Foreign Experience of State Regulation of Innovative Products and Innovations in Supply Chain Management in the Modern Economy

Ildar M. Ablaev
Kazan Federal (Volga region) University, Kazan, Russia
ablaevildar@yahoo.com

***Abstract*- State innovation policy is designed to cover all aspects of science, research and technology: legal, economic, organizational and managerial. The state innovation policy is a system which consists of three levels: national, regional and local. The levels complement each other, despite the fact that the significance and scope of the policies implemented on each of them are different. Through this research, we explore innovations in supply chain management (SCM), in which a manufacturer coordinates and supports the innovations of a supplier. We also analyze the role of innovation policy in the region, which is considered to be leading in the policy of the "new feudalism" of the United States and in the Lisbon Strategy for Growth. The state innovation policy aims to mobilize and activate internal reserves of the country's innovative potential, in particular, innovations in logistics, human resource and scientific and technical potential of the region.**

***Key words*-** *state innovation policy, innovation potential, innovation promotion, the small business, Small Business Technology Transfer Program, tax remissions, science and technology parks, supply chain management.*

1. Introduction

Dynamic complexity has outpaced a possibility of human intervention to identify and solve many systemic problems using smart supply chains. It is harder to achieve performance improvement with traditional tools so companies clearly see a need to develop new solutions focused on technology and innovation based on business models. In addition, in recent years, expenses on instrument-making and devices have sharply decreased. Now computers and information technology can support widespread tools, monitoring and analytics. A smart supply chain produces more information and improves solutions. Research on innovation in supply chain management should certainly be aimed at managing the business of smart supply chains. Five characteristics are distinguished as structural attributes of innovative supply chains [1];1) Information in supply chains; 2) Information technology; 3) Process automation; 4) Advanced analytics; 5) Process integration and innovation.

Supply chain management is multidimensional. The two main types of SCM are external and internal integration [2, 3, 4, 5]. External integration involves the integration of suppliers and customers [6]. To reflect the diversity of supply chains, SCI is divided into three dimensions: internal, supplier and customer integration [2]. Innovation-oriented enterprises focus on creativity and developing new ideas to achieve market success with their products and services and thereafter focus on customer satisfaction and loyalty by cultivating a favorable impression and long-term customer relationships, satisfying customer needs, and enhancing customer value based on an enterprise image. Innovation-oriented and customer-oriented relationships have a common goal, which is to more effectively meet customers' needs and to obtain a higher profit. A previous study stated that the development of a close relationship with customers entails understanding their current situation and potential demand, which in turn can enhance firm innovation capability [7]. In smart supply chains, integrating IT, advanced analytics, and process automation could provide unprecedented opportunities to maximize the supply chain surplus. Companies can stand to realize the gain from big data only if they have the capability to make these data accessible and useable in improving processes. In other words, that is to collect, store, and manage large volumes of data sets; and then transform them into real-time, smart decisions, implement them; and finally achieve a better operational performance. Without appropriate system integration, this aforementioned task can be hardly done [8].

Almost the entire business goes to the form which handles supply chain flows. The industrial revolution, in which muscle power was replaced by mechanical power, has greatly improved productivity and efficiency. With the rise of computing and other technologies, further productivity gains appear to be promising in the adoption of automating processes based on better

information. Process automation hereafter refers to either automated analysis of big data or automated processing of physical product [9].

Today, according to the innovation development index [10], the countries with the most developed innovation sector for 2018 are Switzerland, Sweden, the United Kingdom, the Netherlands, the United States of America, Finland, Hong Kong, Singapore, Denmark, and Ireland. The same 10 countries were in the top 10 in 2013.

