



Lappeenranta University of Technology

School of Business and Management

Industrial Engineering and Management

Global Management of Innovation and Technology

MASTER'S THESIS

**THE ROLE OF NATIONAL INNOVATION SYSTEM IN
INCREASING COMPETITIVENESS OF SMALL INNOVATIVE
ENTERPRISES IN RUSSIA**

First supervisor: Daria Podmetina

Second supervisor: Juha Väättänen

Date: 10.09.2016, Lappeenranta, Finland

Author: Mikhail Struzhanov

ABSTRACT

<p>Author: Mikhail Struzhanov</p> <p>Title: The Role of National Innovation System in Increasing Competitiveness of Small Innovative Enterprises in Russia</p> <p>Year: 2016</p> <p>Place: Lappeenranta</p>
<p>Type: Master's Thesis. Lappeenranta University of Technology</p> <p>Specification: 87 pages including 25 Figures, 2 Tables and 1 Appendix</p>
<p>First supervisor: Daria Podmetina</p> <p>Second supervisor: Juha Väättänen</p>
<p>Keywords: National Innovation System, Small Innovative Enterprises, Competitiveness, Development Institutions, Triple Helix, Composite Materials Industry, Russia.</p>
<p>Nowadays, Russian economy encounters a large amount of structural issues, impeding economic growth and depriving country's ability to respond effectively to emerging challenges. The most appropriate way to ensure sustainable development is to develop new economic strategy, implying the shift to the innovative development path. It is thought that the key role should be played by small innovative enterprises (SIE), designed to perform tasks to strengthen international scientific and technical cooperation and increase the country's competitiveness based on the development, adoption and implementation of innovations. Therefore, the support of the SIE should be a priority of the state policy, implying the creation of an effective national innovation system (NIS), i.e. a set of interrelated entities and institutions whose activities are aimed at encouraging and supporting innovation.</p> <p>This thesis provides an analysis on the problem of SIE interaction with elements of Russian NIS. The research implements the case study of two SIE from composite materials industry. Based on the obtained results, it is possible to conclude that Russian NIS is spending huge amounts of resources for the financing of small innovative businesses. However, this approach does not always lead to an increase of their competitiveness. Instead of gratuitous cash infusions it is better to create favorable conditions for business development. The study results into a list of recommendations, which could be exploited by the corresponding authorities in order to improve current efficiency of Russian NIS.</p>

ACKNOWLEDGEMENTS

That which does not kill us makes us stronger

Friedrich Nietzsche

I would like to express my gratitude to all the people, who accompanied me during the six years of my studies. That was a long way and I feel myself very grateful for all the knowledge and skills I have obtained.

Special thanks to Lappeenranta University of Technology and amazing last year in Finland. It was absolutely priceless experience; I will never forget it.

I would like to thank my dear friends Anton, Danya, Edgars, Dima and Julia for their support and joyful time spent together. And of course Liza who was my faithful companion despite the fact that sometimes she drove me nuts.

I would like to thank my supervisors Daria, Juha and Katya for their valuable comments and time spent on me. I also could not forget to mention professor Kraslawski for the inspiration to work and his energizing charisma. I thank German S. and Ilya Ch. for the exciting interviews and useful information they provide.

I am very grateful to my beloved parents for the possibility to become who I am.

Finally, I am obliged to thank all the wonderful people who filled up these years with happiness and kept me stay on track!

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ABBREVIATIONS

ASI	–	Agency for Strategic Initiatives
BMSTU	–	Bauman Moscow State Technical University
CIS	–	Commonwealth of Independent States
FASIE	–	Fund for Assistance to Small Innovative Enterprises
FDI	–	Foreign Direct Investments
GCI	–	Global Competitiveness Index
GDP	–	Gross Domestic Product
HEI	–	Higher Education Institutes
IDF	–	Industrial Development Fund
MOEX	–	Moscow Exchange
NIS	–	National Innovation System
R&D	–	Research and Development
REC	–	Research Educational Centers
RVC	–	Russian Venture Company
SEZ	–	Special Economic Zone
SIE	–	Small Innovative Enterprises
SME	–	Small and Medium-sized Enterprises
TNC	–	Transnational Corporations
VEB	–	Bank of Development (Vnesheconombank)
WEF	–	World Economic Forum

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1. INTRODUCTION

This chapter reveals background information of the studied subject, research gap and objectives, as well as briefly demonstrates characteristics of the thesis.

1.1. Background

Nowadays, Russian economy encounters a large amount of structural issues. They impede economic growth and deprive country's ability to respond effectively to emerging challenges. Current global environment, flavored by falling prices on fossils, capital outflow from developing economies, as well as escalation of political tensions between Russia and Western countries impairs the situation. In order to overcome these obstacles, it is particularly important to develop new economic strategy, establish viable goals and find new sources of growth to rely on in the long term prospective. It is the only way to ensure a technological breakthrough of the Russian industry, improve welfare, secure the geopolitical role of Russia as a major player on the world political arena (Kuvshinova, 2016a).

Russian government seems to be fully aware of the futility of a resource-based way of economic development. Therefore, at the moment, the priority is shifted to the innovative development path (Russian Federation Innovative Development Strategy for the period until 2020, 2011). It implies the development of smart economy, relying on innovation as a driver of productivity growth and smart people community - highly qualified workforce, creating these innovations. This transition requires institutional and structural changes, as well as significant movements in the governing models, occurring with the support of freedom of enterprise and consensus within the whole society (Kuvshinova, 2016). Today, when the Russian economy meets the bottom of the economic crisis of the past years, society finally come to the agreement to set up new economic development paradigm. There are still different opinions about specific ways and steps in the direction of planned objectives, but most of the experts (Klepach cited in Kuvshinova, 2016; Auzan cited in Kuvshinova 2016a; Vjugin, 2016) agrees on the existing need in denationalization and reduction of the state share in the economy, as well as the development of small and medium-sized enterprises (SME).

Thus, the state attaches particular importance to the private small innovative business, seeing it as a starting point for the growth of the entire economy. It is thought the key role will be

played by small innovative enterprises (SIE), characterized by independence and adaptability, designed to perform tasks to strengthen international scientific and technical cooperation and increase the country's competitiveness based on the development, adoption and implementation of innovations. There are two groups among SIE: the companies originated from the Research Institutes (RI) and parent universities (I type), and independent structures (II type). I type SIE are considered to have advantage of established relationships with governmental structures including development institutions, while II type SIE have to build such relationships from the ground (Dezhina and Saltykov, 2004).

Small businesses have significant advantages in innovation sphere, being able to actively develop the innovative economy. Therefore, the support of the SIE should be a priority of the state policy. This approach requires the creation of conditions that can ensure the efficiency of innovation generation, increase the pace of their commercialization and raise demand in the business environment. It is necessary to create an innovation infrastructure (technology parks, clusters, special economic zones (SEZ)), the regulatory framework governing the relationship between the agents and confidence of the communicative environment ensuring coordination between agents (Pavlocheva 2012). Implementation of these conditions requires the state to create an effective national innovation system (NIS), i.e. a set of interrelated entities and institutions whose activities are aimed at encouraging and supporting innovation.

The integral components of an effective NIS are development institutions, created by the Russian government in order to support innovative activities. Development institutions facilitate the implementation of innovative projects at every stage of the innovation cycle. There are Vnesheconombank (VEB), the Foundation "VEB Innovation", OJSC "SME Bank", OJSC "RVC", OJSC "RUSNANO", the Fund for Infrastructure and Educational Programs, Fund "Skolkovo", Industrial Development Fund, The Foundation for Assistance to Small Innovative Enterprises (FASIE) among the most significant institutions in terms of stimulating innovation.

1.2. Research gap

It is obvious that development institutions are designed to support the innovative business, improve its competitiveness and develop the country's economy. However, their effective-

ness is often questioned, and many of them were reproached for embezzlement and corruption. At the same time, the effect of their work on the real representatives of business, including small innovative enterprises, have not yet been studied by the scientific community. The emphasis of previous researches was put on the phenomenon of SIE and its competitiveness (Tovstiga et al., 2004; Kaspina, Erina and Filippova, 2014). However, in this work the focus is set on the relationship between SIE and development institutions, in the framework of NIS. Moreover, the area of special interest is the difference in these relationship related to the way of SIE origin. Thanks to the established relationships with governmental structures, I type SIE are estimated to be more competitive. At the same time, there is no evidence that can support this assumption.

Nowadays, it is highly important to reassess the value of development institutions in the Russian economy. Thus, this work seeks to fill in this gap by performing qualitative study of the influence of development institutions on competitiveness of different types of SIE, and assessment of the effectiveness of Russian NIS.

1.3. Research questions and objectives

Thus, the objective of further research is the assessment of influence of Russian NIS on SIE competitiveness. In order to reach this objective, the thesis is going to answer the following research questions (Table 1).

Table 1. Research Questions

#	Research Question	Subquestions
RQ1	What is the effect of Russian NIS on SIE competitiveness?	<p>What are the factors affecting SIE competitiveness?</p> <p>What are the elements of Russian NIS?</p> <p>How do development institutions affect SIE?</p>
RQ2	Do the I type SIE have competitive advantage over the II type SIE?	<p>What is the difference in competitiveness approach of SIE?</p> <p>Does the NIS environment affect various types of SIE in different ways?</p>

Several topics were covered to build a deep understanding of the subject, including the theory of National Innovation Systems, different approaches to competitiveness, theory of innovative development, etc. Overall, the following goals were set to answer the RQ:

- examine existing theories on competitiveness,
- analyze the main factors that shape competitiveness,
- study the evolution of NIS theory,
- elaborate the model of SIE competitiveness,
- analyze SIE environment in the framework of Russian NIS,
- examine the existing system of development institutions,
- define the role of development institutions in increasing competitiveness of SIE,
- generate the proposal for further improvement of Russian NIS.

