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MECHANISMS OF STATE SUPPORT FOR INNOVATION IN THE PRC IN THE CONTEXT OF ITS INNOVATIVE DEVELOPMENT

The article presents the results of research into the practice of using state support mechanisms for innovation to stimulate the innovative development of China in the context of globalization. The purpose of the article is to analyze the tools of state support for innovation in the PRC and to identify the main areas for improving their effective use. In the course of the research, the mechanisms for state support for innovation in the PRC are identified, namely: direct and indirect budgetary financing of research organizations and universities in the form of targeted financing of operating expenses, as well as the allocation of targeted grants and placement of government orders for the implementation of research and development (R&D); tax preferences provision to R&D enterprises; investment of budgetary funds in the capital of venture funds; allocation of preferential state loans and credit guarantees to subjects of innovative activity; implementation of targeted public purchases of innovative products and services; financing of business incubators, technology parks and other innovation activity infrastructure. It is concluded that in the current conditions of innovative development of China the complexity and scope of financing mechanisms for Science, Technology, and Innovation (STI) are growing on the basis of advanced concepts that take into account the growing economic value of knowledge and their flows and are aimed at improving the efficiency of innovation, developing interaction and cooperation at the regional, national and international levels. It has been found that a wide range of tools is being used to provide financial support to growing innovative companies in the PRC. These include, first of all, various credit guarantee and investment mechanisms designed to stimulate inflows of venture capital and bank loans. In addition, other methods of government support for small high-tech companies are actively applied, including grants for start-up research and development work on their venture projects, as well as the creation of business incubators and technology parks, which provide favorable conditions for the growth of such companies.

Keywords: innovative development, innovative activity, financial support instruments, mechanisms of state support for innovation, national innovation system, venture funds.

JEL classification: F15, F55, O32, P51.

МЕХАНІЗМИ ДЕРЖАВНОЇ ПІДТРИМКИ ІННОВАЦІЙ В КНР В КОНТЕКСТІ ЇЇ ІННОВАЦІЙНОГО РОЗВИТКУ

У статті наведено результати дослідження практики використання механізмів державної підтримки інновацій задля стимулювання інноваційного розвитку КНР в умовах глобалізації. Метою статті є аналіз інструментів державної підтримки інновацій в КНР і визначення основних напрямів удосконалення ефективного їх використання. У ході дослідження визначено механізми державної підтримки інновацій в КНР, а саме: пряме й опосередковане бюджетне фінансування дослідницьких організацій та університетів у формі кошторисного фінансування операційних витрат, а також виділення цільових грантів і розміщення державних замовлень на виконання досліджень і розробок (ДіР); надання підприємствам, що здійснюють ДіР, податкових пільг; інвестування бюджетних коштів у капітал венчурних фондів; виділення суб'єктам інноваційної діяльності пільгових державних позик і кредитних гарантій; здійснення цільових державних закупівель інноваційної продукції та послуг; фінансування бізнес-інкубаторів, технопарків та інших об'єктів інфраструктури інноваційної діяльності. Зроблено висновок, що в сучасних умовах інноваційного розвитку КНР зростає складність і розширюється охоплення механізмів фінансування НТІ на основі передових концепцій, які враховують зростаючу економічну цінність знань і їх потоків і спрямованих на підвищення ефективності інноваційної діяльності, розвиток взаємодії і кооперації на регіональному, національному та міжнародному рівнях. Встановлено, що для надання фінансової підтримки зростаючим інноваційним компаніям у КНР використовується широкий набір інструментів, зокрема, кредитно-гарантійні і інвестиційні механізми, покликані стимулювати приплив акціонерного венчурного капіталу і банківських кредитів. Поряд з цим активно застосовуються й інші методи державної підтримки невеликих високотехнологічних компаній, включаючи виділення грантів на проведення стартових дослідних і дослідно-конструкторських робіт за реалізованими ними венчурними проєктами, а також створення бізнес-інкубаторів і технопарків, в яких забезпечуються сприятливі умови для зростання таких компаній.