2. Methodology

This paper explores the main innovations in supply chain management in the USA, China, Great Britain, and Russia, and analyzes the experience of state support of innovation in some of these countries. The ranking of countries with the best innovative development according to the Global Innovation Index – [10] collection is presented in Figure 1:

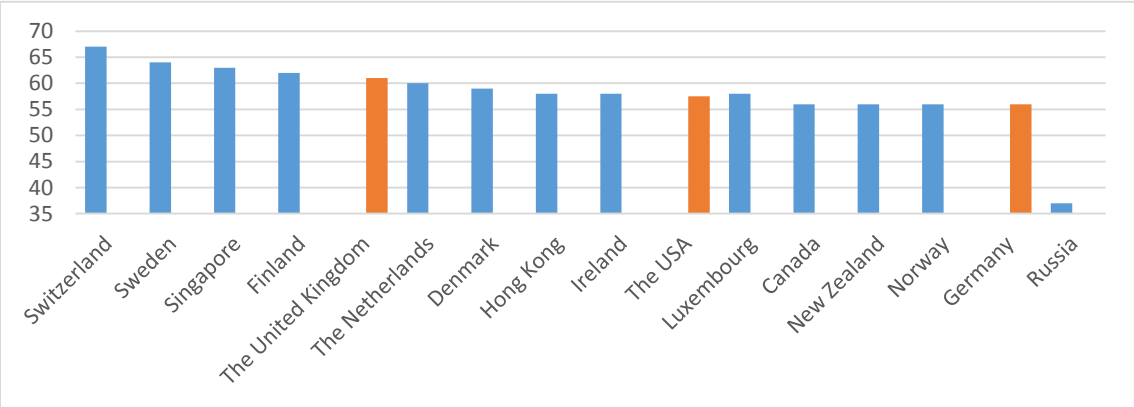

Figure1. The ranking of countries with the best innovative development according to the Global Innovation Index – 2018[10]

Currently there are three models of support for innovation processes in developed countries:

• The first model being applied in the USA, the UK and France is focused on leadership in research and development. The state also supports large-scale projects with a large share of scientific and innovation potential, which cover all stages of the production cycle;

• The second model is aimed at creating a favorable scientific and innovative environment, diffusion of innovation, and also aims to rationalize the entire structure of the economy. This model is typical for such countries as Sweden, Germany and Switzerland;

• In the third model the stimulation of innovations and perceptivity of the scientific achievements is performed owing to the development of infrastructure. The state here coordinates the actions of various sectors in technology and science. The model is typical for developed Asian countries, in particular, Japan and South Korea [11].

3. Results and discussion

Let us examine experience of state support for innovation in SCM. The main important foreign experience, in our opinion, is the practice of improving investment climate and development of market relations in the transport system and in the logistics market. In addition innovation in SCM includes eliminating imbalances and gaps in the system of transport communications, their development around the needs of a real sector of the economy, development of logistics, introduction of intermodal technologies and containerization of the distribution system. Foreign companies modernize logistics infrastructure of sea and river ports, airports in order to meet the needs of strategic merchandise exports, and renewal of the vehicle fleet. Along with this it is required to improve the logistics infrastructure of international transport corridors, primarily the North-South and Trans-Siberian corridors, to form the unified operational information environment, to raise funds from extra budgetary sources of financing using public-private partnership schemes. Innovative technologies of SCM in the USA and China include: fast and affordable internet, cloud technologies, big data, geolocation, internet of things, robotization, artificial intelligence, 3D printers, social networks, online retail [8]. E-commerce and online commerce are gaining momentum in development. Amazon is one of the pioneers, the largest company in the world by revenue, sells goods via the internet [12]. Electronic commerce will keep on gaining momentum: the e-commerce market in the CIS is growing by 30-40% per year; the global e-commerce market is growing by 15-20% per year.

Most of the state regulatory bodies in the United States are funded from the federal budget (National

Science Foundation, NASA, American Council on Science, and others).

The state policy is focused on stimulating research centers and venture funds. The federal budget fully funds the most efficient research centers during the first 5 years due to their risk, complexity, strong international competition and high costs.