1.4. Delimitations

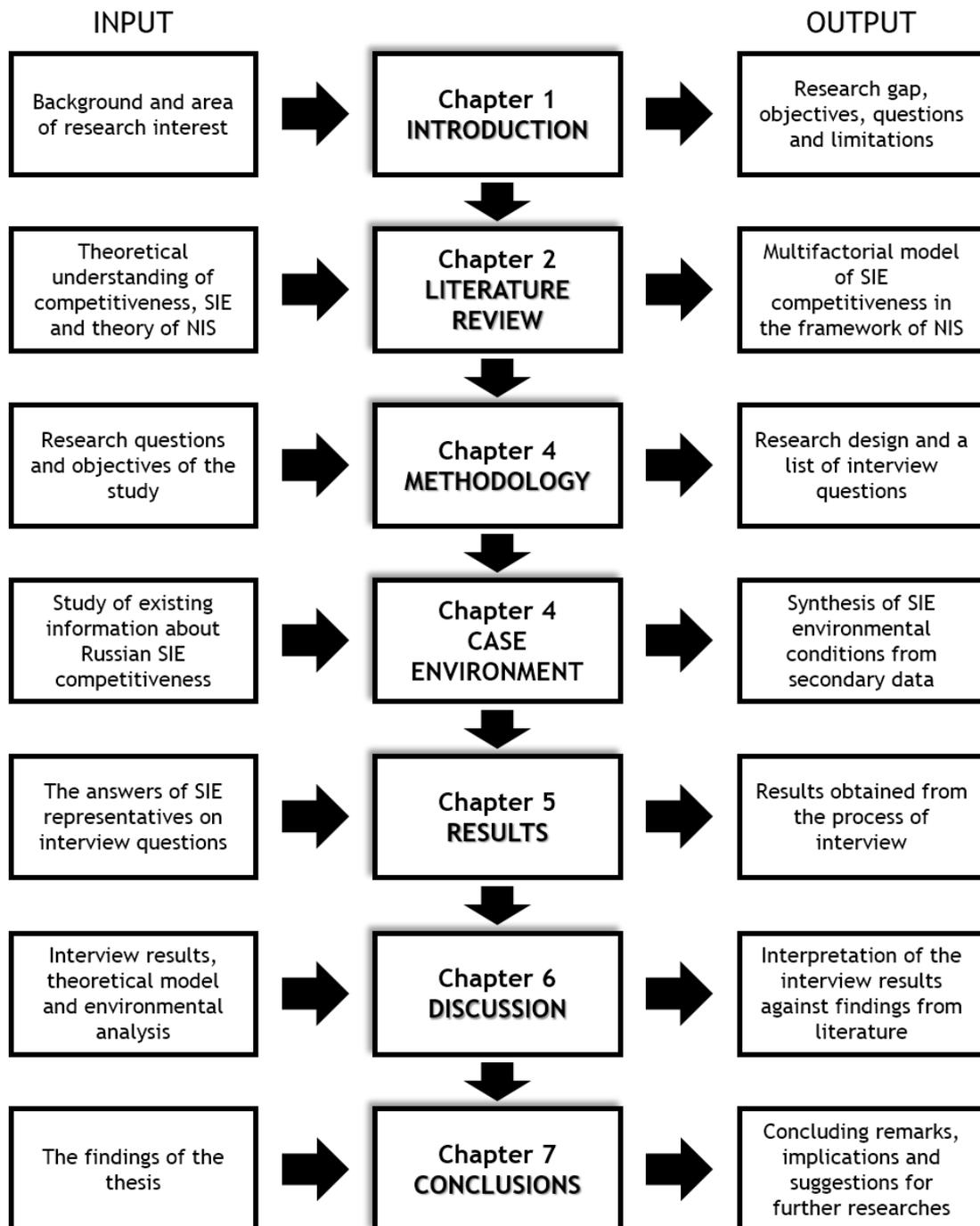
This thesis primary objective is the study of relationships inside Russian NIS. Despite the high relevance of the topic for the world scientific practice, it is hardly could be generalized to assess the effectiveness of NIS institutes on business in other countries. The factors affecting interaction of Russian SIE are very specific to the country (Tovstiga et al., 2004) and due to the small size of the enterprises require micro-level analysis. Moreover, the concept of SIE is mainly relevant to the Russian case and actually is not prevalent in other parts of the world. Thus, the results of this work are oriented on Russian users, mainly in development institutions. They could consider this thesis as an analysis of their current effectiveness and the base point for further improvement.

1.5. Report structure

In order to present the results of the study in a holistic way, the thesis is split into seven chapters. The overall structure could be seen on the Figure 1.

Introduction chapter aims to disclose background of the study and explain the origin of research interest, set objective, question and goals, and briefly demonstrate characteristics of further work. It is followed by *Literature review* combining all the theoretical information relevant to the topic of the report in order to set the framework of the study and elaborate research model. *Methodology* chapter provides an extensive description of full methodological framework including research strategy, design, data collection and data quality. Then

the *Case environment* is analyzed by means of secondary data sources, building an overview on the problem on the basis of previous researches. In the *Results* section the data obtained by the researcher during the process of interviews is presented, and then in *Discussion* analyzed against the data from academic literature. The *Conclusions* chapter is devoted for summary of findings, implications of the research and suggestions for further study.



Source: Author

Figure 1. Report structure

2. LITERATURE REVIEW

This chapter is devoted to elaboration of the framework and research model based on the study of academic literature, theories and concepts, falling under the scope of research.

2.1. Economic consequences of globalization.

The world around us is constantly evolving. Every year, month, hour, every moment there is a huge amount of changes. And each time the pace of these changes is increasing, breaking new boundaries and striking the imagination. A new global reality makes it possible for people to cross the oceans and continents in a few hours, instantly communicate anywhere in the world. The boundaries of space and time are compressed, almost wiping the barriers between states (Porter, 1990a). Economic relations acquire a new quality value. Languages, currencies, ideology become global. The world is transformed into a single system, open equally to all its members, creating new opportunities and ways of evolutionary development.

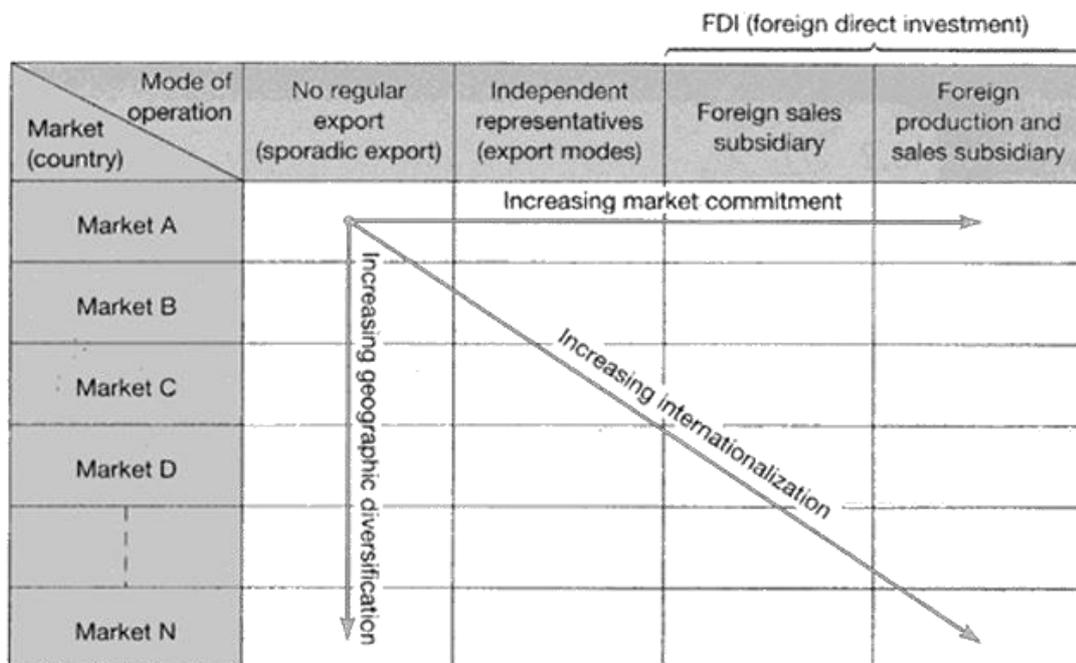
In order to explain the ongoing processes in the world, the concept called *globalization* was introduced (Levitt, 1983). It affects almost all spheres of public life, including the economy, politics, ideology, social sphere, culture, ecology, lifestyle, etc. Globalization has become an essential feature of the modern real world, one of the most influential forces that determine the development path of our planet.

The new reality contributed to the creation of large transnational corporations (TNCs), creating a unified product, using economies of scale and global sourcing, and international markets to sale their goods all around the world (Levitt, 1983). Such development model was made possible by dramatic changes in the speed, quality and efficiency of global channels of communication and transport, which in turn reduced the transaction costs of international cooperation (Porter, 1990a). Moreover, rising homogenization of markets in different countries has greatly simplified doing business abroad, to make the process understandable for everyone (Hedlund and Kverneland, 1985). Globalization also affects the development of small and medium-sized businesses, providing access to global markets even for the most insignificant economic agents.

At the same time, current market conditions have created a much more effective international economic space, offsetting the competitive advantage of scale of large vertically integrated

multinationals. The greatest recognition got the theory, asserting the global sustainable competitive advantage can only be achieved by the presence of unique assets and competencies (Hamel and Prahalad, 1990, Barney, 1991). Thus, small and young organizations limited in resources, but possessing unique assets, are able to compete with the established giants in the market, offering consumers a more specific and effective approach to meet their needs. Moreover, the current economic conditions have significantly simplified the process of internationalization of these companies.

Typically, foreign market entry is carried out in several stages, that are demonstrated in the framework of Uppsala model (Figure 2). Traditional internalization process takes years and require gradual steps towards expansion and development of international cooperation (Johanson and Vahlne, 1977). In contrast to this model, modern young companies' internationalization process can skip some steps or generally occur simultaneously. Sometimes a company originally established as a global, that has given rise to the phenomenon of *born global firms* (Oviatt and McDougall, 2005).



Source: Forsgren and Johanson, 1975

Figure 2. Internationalization steps according to Uppsala model

2.2. Competitiveness, innovation and productivity

In today's world, competitiveness is a decisive indicator determining the effectiveness of entities' activities, indicating the ability to successfully grow in a competitive environment (Kotler, 2010). In the context of global competition, traditional factors shaping the competitiveness of companies and countries are losing their significance. Factor conditions, recently considered as a key to achieve sustainable competitive advantage, no longer play a decisive role. Nowadays, a low input costs, attractive interest rates, a weak exchange rate of the national currency and the potential economies of scale cannot ensure the country's competitiveness on the world market (Porter, 1990a).

While geographic location is still the main factor of competition, its role has changed significantly. Areas possessing rich natural resources or having unique geographical location, is still reaping the benefits of "comparative advantage". However, in today's world, competition is becoming more dynamic, allowing companies to avoid significant costs by using global supply strategies. Thus, nowadays, the competitive advantage is based not only on factor conditions themselves, but on the more efficient use of them, which requires successive innovative changes (Porter, 1998).