Ключові слова: інноваційний розвиток, інноваційна активність, інструменти фінансової підтримки, механізми державної підтримки інновацій, національна інноваційна система, венчурні фонди.

Actuality of issue. State financial support for research and development in all leading foreign countries plays a key role in ensuring the innovation process. The state itself

is a large, and in a number of countries, major investor in new knowledge and technologies. At the expense of budgetary funds, in particular, most of the costs of basic

science, applied research of defense purposes, as well as the most complex and expensive developments, including space stations, accelerators, etc. are funded. In addition, the state acts as a catalyst for the innovative activity of national business, creating favorable conditions for it to expand investments in high-tech projects using various financial and tax mechanisms. These circumstances determine the relevance of the innovation state support mechanisms study for modern science and practice.

Analysis of recent research and publications. Fundamental researches of the special features of innovative development of the world countries are found in the scientific fields of such foreign distinguished scientists: A. Raišienė, C. Huang, N. Sharif, H. Kroll, P. Neuhäusler, J. Schumpeter, J. Sigurdson, Yu. Yakovets and others [3; 4; 8; 9; 11; 15].

The evolution of technological structures and their impact on modern economic development is considered in researches of such Ukrainian scientists, as N. Honcharenko, O. Dovhal, I. Matiushenko, O. Fedirko, O. Shvydanenko, O. Yatsenko and others [2; 5; 12; 13].

The purpose of the article is an analysis of the instruments of state support for innovation in the PRC and identifying the main areas for improving their effective use.

Statement of the main research. An important step towards the popularization of science and technology was the adoption of the Law of the People's Republic of China "On the Dissemination of Scientific and Technical Knowledge", which was released to public in June 2002. This normative act was aimed at disseminating and improving the quality of scientific and technical education and enlightenment. The adoption of the law was accompanied by the development of relevant regulations at the local level. The governments of a number of provinces, cities of central subordination and autonomous regions adopted normative documents aimed at attracting scientific and technical personnel, as well as ensuring financial investments in science and technology and the development of high technologies. In the same year, the state Law "On Innovation Policy" was adopted, providing for clear legislative and financial support for scientific, technological and innovative activities [1; 6].

The modernization of the innovation infrastructure, the growth of financial investments in the field of R&D, coupled with government measures to stimulate innovation, led to positive progress in the performance of the Chinese national innovation system. A manifestation of these positive developments is the increased activity of the Chinese researchers and inventors in the domestic and global patent market. In 2006-2018, the number of applications to the Chinese Patent Office grew at the fastest rate in the world (more than 14% annually). In 2011, China has become and still remains one of the world leaders in the

number of patent applications filed with national patent agencies (see table 1).

It is noteworthy that the rapid growth of applications to the Patent Office of the PRC was provided mainly by an increase in the number of applications from domestic inventors and developers. So, in 2000-2018, with an increase in the number of patent applications from non-residents by 4.8 times, the number of applications from the Chinese applicants increased by 6.7 times. As a result of this dynamic, the share of applications filed with residents to the Chinese Patent Agency increased from 82.1% to 86.3%, while the share of patent applications from non-residents decreased. Currently, it is the lowest among the countries that are leaders in the global patent market (13.7%) [7; 14]. These figures reflect a twofold tendency: an increase in the innovative potential of the country and an increase in patent activity of national inventors, as well as a decrease in the dependence of the country's economy on external sources of technological progress.

At the same time, in absolute terms, the number of patent applications from non-residents in the Chinese patent market (more than 127 thousand) is higher than in the patent markets of other countries (except the United States), which indicates that the Chinese technology market remains highly attractive for foreign inventors and investors. TNCs are particularly interested in developing a large Chinese market. In 2012-2019, more than 93% of the total number of patent applications to the Chinese Patent Office has been filed by residents of Japan (Panasonic, Sony, Toyota, Sharp), the USA (General Electric, General Motors), Germany (Robert Bosch, Siemens, Philips), the Republic of Korea (Samsung) [7; 14].