The US state innovation policy is also distinguished by the low bureaucratic concentration of decisions on the development and implementation of innovative projects; while the main emphasis is on forecasting, optimization of management decisions, state expertise of innovative projects. A mechanism of the development of domestic and international competition in high technologies is well-developed [13]. In the USA two major programs are implemented to support the innovations in small businesses, which are principal in supporting innovations in the country:

- The Small Business Innovation Research (SBIR) is a program by which the state coordinates small businesses. 2.5% of the total volume of extramural research budgets of all federal agencies and extramural research budgets over $ 100 million are reserved for contracts or grants for small businesses [14]. By 2017, 112,500 grants were awarded for a total of more than $ 26.9 billion [13].

- The Small Business Technology Transfer Program (STTR) is an important small business program that expands the financing of innovative research and development. Expansion of public / private partnerships, as well as a possibility of establishing joint ventures for small businesses and national enterprises, for example, non-profit research institutions hold a central place in the program. The most important role of the STTR program is to promote the innovations required to solve the scientific and technological problems of the country in the 21st century [15].

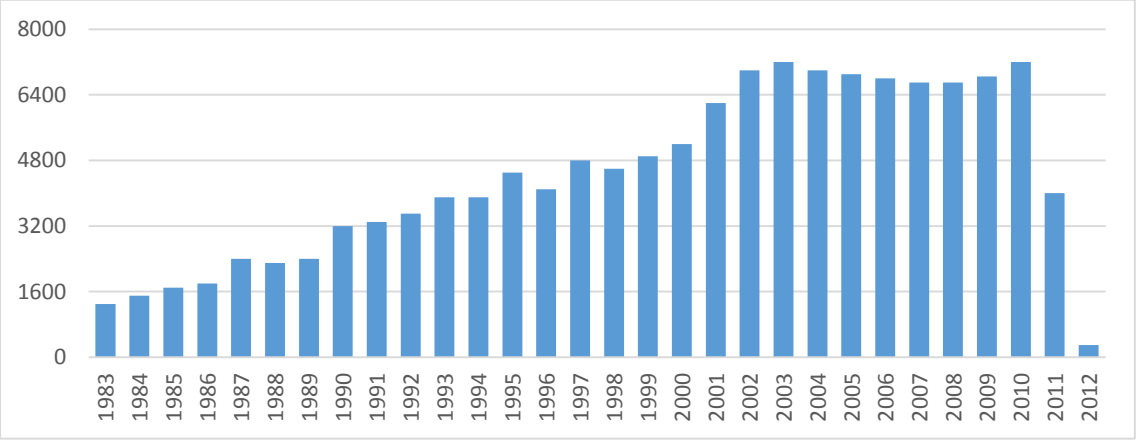

Figure2. Distribution of grants under the SBIR and STTR programs

Innovation regulation in the UK is carried out by the Department for Business, Innovation and Skills aimed to make the UK the most attractive place to invest in technology business [16]. Proceeding from the fact that there is a separate structure in the country that deals with innovation development, it can be concluded that innovation development has the highest priority in the country.