According to the statement of Michael Porter, companies achieve competitive advantage through acts of innovation (Porter, 1990a). However, the term "innovation" is ambiguous and could be interpreted in different ways. For the first time this term was coined by J. Schumpeter (1934). He defined innovation as the invention that have been commercialized by entrepreneurs, in other words it is the development or discovery, which has a sufficient demand on the market. It could be both new products and new methods of production, services and new market segments, new organizational structures, etc. (Lundvall, 2007). A vital aspect of innovation is the need for its practical implementation. Without it the innovation loses its meaning (Schilling, 2006).

There are two different types of innovations: product and process (Tidd et al., 2005). Product innovation involves the development of a new product or improvement of the characteristics and properties of the existing one, like adding new functionality, change the materials the product is made of, etc. In other words, it is a change in the product. Process innovation is focused on changing the way how the product is created and sold, including the development of methods of production, delivery, maintenance, utilization, and organizational models, processes within the enterprise, industry or even country.

Most innovations do not imply major changes. They are just new combinations of already known improvements, accumulated over years of development. These incremental (gradual) innovations consist of ideas, which are not new, flying in the air, but never before implemented into reality (Porter, 1990a). While incremental innovations exist within the dominant paradigm, radical are tending to break the templates. They create entirely new methods and ways to shift to the new edges of competition.

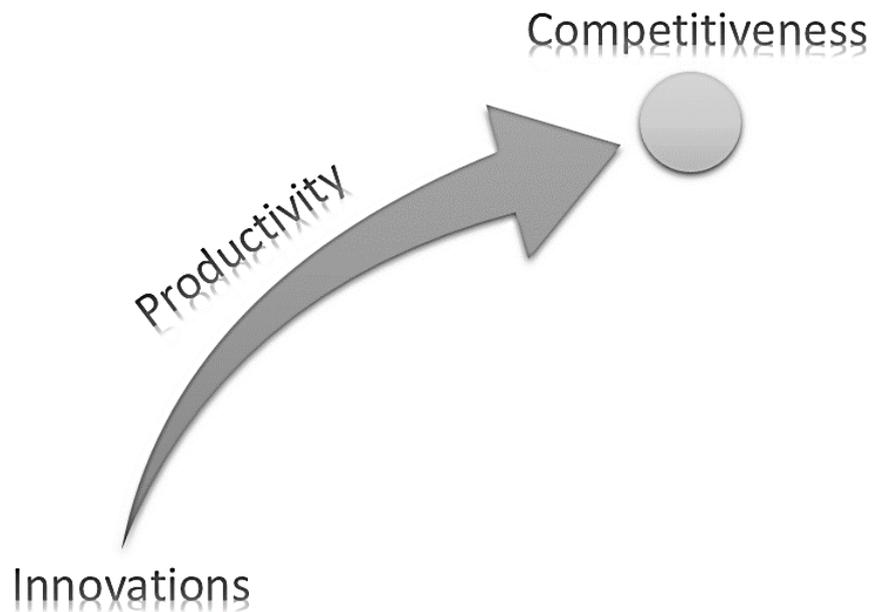
Incremental innovations in most cases owe their emergence to marketers who understand well the requests of the target audience, and then address them to R&D department to extend the functionality of the existing product. Contrary, the basis for radical innovation is divergent or lateral thinking, in other words a non-standard or going beyond the common way of thinking (Miller and Morris, 2008). There is always a technological breakthrough behind, new core technology or the product of brilliant vision of a scientist or an engineer. If the level of communication between the creators and marketing representatives is weak, the technology can permanently stick in an initial stage, without bringing substantial benefits to society. Conversely, the close collaboration between scientists and engineers with marketers and sellers can turn a brilliant technology into radical innovation.

It is obvious that radical innovations are more complex and resource-intensive form of innovation. They require sufficient investments and will pay off in a long term prospective. Nevertheless, despite these disadvantages, the complexity of radical innovation endows their owners with the valuable advantage. Such innovation is much harder to imitate and copy. Therefore, the market ought to have more time to react. This creates a more durable and sustainable competitive advantage for the innovator. Thus, we can conclude: the more innovation is unique by its nature, the more value it gives for the company implemented it.

A fundamental property of innovation is the introduction of new, more effective ways to create and use things, meet consumer needs. Thus, the inevitable effect from innovation activity is increasing productivity, which in turn is the basis for competitive advantage development (Figure 3). Productivity - is non-systemic value that can be defined as the ratio of the volume of goods and services produced per unit of input. The greater productivity of a company or a nation, the more effective it utilizes its resources (Atkinson, 2013).

Finally, it is possible to conclude that continuous innovation process will ensure the growth of productivity which in fact will lead the increasing competitiveness. However, there are

many other factors, affecting the innovation pace and productivity growth, forming the competitiveness of the company.



Source: Author

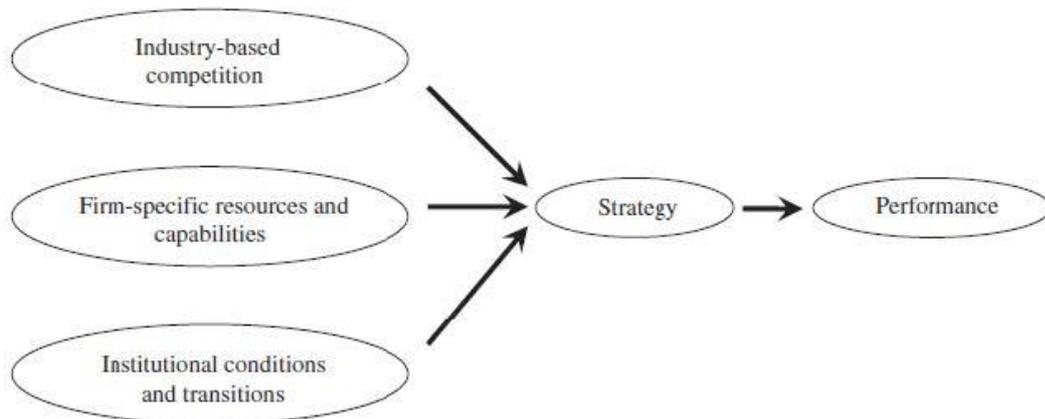
Figure 3. The role of innovations and productivity in achieving competitiveness

2.3. Three approaches to firm's competitiveness

There are several approaches to determining the competitiveness of companies. The market approach explains the competitiveness and competitive advantage in the context of the external environment and the company's position within the industry or sector. It pays special attention to geography and location, as well as the business environment in which the firm is forced to exist. According to this approach, a competitive market, its structure and competition determines the company's strategy (Porter, 1980).

However, market-based approach alone is not able to comprehensively explain the competitiveness problem. It should be complemented with the resource-based approach, focusing on the resources, capabilities and expertise of the company. They determine the value and uniqueness of the company's position in the competitive environment. In this approach, competitive advantage exists if the company could preserve their unique assets from competitors. It leads to sustainable advantage, when competitors utilizing convergent strategies cannot obtain comparable benefit from its implementation (Barney, 1991).

Nowadays, institutional approach defining competitiveness becomes more popular (Torvinen, 2016). Institutions are more actively involved in the regulation and support of the companies' development. Thus, they affect the strategies of firms and their performance, especially in the emerging markets (Peng et al., 2008). Comprehensive model of competitiveness turns us to look like this (Figure 4).



Source: Peng et al., 2009

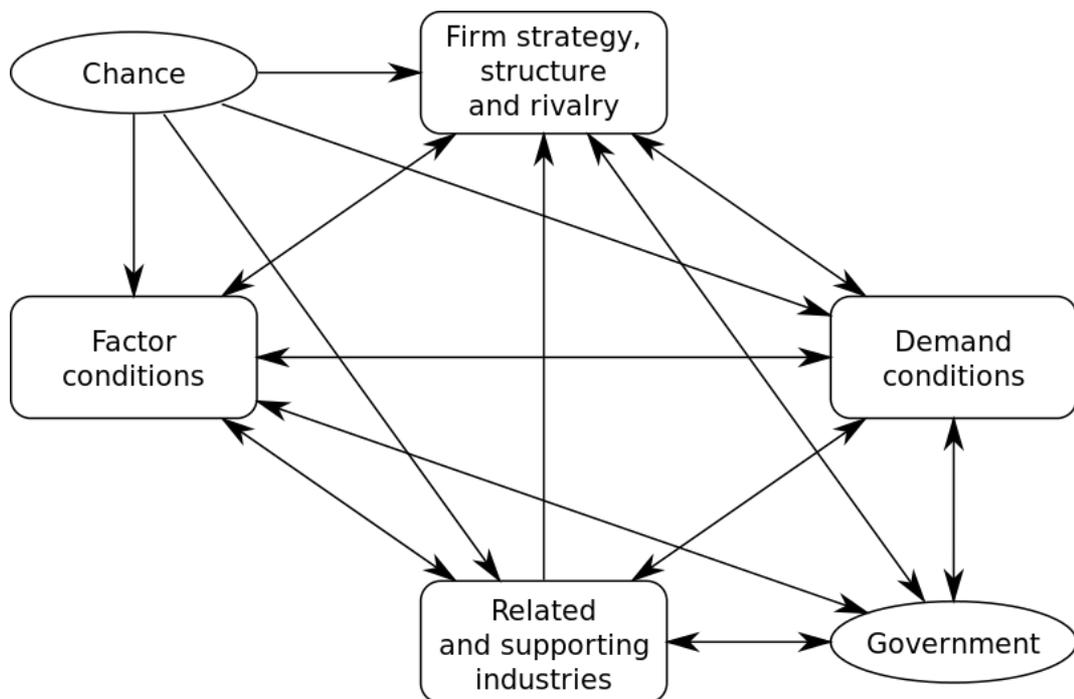
Figure 4. Strategy tripod

2.3.1. Market approach

The key idea of M. Porter is that factors affecting the competitiveness of a country and therefore its prosperity are not inherited, they are created. And the most important thing is their effectiveness, not just their existence. Despite the fact that nationality and geography still play an important role in the success of businesses in the global market, the main subjects of the competition are not nations, but the companies representing them. Nevertheless, nationality creates a company's ability to innovate, and thus could be the source of the competitive advantage. While some countries provide a set of fundamental benefits, others create additional strategic complexities. However, the appearance of the company in the "right" country alone does not automatically lead to success in the global arena. Formation of competitive advantage requires continuous work on the development of competencies and innovations. Companies have to be constantly in the search for new sources of competitive advantage, and not just rely on the factor conditions from the countries of origin. The proper strategy is the effective use of the advantages inherent in the national economy, while the negative impact of the disadvantages should be reduced by seizing global opportunities.

