summing up and specifying the conclusions of this study, it may be said that sustainable economic growth through innovative processes requires the following:

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1. In developing countries, the main obstacle to the introduction of innovation processes is the weak activity of government and entrepreneurs in R&D.
2. Innovation-driven growth of the economy amid the digitalization is possible based on innovation, since the use of digital technologies can improve the business and investment climate and ensure the production of high-tech competitive products.
3. The prospects for innovation-driven growth of the economy amid the digitalization should be determined by the vector of the national incentive policy.
4. The use of digital technologies improves the business and investment environment and ensures the production of high-tech and competitive products. New technologies will lead business development and improve the quality of life.
5. Increased R&D funding and training in high technologies increases the competitiveness of both the individual companies and the entire economy, introducing scientific achievements and moving to qualitatively new, innovative stages of development.

CONCLUSION

Measures to improve national management models and encourage innovation in the large-scale business sector can be identified: the major priorities of Russia's modern strategy are national economic security, financial and social sphere, sustainable development, and expanding the structure of the GDP sector (economic diversification). A strategic vision of the country's economic development and the role of related innovations appear to be fashioned. In other words, it is required to move from a model focused on tactical management to a model focused on strategic development.

There are two basic approaches to solving these challenges of the Russian model of management and innovative development. This is an incentive in the form of funding mechanisms and profits.

Funding mechanisms can be considered at two levels. The macro level represents public funding, and maintaining conditions for improving the innovation environment in the country. Basically, at the micro level venture capital funding of certain innovative projects is carried out. International practices have shown that state participation (direct lending) is an integral part of the development of investment and innovation activities. In the United States, France, and many other countries, government funding covers 50% of the cost of innovations. Direct lending includes concessionary grants and loans. In addition, state backing is provided through a guarantee of return of part of the invested funds. In Germany, for example, the government provides grants to cover half of the cost of innovation, while in the United States, grants are provided to back innovation projects (although the grant amount is 75% of the project cost). The analysis of the experience of many countries reveals the following:

1. Companies that place orders (government orders) and agencies (universities) that perform promising research projects, but at the same time bear a high level of risk. Specifically, in Germany, 80% of university research activities are funded by grants from five major research agencies.

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2. Companies in countries with significant predominant sectors in medicine, education, defence industry, culture, and the environment (Norway, Estonia, Finland, and China).
3. In the United States, the United Kingdom, France, and China, much attention is paid to backing innovation-oriented small businesses. Small and medium-sized knowledge-intensive businesses are considered the most promising and efficient in these countries.

Solution to the above issues will contribute to the evolution of innovation activities. Important here is the identification of the intellectual property system and its analysis as one of the elements of innovation.

In recent years, most developed countries have called for new approaches to the advancement of digital technologies. The country is now in the process of moving to a fundamentally new level of technological growth pertaining to the use of artificial intelligence, new digital methods of information processing, 3D printing and the introduction of 5G communication. The use of fundamentally new technologies means new opportunities in various fields of activity, such as creating new products, "conventional" industry updates, more effective business solutions, health, education, environmental protection and entertainment.

The core strategic targets of the state today are to reach the potential of convergent high-tech industries and support large- and small-size software companies.

The latest digital technologies in industry can be used, provided that country is at a fairly good level of digitalization of the public sector segment backed by the country.

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