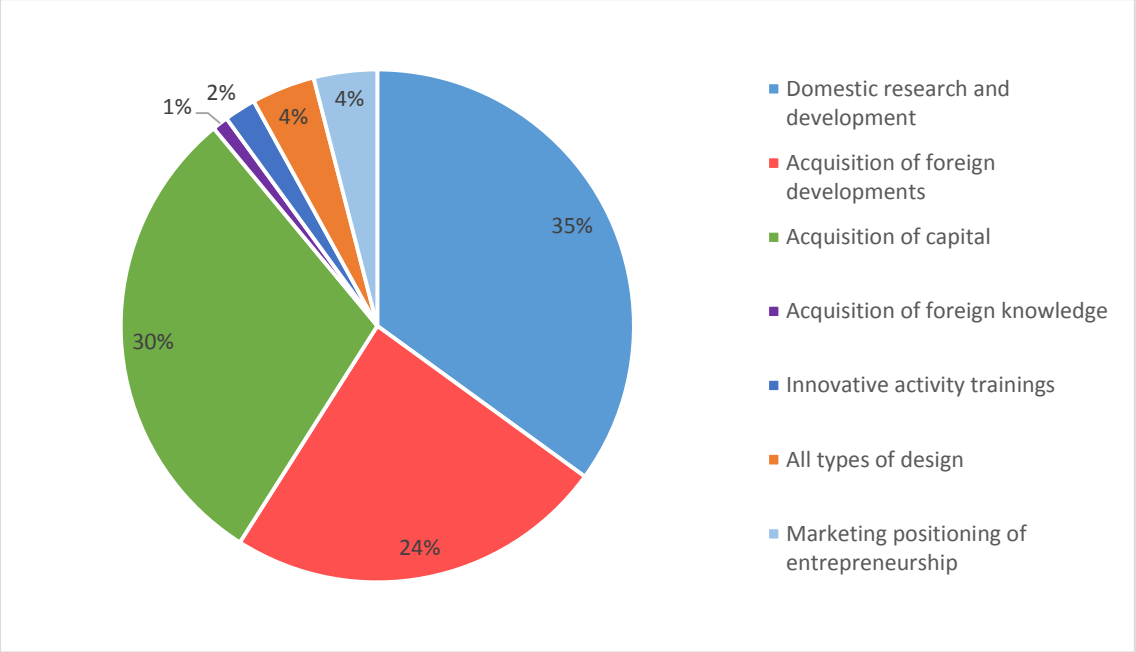

Figure3. Distribution of investment in innovation by articles in the UK [13]

As the main mechanism of state support for the development of high technology and science in the UK, tax remissions for the organizations involved in research and development are being considered.

As a part of a strategy to support investment in research and development, in 2017 the UK government introduced tax remissions for small and medium businesses, then in 2018, tax remissions extended to large companies. Companies that annually invest more than 10 thousand pounds sterling for research and development in high technologies are eligible for profit tax deductions.

The size of the remission is fixed depending on the size of a company:

• 150% of development and research costs for small and medium businesses;

• 125% of development and research costs for large companies.

Additionally companies are eligible for accelerated depreciation for certain types of fixed assets used for development and research. This policy of introducing tax remissions is aimed at improving the efficiency and transparency of relations between the state and the private sector. The strategy for establishing and maintaining public-private partnerships, implemented in the UK, is recognized as the best practical model of such measures at the international level [17]. The positive impact on the development of innovation policy in the UK is provided by information support for the implementation of innovative projects. With this in view the Department for Business, Innovation and Skills on its official website places a large document collection beneficial to participants in the innovation process [18]. It is also important to mention the role of infrastructure support, which is the basis for innovative activity. Thus, companies providing service and consulting on technology development have become very popular. Such companies were initially established on the basis of universities and possess different innovation centers that provide laboratories and offices for young innovative companies. They are also intermediaries between the developers of innovative ideas and business representatives ready to implement these ideas in practice. The main tool of financial support for research and development in Germany in the field of innovation is the state support. It is the German government that is called upon to play an active role in scientific research: up to 80% of the research activities of universities are financed by the state through grants from five major scientific societies. Besides, the government financially supports the development of risky and long-term projects in the basic branches of industrial and scientific activities. This support is carried out in the following areas: firstly, the state finances risky projects in order to attract private investors to innovative projects. Secondly, it provides direct financial support for private investors. In 2004 the Act for Promoting of Venture Capital was adopted, which provides tax remissions for initiators of venture capital funds. As a consequence special funds were established in Germany, which are intended to support the market of risky share participation.

Just like in the UK much attention is paid to the information support in the innovation sphere. The

main source of information in the business sector is the Patent and Trade Mark Office of Germany. Over 20 patent and information services have been established to facilitate the access for medium and small enterprises to the needed information on support and development of innovative projects. Science and techno parks are actively developing in Germany; one of the most famous is the Berlin-Adlershof science city. There are 445 innovative enterprises on the territory of this science city, more than 5000 employees have a job here [19]. Figure 4 shows the ratio of public and private investment in the construction of the Berlin-Adlershof science city. It can be concluded from the graph, that initially state investments made up the essential part of the financing (82%), but in recent years the share of state participation is declining, and private investments are growing in direct ratio, for which it has grown by 54% for the last 6-7 years.