Thus it is possible to conclude that global competitive advantage derives from an effective combination of the corporate strategy of the firm and the national endowments of the country the firm has appeared in (Porter, 1990a).

M. Porter formalized the main sources of global competitive advantage in the model, known as "diamond" (Figure 5) due to its appearance, resembling a crystal lattice. In this model, he identified the main determinants: factor conditions, domestic demand conditions, related and supporting industries, firm structure, strategy and rivalry. In addition, there are two special determinants in the model. Absolutely random events could give the company a chance to create new competitive edge. Also, the state can significantly affect all of the determinants of this model to create favorable conditions for the companies.



Source: Porter, 1990

Figure 5. Porter's Diamond model

Factor conditions consist of tangible and intangible assets, which are the basis for the formation of the competitive advantages of the country as a whole and its leading export-oriented industries (Porter, 1990). There are several categories among them:

- human resources, professionals of different qualification;
- natural resources, including geographical location and climate;
- infrastructure, including industrial, social and institutional;

- capital, national financing conditions, characteristics of domestic capital markets;
- scientific and innovative potential, i.e. accumulated knowledge within the country and technologies associated with the production of goods and services.

Unlike classical concepts (Smith, 1776), generalizing main factors of production (labor, land, capital), Porter has expanded the list to include the resource of knowledge, i.e. the amount of scientific, technical and market information affecting the competitiveness of goods and services, and infrastructure (transport, administrative, telecommunication, health care, residential, financial, etc.). An important feature is a division of factors on general factors (creating a competitive advantage for a wide range of industries) and special factors (for a limited set of industries). Special factors provide a more durable and sustainable competitive advantage (Porter, 1985). In certain cases, they consist of idiosyncratic assets, which lose any value in an alternative use or have limited mobility.

Related and supporting industries that exist in the national economy, increase the global competitiveness of firms in relevant industries. Developed network of materials, components, semi-finished products or auxiliary equipment suppliers considerably reduces expenditures associated with transportation and promotes internal competition, decreasing the bargaining power of suppliers (Porter, 1990a).

When multiple horizontal and vertical links appear between entities located within a limited geographical area, it is called clustering effect. Clusters greatly improve the competitiveness of their member companies by improving their productivity. Clusters facilitate access to highly qualified personnel and workforce, encourage active movement of knowledge and information flows, generate strong domestic competition. The most successful cluster companies accelerate the success of the less fortunate. Complementary companies in the cluster leads to a rapid development of the entire cluster, benefiting every member as if it were bigger or merged with others without losing their own flexibility (Porter, 1998). In addition, companies, located in clusters, are more likely to innovate (Baptista and Swann, 1998) that, as a result, has a positive effect on international competitiveness.

Domestic demand still plays a very important role, despite the globalization of competition. At the same time the accent is shift from the volume of domestic demand to its quality and compliance with global development trajectory. Countries where the development of a par-

ticular market segment has been given increasing attention while the demand for these products in other countries was still small finally won the global competition in this segment (Porter, 1990). As an example, the rapid development of the defense industry in the United States and the Soviet Union during the Cold War, when the original consumers of weapon and armor products was their governments, gives these countries competitive advantage nowadays, when they export their products across the globe.

Also, a huge impact has the quality of private and industrial consumers. Companies benefit the country if their customers are the most demanding and qualified by world standards. The cultural characteristics of the country may also affect the quality of the product. For example, the requirements of kashrut in Judaism, create a more complex demand from national consumers that, as a consequence, lead to the improvement of quality and competitiveness in the world market. If the composition of demand is complex and outruns international standards, the volume and nature of domestic demand may increase the competitive advantage of industries. Another advantage of the large market is a presence of domestic competition. Although, under certain conditions, a large domestic market also can be a negative phenomenon, as firms lose the incentive to continuous updating and improvement.

The strategy of firms, their structure and rivalry play a crucial role in ensuring global competitive advantage. If the company is not ready to compete within the country, if its competitiveness in the domestic market is low, it does not make any sense to internationalize because with a high probability it will not have competitive advantage in the foreign market. It can be assumed that the intra-competition is a catalyst for the whole system, since the presence of domestic competitors is much more effective way of stimulating the development of production. Companies understand that they are under equal conditions with other market participants, and can adequately assess the cost-effectiveness and performance relative to other companies. Such information encourages companies to develop, enhance productivity and innovation.

In terms of strategy, it is impossible to speak about the only one and universal approach to the management of the organization. Competitiveness is the result of the convergence of management approaches, organizational models and sources of competitive advantage in the industry (Porter, 1990a). The decisive role is played by endogenous factors specific to each company, which create micro-level basic conditions for the development of competitiveness on a global scale.

Special determinants of the model were added in a later publication of M. Porter. He expanded it, adding chance and government, as they are able to influence all the basic conditions of the model (Porter, 1985).

Among random events creating chances there are, for example, large-scale scientific and technical discoveries, abrupt changes in prices, unforeseen tensions in the international relations etc. The chance has little to do with the development of economic conditions in the country, it is almost impossible to predict, and the more it is virtually impossible to influence. However, sometimes it is just a simple occasion which can play a decisive role in the success of companies.

Also, the competitive advantage of companies depends from the state government. It creates the conditions, coordinates and stimulates the activity of companies through the institutions. Using monetary, tax and customs policies it affects the pace of production and the level of demand. The government itself in most countries is the largest client of the defense industry, transport and telecommunications companies, as well as many other companies in different sectors of the economy. The government has an impact on the maintenance of an optimal competitive environment in the leading sectors and industries of the national economy by utilizing antitrust regulation. In many countries, it supports the development of related and associated industries that interact with the leading export sectors. Finally, the government is responsible for long-term development of the economy and the creation of effective national innovation system (NIS).

However, the state's influence can be not only positive, but as well negative. Support for individual companies, and targeted subsidies violate the balance in the market, allowing inefficient and uncompetitive companies to exist in the market. Such support is quite often justified by the strategic or political goals, especially in economies with a high degree of state participation, which certainly makes them less effective.

2.3.2. Resource-based approach

The main disadvantage of the market approach to competitiveness is the inability to fully explain the benefits of individual companies over others going beyond development strategies. Continuing the work of Hamel and Prahalad (1990), J. Barney (1991) underlines resources and competencies of the company, as the main source of success and competitiveness. That is why this approach is called a resource-based. Companies' resources consist of

all tangible and intangible assets of the company, including machinery, real estate, raw materials, people, technology, knowledge, organizational processes, etc. Common sense dictates that the more diverse resources the company has, the more room it has for development, and therefore the more likely it will achieve the success. However, the possession of a variety of resources itself is not the target. Some resource types do not represent a strategic interest for their owners (Barney, 1997). Therefore, this approach requires companies to assess and understand the importance of the individual resources in the formation of competitiveness, requires thorough prioritization.

The key resources of the company should possess the following characteristics:

- value - the company's ability to use the resource to exploit opportunities or neutralize threats from the environment;
- rarity - low prevalence of the resource among competing companies;
- in-imitability - the inability of competitors to produce an imitation using other resources;
- non-substitutability - inability to replace the resource by the other frequent and reproducible resources.

The most important for generating sustainable competitive advantages are non-standardized (heterogeneous, non-uniform) and difficult to copy (non-mobile) resources. At the same time, strategically-important resources should be relevant to the company in the long term, the ownership must be established, and the value should be higher than the value of competitors' resources and be measured on the basis of objective information (Collis and Montgomery, 2008).

2.3.3. Institutional approach

In modern world institutions determine the rules of doing business, directly and indirectly affecting various aspects of the economic model. Especially important is the role of institutions in the emerging economies, where the business environment, laws, regulations, standards are constantly changing, Thus, companies have to grasp how to win the game with rules that change all the time (Peng et al, 2008).

First of all, it is important to understand the nature of the institutions. According to North (1990), the institutions - are "humanly devised constraints that structure political, economic

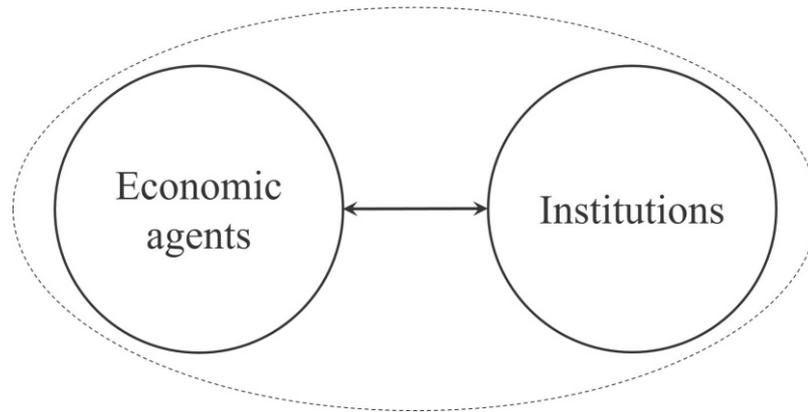
and social interactions". Scott (1995) defines institutions as "cognitive, normative, and regulative structures and activities that provide stability and meaning to social activities". Thus, institutions run social interactions in various fields of human life.

Institutions play a special role in the economy. Their activities are aimed to reduce transaction costs between economic agents, i.e. to decrease tensions between them and raise the level of trust in economic society (Coase, 2012). Facilitating cooperation, institutions improve the efficiency of business operation, and therefore play an important role in increasing productivity and competitiveness, economic growth and the maintenance of national competitive industries and firms they represent.

Market and resource models pay much attention to the business environment, taking the state and its institutions on a secondary role. They do not take into account the fact that the institutional environment is able to significantly affect strategic decisions of the company, encourage them to modernization, internationalization, or, conversely, the reorientation on the domestic markets. Thus, the company's strategy should be based not only on the basis of the competitive environment, resources and competencies, but also on the institutional constraints. Institutional environment turns into a factor determining the strategy aimed at increasing the company's competitiveness (Ingram and Silverman, 2002).