The Chinese companies have shown particular activity in the global patent market in recent years. So, according to the World Intellectual Property Organization, in 2018, the list of 50 leading companies in the number of patent applications included 8 Chinese companies. At the same time, the Chinese companies Huawei and ZTE took the first and the fifth places in the list of leaders, leaving far behind such major patent applicants as the Japanese corporation Panasonic, the Swedish telecommunications giant Ericsson and many others (see table 2).

Modernization of the innovation infrastructure and new mechanisms for integrating science with the industrial sector have revived the innovation activity of the Chinese universities, which also manifested itself in their patent activity. According to the World Intellectual Property Organization, since 2005, Peking University and Tsinghua University have consistently been included in the list of 50 leading universities in the world in the number of patent applications filed, and in 2014, China University of Mining and Technology has joined them [14]. The Chinese companies and universities have become the first and so

Table 1

PCT applications for the top countries, 2016–2018

	2016	2017	2018	Change from 2017, %
The USA	56.591	56.676	56.142	-0.9
China	43.091	48.905	53.345	9.1
Japan	45.209	48.205	49.702	3.1
Germany	18.307	18.951	19.886	4.9
The Republic of Korea	15.555	15.751	17.014	8.0

Source: [7]

Table 2

TOP 10 business PCT applicants, 2016–2018

		2016	2017	2018
HUAWEI TECHNOLOGIES CO., LTD.	China	3.692	4.024	5.405
MITSUBISHI ELECTRIC CORPORATION	Japan	2.053	2.521	2.812
INTEL CORPORATION	The USA	1.692	2.637	2.499
QUALCOMM INCORPORATED	The USA	2.466	2.163	2.404
ZTE CORPORATION	China	4.123	2.965	2.080
SAMSUNG ELECTRONICS CO., LTD.	The Republic of Korea	1.672	1.757	1.997
BOE TECHNOLOGY GROUP CO.,LTD	China	1.673	1.818	1.813
LG ELECTRONICS INC.	The Republic of Korea	1.888	1.945	1.697
TELEFONAKTIEBOLAGET LM ERICSSON (PUBL)	Sweden	1.608	1.564	1.645
ROBERT BOSCH CORPORATION	Germany	1.274	1.354	1.524

Source: [7; 10; 14]

far the only organizations from the BRICS countries to be included to the corresponding lists of the “top 50” world leaders in the number of patent applications [7]. The data presented reflects the process of China’s increasingly active integration into the global market for intellectual property results and its growing expansion in this market.

Over the past decades, financial support has become key to the development of science, technology and innovation (STI). Financing mechanisms are much more complicated. There has been an improvement from linear models to the concept of a national innovation system; new tools for resource support for research and development (R&D) and innovation have emerged. The dominant role in financing continues to belong to the state. Due to increasing spending on STIs and increasing budgetary constraints, government grants and subsidies are giving way for more complex schemes. Taking into account the growing role of cooperation and networking in the field of STI, the state actively uses co-investment mechanisms with businesses through public-private partnerships (PPPs), usually based on project financing [3; 4].

Currently, the complexity and scope of financing mechanisms for STI are growing on the basis of advanced concepts that take into account the growing economic value of knowledge aimed at improving the efficiency of innovative activities, developing interaction and cooperation at the regional, national and international levels. These tools include [11]:

- formal measures, such as tax policies and government subsidies;
- financing of long-term projects by the state and business;
- budgetary allocations to universities, research institutes, libraries and other organizations involved to the process of knowledge creation and innovation;
- support for programs implemented by international and regional organizations;
- targeted funding allocated by specialized institutions (for example, scientific and technological councils and foundations);
- implementation of individual initiatives through project financing mechanisms.