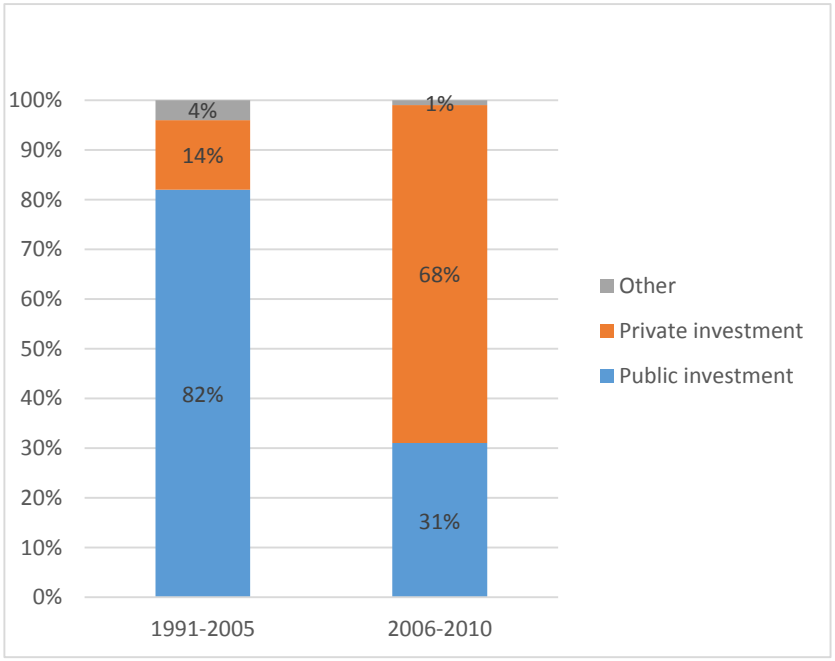

Figure4. The ratio of public and private investment in construction [20].

Also, there is the Joint Initiative for Science and Innovation program, which aims to increase the competitiveness of national research. Since 2005, it has been implemented by the federal government, German research organizations and federal states. A purpose of the program is to strengthen cooperation between scientific disciplines, as well as industry and science. Up to 2010, 3% of annual additional funding was allocated to German research organizations as a reward. From 2011 to 2015 it was decided to raise the budget to 5%.

Along with that, the state has developed a new paradigm on higher education - 2020, which aims to modernize the system of higher education in Germany. As a result of international competition, there is a need for active development of the research profile of universities. The state undertakes the responsibility to create financial conditions for more effective work of higher education institutions at the international level. This initiative is coming from the fact that in Germany the demand for qualified personnel in complex professions is constantly growing, especially the need for graduates in such sciences as high technologies, informatics and mathematics is high. The state support allows, among others, to invest up to 26,000 Euros in each student seat [13]. Also, it is necessary to give consideration to the state stimulation of China's innovation processes, since this country has entered the next stage of development in the scientific and technical field. Therefore, the experience of this country could be helpful for developing the state innovation strategy of Russia. The Chinese governance considers the increasing of scientific, technological, and intellectual potential as a major driving force of socio-economic development and growth of the country's competitiveness. The state policy was officially initiated in 2006 after the publication of the 15 year Medium-to-Long-Term Plan (MLP) for the Development of Science and Technology for the period of 2006-2020, which marked the purpose of creating the business environment capable of promoting independent innovations through efforts of private companies. The task was to master all possible technologies [21]. Currently, a primary task for China is to decrease the dependence on foreign technologies, which has grown over the last