2.4. National Innovation System

Considering the institutional environment as a factor that determine competitiveness, it is also necessary to evaluate its relationship with the economic agents involved in the creation, accumulation, distribution and transformation of knowledge into new technologies, products and services consumed by society (Freeman, 1995). Basic structure of these relationships (Figure 6) is described by the theory of national innovation systems (NIS). For the first time this term was coined by B.A.Lundvall (1992), even though he points out that the roots of this theory have their origins from the concept of F.List described in "The National System of Political Economy" originally published in 1841.



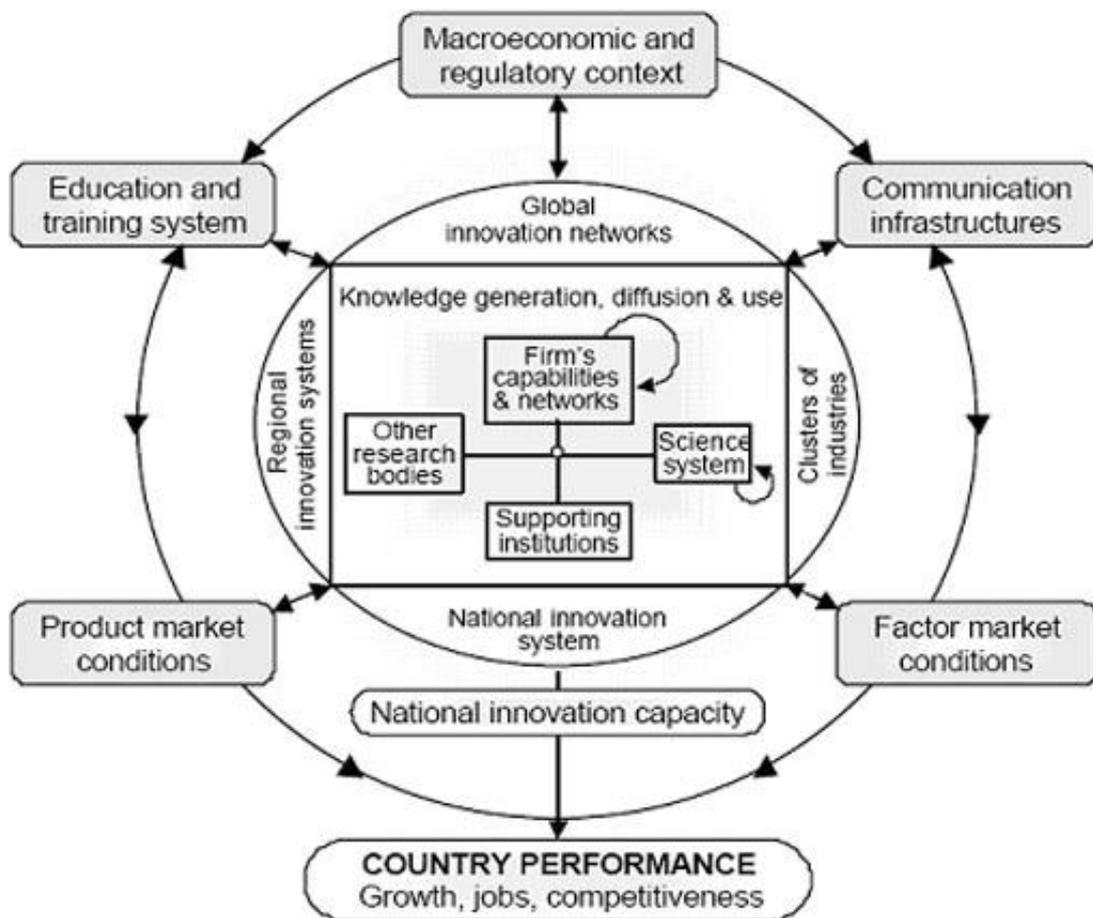
Source: Author

Figure 6. Basic model of relationships within NIS

List (1841) put forward the theory that it is necessary not just to protect the young developing industries, but implement the comprehensive policies that accelerate the industrialization and economic growth. The main purpose of these policies was acceleration of the technological researches and more rapid introduction of newly discovered technologies into practice, that is from a modern point of view called the intensification of development and commercialization innovation. This theory was at odds with the major cosmopolitan tendencies towards globalization and free trade, emphasizing the influence of internal factors in the national economy. Among these factors, one could find educational, scientific and technological institutions, interactive learning systems, systems for knowledge accumulation, methods of adapting imported technology, systems of promotion of strategic sectors, etc. In addition, List underlined the state's role in coordinating and carrying out long-term strategies for the industry and the economy. Even with openly racist and colonial rhetoric (List agitated Holland to fall under the sovereignty of Germany), this approach had gained support among scientists and, in consequence, became the basis for many modern theories.

Modern theories describe NIS, as a set of business entities (companies, research organizations, consumers) and institutions (regulatory, financial, social, legal) that interact in the process of production, distribution and use of the competitive knowledge and technologies, aimed at the realization of strategic goals of sustainable development of the economic system and contribute to increasing the competitiveness of its subjects, including states at the international level (Gretchenko, 2008).

NIS is formed due to the interaction of three main determinants: state, industry and academia. In turn, the drivers of NIS development are the R&D and innovations, which requires ongoing complex processes involving many interconnected participants (firms, universities, technology and analytical centers, etc.). An interesting point about any NIS that relations between the participants prevail over the subjects of the interaction. Thus, the quality and regulation of these relations determine the level of NIS development. Relations could be regulated through the development of law and legal base. Nevertheless, state institutions are often seen as a source of resistance, not considering the fact that institutional innovations may also give new impetus to the technical and economic growth (Johnson, 1992).



Source: OECD, 1999

Figure 7. Elements of NIS

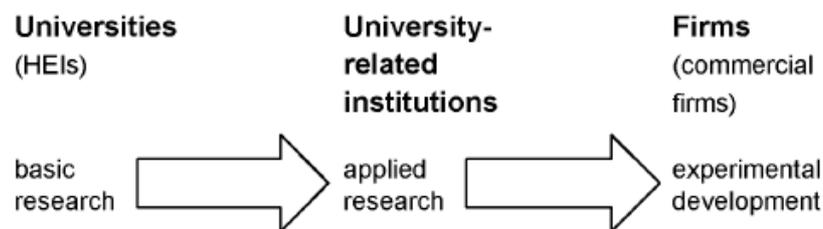
An integral part of NIS is innovative infrastructure, a system of interrelated and complementary organizations of various organizational and legal forms, united by a common objective

of the production and commercialization of innovative activities. The purpose of the infrastructure is to create favorable conditions for improving the efficiency of the system and ensure the implementation of innovation at all stages of the innovation process. The elements of this infrastructure are industrial parks, clusters, special economic zones, stock exchanges, technology transfer centers, consulting and audit organizations. Infrastructure that provides a productive co-operation of higher education institutions, research and development departments in companies and state innovation policy is a key factor in the transition to the innovative development of the economy.

The emphasis in NIS theory is set on internal state conditions, which in spite of the intensification of global competition still play a decisive role, especially in case of the emerging economies. At the same time, the interactions between national innovation systems and global innovation networks and TNC are also crucial to maintain a favorable environment for development (Freeman, 1995). The result of properly structured NIS is the significant increase in the innovative capabilities of the economy. More innovation means greater productivity, which leads to the well-being of the nation and the raise of its competitiveness (Lundvall, 2007).

2.5. Evolution of NIS theory

The concept of NIS has replaced the linear model of innovation (Figure 8), implying a sequential linkages of innovation process elements and the one direction communications. According to linear model, innovation is preceded by a series of fundamental researches with the results, which are used in applied researches and in the development of prototypes for future products for the market. This model could also be explained as a technology push.



Source: Carayannis and Campbell, 2009

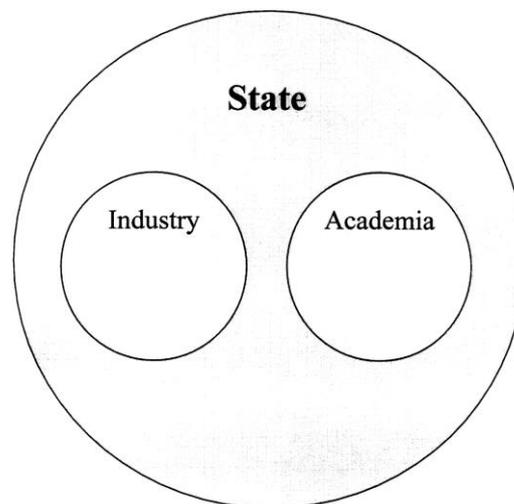
Figure 8. Linear innovation model

Evolution of NIS theory has proved the importance of feedback between the elements. Feedback facilitates the appearance of innovative knowledge on different stages of innovation lifecycle, not only in the point of origin. Thus, linear model of innovation is replaced by more complex network model, ensuring the knowledge generation whenever possible by all of the elements of the process (Dezhina and Saltykov, 2004). Finally, the emphasis in this theory is shifted from the subjects themselves to their interactions and the effectiveness of their regulation.

These changes are clearly seen in comparison of two types of NIS, which are specific to two types of economies of XX century: planned and market economy.

In the NIS of planned economy innovative processes obey the principles of the dominant paradigm, implying nationalization of the whole range of results of labour, including intellectual. The system is closed, preventing the transfer of knowledge both within and outside it. All activities, including research, are indoctrinate, negatively affecting the technological and scientific development. The absolute priority of national security in all economic decisions of planned economy NIS leads to low interaction between industries. High-quality resources (personnel, equipment, technology, etc.) are not allocated to effective sectors, but to those that meet the requirements of the planned economy and ideology.

Organizational scheme of NIS consists of departmental organization (state representative), managing all entities engaged in education, research, development, production and service (Figure 9).



Source: Etzkowitz and Leydesdorff, 2000

Figure 9. Planned economy NIS

The main actors are the large and extra-large R&D organizations, engineering offices, experimental productions, controlled by government agencies. New knowledge is created as a result of fundamental research and then transferred in a planned order to applied research institutes, design bureaus, production plants and so on.

In this scheme, the real needs of the end users are not studied, they are simulated. In such NIS the bulk of new knowledge producers are alienated from both the educational and industrial sectors. Small R&D actors, i.e. small innovative business, almost cannot legally exist under the conditions of adopted social paradigm.

In the planned economy, all processes, including innovative, are governed from the center, in accordance with the parameters of the national economic plan, which defines the order and structure of technological upgrade, the list of consumer products and services. Tasks are implemented by allocating public resources in accordance with this plan.