In practice, the PRC has developed a wide range of mechanisms for state support of innovation, focused on various categories of subjects of innovation, including educational institutions, research institutes and laboratories, large national corporations, small and medium-sized businesses. The main mechanisms that are most actively used at present are:

- direct and indirect (through government agencies) budget financing of research organizations and universities in the form of estimated financing of operating expenses, as well as the allocation of targeted grants and placement of state orders for the implementation of R&D;

- the tax preferences provision for R&D enterprises;
- budget funds investment in the capital of venture funds and other specialized financial institutions involved to the implementation of innovative projects;
- allocation of preferential state loans and credit guarantees (insurance) to the subjects of innovative activity;
- implementation of targeted public procurement of innovative products and services;
- financing of business incubators, technology parks and other infrastructure facilities for innovation.

To support small innovative enterprises in the industry effectively, the state must ensure the stability and competitiveness of the banking sector, and redirect it to the interests of small businesses. Government policy should encourage commercial banks to provide loans to small enterprises. Credit organizations, in which the state has a share in the authorized capital, should also assist small innovative enterprises in creating favorable conditions for lending.

In general, institutional support of the state in lending to small innovative enterprises is expressed in [3; 11]:

1. State ability increasing to subsidize the interest rate on loans and to participate in equity financing of investments of socially significant objects, that leads to a reduction in the risks of commercial banks;
2. Expanding the activities of funds for financial support of entrepreneurship, that accumulate budget funds and finance development programs of small innovative enterprises, satisfy the needs of enterprises in credit resources and provide guarantee on them;
3. Using the bank insurance mechanism with the participation of the state, that plays the role of an insurance company offering reinsurance services to banks, which reduces uncertainty and risks in financing small innovative enterprises;
4. Stimulating the development of microfinance organizations, which are credit cooperatives providing access for small enterprises and individual entrepreneurs to borrowed resources;
5. The development of non-banking infrastructure to support small innovative enterprises, including leasing, factoring companies and venture funds.

Thus, the mechanisms of state financing of innovative activities of small enterprises are constantly updated and

optimized. At the same time, prior attention is paid to the formation of financial mechanisms to accelerate the commercialization of acquired scientific knowledge. Taking into account all these factors of providing state guarantee support for innovative enterprises that change their quantitative and qualitative position in the country's economy will help to increase the effectiveness and efficiency of the national innovation system.

Conclusions:

The main emphasis in the PRC programs is currently being made in the following areas:

- further increase in public investment in research and development in priority sectors;
- increasing the economic return on invested budget funds, including by stimulating domestic demand on high-tech products;
- the adoption of comprehensive measures to stimulate the innovation activity of private business, especially small and medium enterprises.

In addition, special attention is paid to the training of qualified scientific and engineering personnel, which is the main productive force in the innovative economy, providing for a significant increase in budget allocations for these purposes in the coming years.

A wide range of tools is used to provide financial support to growing innovative companies in China. These

primarily include various loan guarantee and investment mechanisms designed to stimulate the influx of joint venture capital and bank loans into small and medium enterprises. Along with this, other methods of state support of small high-tech companies are actively applied, including the allocation of grants for launching research and development work on venture projects that they implement, as well as the creation of business incubators and technology parks that provide favorable conditions for the growth of such companies.

Thus, it can be concluded, that scientific, technical and innovative activities are becoming increasingly expensive, state budgets for its support are being reduced. The innovation production system has become much more complicated, the importance of cooperation between its participants is growing. The dependence of productivity and competitiveness of companies on innovation is growing. In such a context, more effective and comprehensive solutions are needed using public and private funding. Different stages of scientific, technological and innovative activity are increasingly becoming interdependent and intersecting. Serious efforts can be expected to consolidate the stages, participants and investors within the framework of targeted programs focused on specific products. Clusters, centers of excellence and value chains will play an important role.

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