decades as a result of the "market in exchange for technology" state policy, which led to the transformation of China into an industrial export-oriented center of global importance. The country's governance has concluded that it is crucial to participate directly in the processes of globalization of scientific and innovation development based on own ideas and developments, to "grow" leaders on priority areas in China itself. Much attention is currently being paid to innovations in “narrow spaces” of economic progress, such as power economy, including manufacturing process and consumption of basic energy sources and the use of new sources of energy, such as food security arrangements, public health service, production of basic equipment for machine-tool industry, transport engineering, electric power. The main emphasis is made on the development of owned innovations as a lever for building up the aggregate national power, which, at the same time, does not exclude the necessity and reasonability of using technological and other borrowings at a certain stage that could contribute to the development of owned innovations by technologically developed powers in relation to competitiveness in the framework of these industries and is implemented by the efforts of the state and private business. To date in the PRC a system of scientific research and development has formed, covering nearly all areas of science and technology, including biology, nanotechnology and astronautics. The main efforts in China are directed to the creating conditions facilitating the expansion of innovative scientific activity, fundamental researches and researches in applied sciences, as well as accelerating the processes of implementing the achievements of science and technology into practice in order to promote the country's social and economic development and ensure national security. Among the priorities are power economy, water and mineral resources development, ecology, agriculture, manufacturing, transport, informatics, public health care, urbanization and urban development processes, as well as social security and national defense. In order to improve the efficiency of using the existing scientific, technical, technological and intellectual potential and resources, China has begun to reform the interaction mechanism between the research institute of the Military-Industrial Complex (MIC) and the national economy. In accordance with these plans, MIC research institutions will be involved in general-purpose research and development, and the civilian sector research institutions for research and development of military products. By building scientific and technical potential, the Chinese administration is planning to substantially increase the financing of science. 33 million US dollars were allocated to the Academy of Sciences for the organization of 60 international science and techno parks on the territory of China and abroad, and for establishing new research structures on the problems of development of coastal areas, bioenergy, nanotechnology and nanobionics, and launching a national system of standards by 2015, meeting the world standards. According to the projections of Chinese analysts, Beijing will be able to become a scientific capital of the world by 2020. The China’s administration at the same time considers it necessary to use the opportunities that are opening up in connection with the processes of globalization and the expansion of foreign relations. China is determined to continue adopting best practices, technologies, scientific and technical achievements of other countries, expand the practice of attracting foreign scientists and specialists to research and development in China [22]. With the reference to the performed analysis, in our opinion, the Chinese experience of the state regulation of the innovative economy is the most acceptable for the further development of innovations in Russia. This view is based on the common approaches to regulating the economy, where in both countries the state continues to play an important role, as well as on the near simultaneous start of the countries' transition to the market economy (China – in 1978, Russia as a part of the USSR – in 1985). In the realm of innovation regulation in Russia, the main emphasis, as well as in China, should be made on the development of their own innovations, in order to reduce dependence on foreign technologies. It is required to stimulate the development of its own intellectual capital, to ensure effective cooperation of business communities with research centers, in order to boost the introduction of research and development in the native industry. It is also possible to make use of the China’s experience in the development of innovations based on the MIC, Russia’s one of the most developed direction [23, 24].

4. Conclusion

Hence, the state innovation policy is designed to cover all aspects of the scientific and technical sphere: legal, economic, organizational and managerial. The state innovation policy is a system which consists of three levels: national, regional and local. The levels complement each other,

despite the fact that the significance and scope of the policies pursued on each of them are different. There is a tendency to strengthen the role of innovation policy in the region. The investment climate and the development of market relations in the transport system and in the logistics market should be improved in order to solve problems of innovation in SCM.

The state innovation policy aims to mobilize and activate internal reserves of the country's innovation potential, in particular, innovations in logistics, human resource and scientific and technical potential of the region. Also, a great emphasis is placed on the reducing the differentiation in the development level of regional scientific and innovation potentials. At the domestic level, the innovative activity of all economic entities is boosted through the cluster strategies aimed at launching specific knowledge networks. A new cluster-network principle of innovation policy is found during the launching process. The nature of inter-regional innovative cooperation is changing. The foundation of innovative regional networks and the implementation of cluster strategies have contributed to the development of transnational interaction and the establishment of trans-regional network structures. They are launched by the regions themselves and represent an innovative network of regions with common goals of innovation development.

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