The absence of private ownership on intellectual product and the institute of intellectual property precludes the use of powerful motivational levers for stimulating innovation processes. Innovators don't see significant economic benefit associated with the reimbursement for scientific discoveries, advantages and development prospects. For this reason alone, the issue of introduction of innovations in the existing planned NIS became essentially insoluble.

An important characteristic of the innovation process in the planned NIS is a labour surplus at all stages of the production cycle, which leads the creation of useless labour "ballast".

However, the model described above possesses several benefits, including:

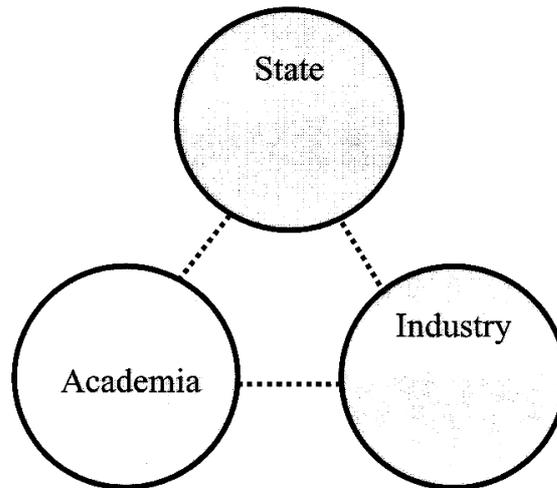
- the possibility of concentrating huge intellectual and material resources needed to address to large-scale scientific and technical problems;
- from the scientific community's standpoint, very favourable economic and social conditions for the development of fundamental research
- the ability to solve certain complex problems with very modest investments (due to the cheap intellectual resources).

However, the fatal flaws of the planned model NIS were ultimately confirmed by the example of USSR, leading to the failure of the system to a backlog of countries utilizing this

model in the most advanced areas of science, technology and high-tech industries (Dezhina and Saltykov, 2004).

In the NIS of market economy, government does not participate in the relations between academia in industry, acting according with «*laissez-faire*» principle (Figure 10). Government relations are constrained by only direct interactions with other participants of innovative process. An important feature of this model is the presence of feedback between all stakeholders. Overall, market economy NIS has several advantage:

- openness of the national economy, its integration into the global community;
- legally enforced right for private property, including the results of intellectual activity;
- equality of business entities, including the State in economic activity;
- legally enforced competitive environment that constantly pursues producers to satisfy the interests of consumers and encourage continuous innovation process.



Source: Etzkowitz and Leydesdorff, 2000

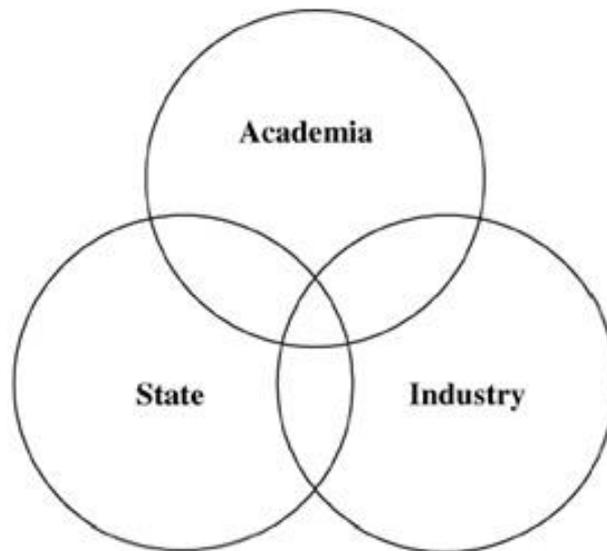
Figure 10. Market economy NIS

In such NIS, all the risks related to innovation activity are taken by the subjects, who are gambling own well-being as well as the whole business existence. However, the motivational incentives for these subjects in open market conditions are several times higher than in case of planned economy. That is a reason why small innovative business organically emerges and develops in the structures of market economy NIS. In general, the organizational structures of market NIS are characterized by a combination of large firms, including transnational integrated companies, the leaders of the national and world economies, with

lots of small innovative enterprises operating in the riskiest stages of technology lifecycle (Dezhina and Saltykov, 2005).

In the late 1990s, it became clear that NIS theory needed further development. Economic systems were transformed, driven by advances in technology and scientific breakthrough.

During these transformations, forms of interaction between academia, industry and state were undergoing evolutionary changes (Figure 11). The model was transforming due to the fact that at each successive stage of technology development, independent activity of one of the agents no longer provided considerable results for the society (Etzkowitz, 2010).



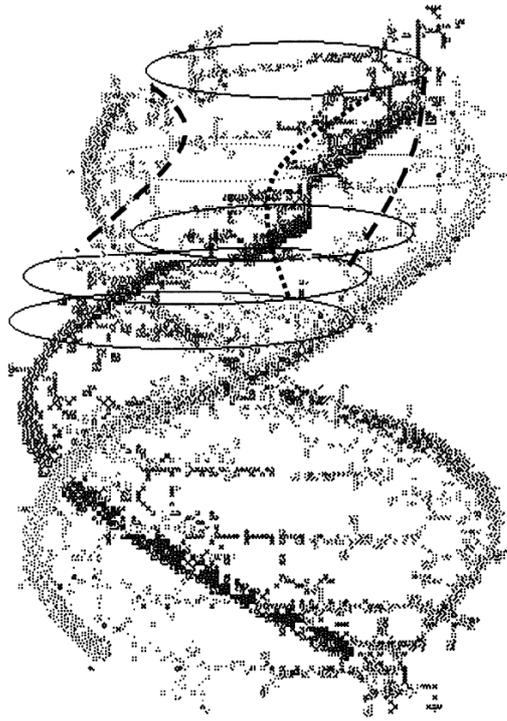
Source: Etzkowitz and Leydesdorff, 2000

Figure 11. The triple-helix model

Looking at the whole process from a strategic perspective, one can observe the following. At the planned economy partnership between three players were missed at all. Business and science were under the full control of the state. In the industrial market system, there were pair interactions with feedback, forming a double helix (state and industry, academia and state, industry and academia). Notwithstanding, in the post-industrial economy pair format of relations is no longer sufficient to make the best management decisions. Now it requires the interaction of all three entities in a network mode, i.e., the formation of a complete triple helix (Leydesdorff and Etzkowitz, 2000; Smorodinskaya, 2011).

2.6. The triple-helix model

The triple helix model is radically different from the model of public-private partnership of the industrial age, not only by the nature of the interactions of three players, but also according to their functional role in the economic process (Figure 12).



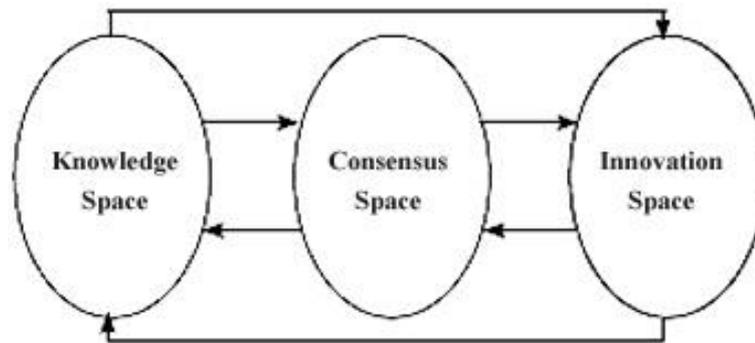
Source: Etzkowitz and Leydesdorff, 2000

Figure 12. Communications and expectations at the network level

First, in today's economy, the key player in determining the direction of development is academia (instead of former leadership of the state), as the main generator of constantly updated knowledge. Second, three elements not just interactively collaborate, interweaving communications, but adopt twist the inherent features of each other, transforming into hybrid network organizations. They provide integral effect of continuous updates to each player, and the entire economy as a whole (Etzkowitz, 2010). Third, from an institutional point of view, the formation of innovative environment is based on the gradual formation of the three network spaces (Etzkowitz, 2002).

At the beginning there is a localized space of knowledge - critical concentration of ideas, research groups and intellectual activities in the particular area. Then a consensus space is formed, where the representatives of science and business come together (or they are collected by the state), establishing cooperative ties, develop joint ideas. Finally, innovative

space is created - participants implement the cooperation objectives of the planned projects, connecting the capital, expertise and technology in various combinations. During last stage, an integrated spiral effect is achieved implying the process of continuous innovation (Figure 13).



Source: Smorodinskaya, 2011

Figure 13. Spaces of triple helix theory

The idea of the triple helix is directly opposed to the concepts that lay initiative of innovation generation on government or business. In today's economy, the state becomes an equal partner with the academia and industry, performing organizing and catalytic role in the development of their partnership, i.e. continuously maintaining the configuration of the spiral itself.

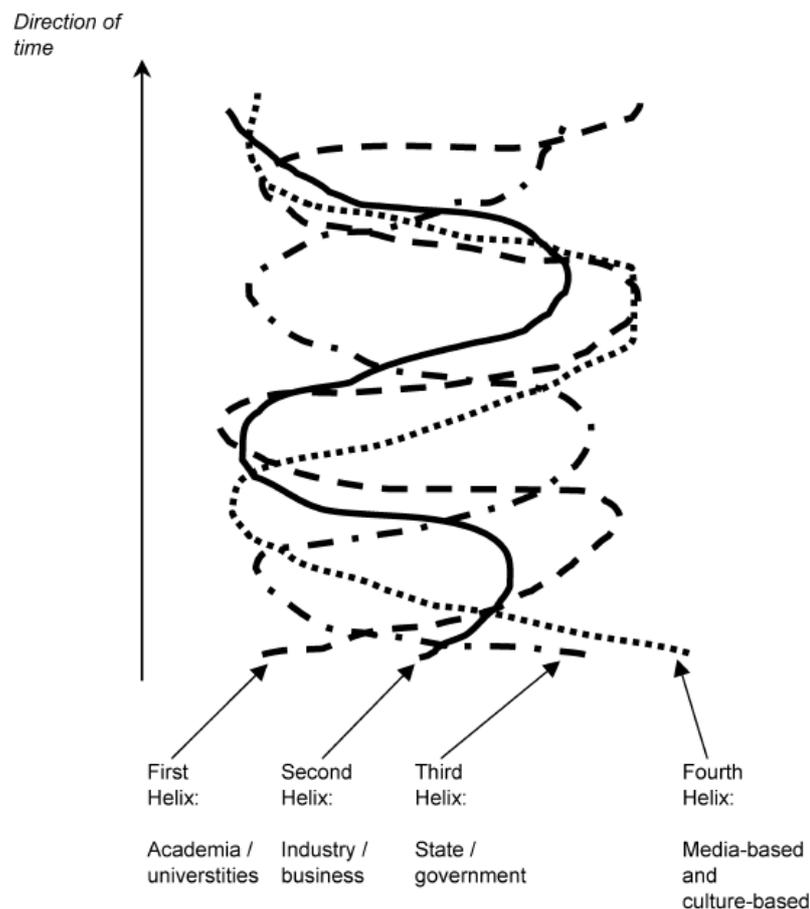
Noteworthy, in contrast to the industrial economy, where competition was the factor driving discoveries, in the innovative economy such factor is cooperation, existing on the background of the hypercompetitive environment, determined by continuous changes. Members are in a relationship of cooperation and competition with each other at the same time. However, it does not prevent sustainable competitive development but rather fosters it.

Functional interweaving of the three sets of relations in the triple helix mode generates two interrelated effects. First, it reduces the level of uncertainty in decision-making, increasing the adaptability of the network members and the whole system to the continuous changes in the environment. Second, it allows to continuously create new entities and knowledge. Thus, special synergy arises in the network structures leading to win-win situations, as indicated in the cluster concept of M. Porter (Porter, 2008). In turn, the shift of economic systems to the cluster structure provides them with integrated synergetic effect of continuous improvement of competitiveness (Ketels, 2009).

Network space is a self-developing system, a mobile structure with open borders. The basis of its self-development is a positive resonance from interaction of the internal components. It is flexibility that gives economy and society the ability to continuously update, allowing countries and territories to engage in a new type of competition - for the speed of innovation (instead of the traditional competition for the resource volumes). Therefore, through the mechanism of triple helices, an innovative environment forms in the economy, while its growth is becoming innovation-oriented (Smorodinskaya, 2011).

2.7. Quadruple helix and non-linear innovation mode

The triple helix model emphasizes tri-lateral networks of Academia, State and Industry relations and hybrid organizations, where those helices overlap. However, nowadays, the impact that civil society has on the development of innovation and its creation becomes more and more tangible. In order to extend the theory Carayannis and Campbell developed Quadruple Helix model (Figure 14).

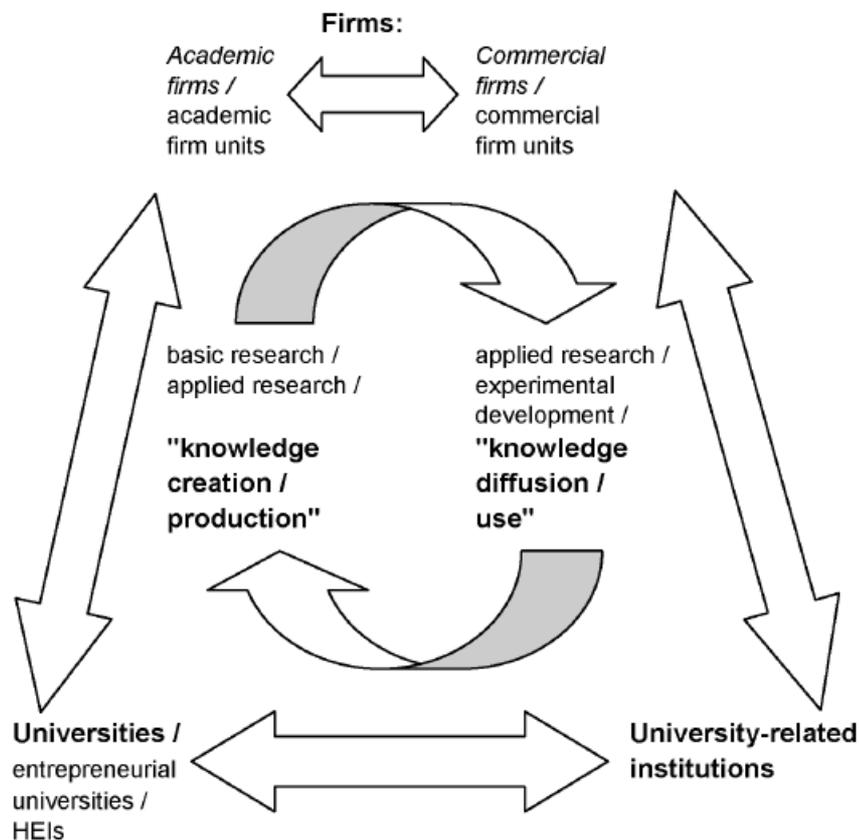


Source: Carayannis and Campbell, 2009

Figure 14. Quadruple Helix

The fourth helix consists of ‘media’, ‘creative industries’, ‘culture’, ‘values’, ‘life styles’, ‘art’ (Carayannis and Campbell, 2007). They form so called ‘innovation culture’ in the society fostering and promoting innovations. The theory stresses the importance of pluralism and diversity of agents, actors and organizations, resulting in a ‘democracy of knowledge’.

One of the most important features of both Triple and Quadruple Helix theories is an evolving role of firms in the process of innovation creation. Moreover, all the agents join together in networks and share their roles to be able to perform basic and applied research and experimental development at the same time.



Source: Carayannis and Campbell, 2009

Figure 15. Non-linear innovation mode

In this context, the study of the phenomena of academic firms is an object of exceptional interest as it gives birth to the development of small innovative enterprises.

2.8. The role of small innovative enterprises

SIE play an important role in NIS, as they act as a bridge between science and its practical applications. Small firms often use to take the risk of the development of new products and

technologies (Dezhina and Saltykov, 2004). But it does not generally mean that entrepreneurs are eager to take the risks related to innovation. SIE understand that innovative development is an only way to the long term prosperity. In this game, state support is often needed to facilitate the innovative process and insure some risks. Nevertheless, lots of companies are dying, falling under the pressure of big players. But there also many of them, appearing at the same time. Overall, in the long term, the balance ensuring stable economic growth is supported.

The concept of SIE is unique and specific to the Russian reality. The development of the SIE was one of the objectives of the *Strategy of development of science and innovation in the Russian Federation for the period till 2015* (2006), and then the strategy *Innovative Russia - 2020* (2011). At the same time, the inherent features of SIE are common to all developing countries, which are on in transition to the innovative type of economy.

SIE are characterized by autonomy and relative independence. They are designed to address issues of restructuring of the production and improving the effectiveness of social and economic situation within the country. The most important feature of SIE is a clear strategy for tasks such as development and implementation of various innovations (product, technology, management, etc.), improvement of competitiveness of product or production, creating innovative environment on the scale of the city, industry, region or country.

Given this, definition of the SIE can be formulated as follows. SIE are new entities in the economy, characterized by independence and adaptability, designed to perform the tasks of production restructuring, expansion of international scientific and technical cooperation and increasing the country's competitiveness in the world through the development, adoption and implementation of innovations (primarily radical), and increasing absorptive capacity of market players (Tidd, 2005).

Existing SIE can be divided into two main groups: the companies created within parent research institutes or universities (I type SIE), and independent structures (II type SIE). I type SIE are developed on the basis of scientific organizations, actively exploiting numbers of advantages of mutual cooperation. Scientific organizations allow their residents to postpone payments for rent and utilities, to use experimental base, sustainable relationships with partners and customers, its scientific potential, brand, and most importantly, to prepare and train young professionals within the walls of these organizations. At the same time, the existence

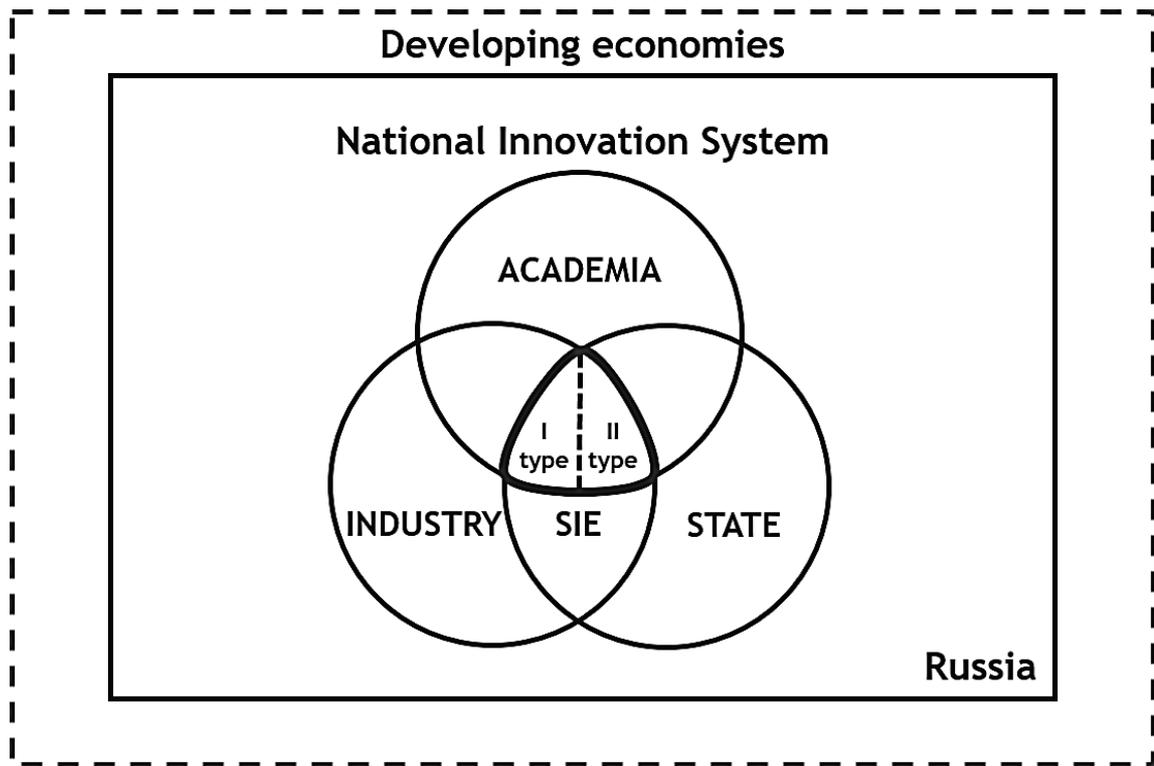
of SIE on the basis of academic institutions enhances the prestige of these organizations, extends cooperation channels to attract new partners, and increases the scientific potential and the quality of educational services. Finally, it opens up new ways of commercialization of scientific developments. Such symbiosis is the reason why most of SIE are related to the I type. There are much less independent II type SIE. They survive if they are able to find their "niche" in the market of high technology products. Each case is unique, and cannot generalize the successful path of II type SIE development.

In the sphere of innovation, small businesses have significant advantages and are able to actively develop an innovative economy thanks to its flexibility. In the strategic perspective, the development of SIE network leads to the development of the whole NIS, a technological breakthrough in the promising areas of science and technology and, as a result, to the improvement of the country's competitiveness on a global scale. However, the development of SIE requires collaboration of all three elements of NIS, therefore the development of NIS itself.

2.9. Research framework and model elaboration

Currently, SIE face many difficulties in the process of commercialization of results of intellectual activity, e.g. unadapted for innovative enterprises legislation, financial difficulties, high levels of business risk, the lack of customers, etc. At the same time, the government has taken many steps to encourage the creation and support the development of SIE. Different development institutions, clusters and special economic zones were created. However, the result of such actions is not so evident, while the efficiency of the support was not assessed sufficiently.

Given the fact that the SIE is quite a new phenomenon, the existence of SIE within Russian NIS is of considerable scientific interest for the scientific community. Based on the theories listed above it is possible to set the conceptual framework of this study (Figure 16). The framework is based mainly on the triple-helix theory, assuming the existence of SIE at the intersection of the three components of Russian NIS: the state, academia and industry. The addition of the fourth helix does not seem to be reasonable, because Russian civil society is on an early stage of its formation, and therefore, its participation in the innovation process is negligible (Sundstrom and Henry, 2006).

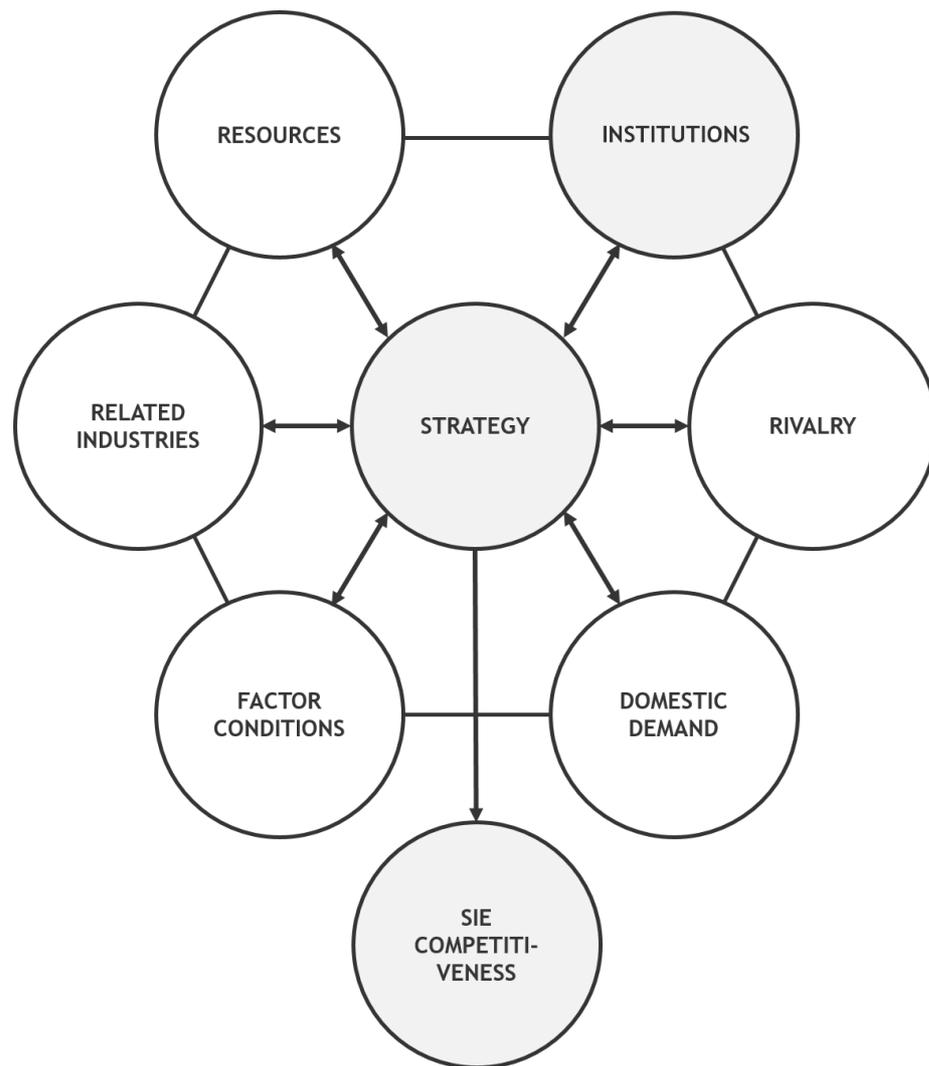


Source: Author

Figure 16. Conceptual framework

The objects of this study are different types of SIE and their relations with all the elements of NIS. At the same time, the hypothesis states that inevitable consequence of the interaction of SIE with NIS is increasing competitiveness, which in turn, is based on many factors. For an objective assessment of the impact of development institutes, the influence of other factors should be eliminated. But at first the comprehensive understanding of the whole list of factors affecting competitiveness were developed. Based on the results of theoretical review on competitiveness, research model was elaborated (Figure 17).

During the study, it was found that the competitiveness of enterprises that exist in emerging market is formed on the basis of an effective strategy that takes advantage of a number of factors. Combining different approaches to competitiveness, and rearranging models of Porter's Diamond and Peng's Strategy Tripod, elaborated model includes internal resources of the enterprise, factor conditions and domestic demand of local market, the presence of related industries and the strength of competition, as well as state institutions. All of them affect the strategy of the firm. Even if all of the factors are beneficial for the company, it is almost impossible to achieve competitive position without clear and wise strategy.



Source: Author

Figure 17. Research model

Based on the goals and objectives of this work, the study of the influence of institutions is of a greatest interest. In the case of SIE, the most important in terms of institutional relationships are the interactions with development institutions. Therefore, the focus of further research is the qualitative study of the influence of institutions on strategy and competitiveness of SIE. For the purpose of objectivity, the influence of other factors will also be examined, which will assess the diverse picture of the interactions and separate the influence of individual factors on the final result.

3. METHODOLOGY

The research methodology is one of the fundamental issues which should be considered to guarantee the high quality of research. Well-planned research strategy ensures the credibility of findings and confidence in the validity of results. This chapter is going to explain the methodological approach implemented in this study.

3.1. Research strategy

The character of research objective and questions undermines the exploratory nature of the study. As soon as the object of the study is result of interactions, which is hardly possible to predict, the exploratory research is the most appropriate strategy for creation of the holistic understanding of the topic (Robson, 2002). Such strategy is flexible and adaptable to changes and often relies on qualitative approaches, which in turn imply close interaction with the subjects of research. Researcher has to understand and feel the problem to develop the qualitative assessment of studied phenomena. Therefore, the case study method was chosen in order to answer stated research questions.

According to Robson (2002), case study is a “*strategy for doing research which involves an empirical investigation of particular phenomenon within its real life context using multiple sources of evidence*”. Case study is often considered as one of the most effective strategies for business environment study (Yin, 2009). The case sampling strategy is based on the research questions themselves, as they propose to compare SIE of different types according to the way of their origin. Thus, the thesis consists of two cases corresponding with two types of SIE establishment.

3.2. Data collection

For the data collection methods, the secondary sources review and interviews were chosen. Secondary data were used to give a glimpse about existing conditions and business environment in Russian NIS. The information, obtained from academic articles, reports, data books, decrees, provides the researcher with the understanding of current situation, elements, players, statistics etc. Nevertheless, these data could not help to assess the quality of interactions, explain how and why the things are going on.

Therefore, to enhance the thesis and address stated research questions two semi-structured in-depth interviews were conducted with management of SIE. As soon as the access to top

management of small companies is comparably easy, while these executives possess a holistic view on the processes and company's situation, directors and their deputies were interviewed. This data collection method allows researcher to develop rich insight about the problem through perception prism of the studied object. Contrary to structured, semi-structured interviews are more flexible (Saunders, 2009), making possible to switch between the topics. The conversation becomes more lively, promoting a better understanding of the information. Despite decreased reliability, this method suits exploratory studies much better, in the meantime could be compensated with thorough preparation and planning of the interview process. Moreover, at the time of the interview the main theoretical basis of the study was prepared, which undoubtedly created favorable conditions for the effective perception of the information and the quality of discussion within the selected theme.

The interviewer prepared an extensive list of questions (Appendix 1) to guide the discussion. For better orientation of the interviewer, the list includes a variety of question types: open, closed, clarifying and summarizing. Interviews were conducted with representatives of the Russian speaking companies in Russian language, native to interviewer and interviewees allowing avoidance of language related misinterpretations. Then the data was carefully transcribed, transformed in a readable form and translated to English. The brightest statements were cited in the transcription.

3.3. Data analysis

The collected data was combined and compared to theory in order to draw conclusions. The inductive approach was used, being the most appropriate for the research of the exploratory nature (Yin, 2009). First, secondary data were analyzed and summarized into preliminary conclusions. Then, the data from the interviews were proceed to recognize relations and more deeply understand the quality of interactions. Finally, the data was combined and compared against theoretical findings. Thus, it allowed to make insightful individual conclusions and build a list of recommendations. The analysis was made manually, without the use of special software.

3.4. Methodological limitations

An important feature of the qualitative method of research is the impossibility to generalize the data. Therefore, it is almost impossible to make a definite conclusion on the basis of the results, reflecting the big picture and applicable to the entire set of the objects. At the same

time, one should keep in mind that qualitative results allow us to make very important individual conclusions, answer questions, which with the help of quantitative methods cannot be answered. Thus, there is no need to generalize the data, as long as case study method of research do not imply it.

Other methodological limitations are related to a limited number of cases, one for type of SIE and the industrial related biases. The latter were partially mitigated as cases of a single industry were chosen, but at the same time this fact again narrows the applicability of the study.

4. CASE ENVIRONMENT

In order to create comprehensive understanding of case environment the review of already existing academic literature on the topic was conducted.

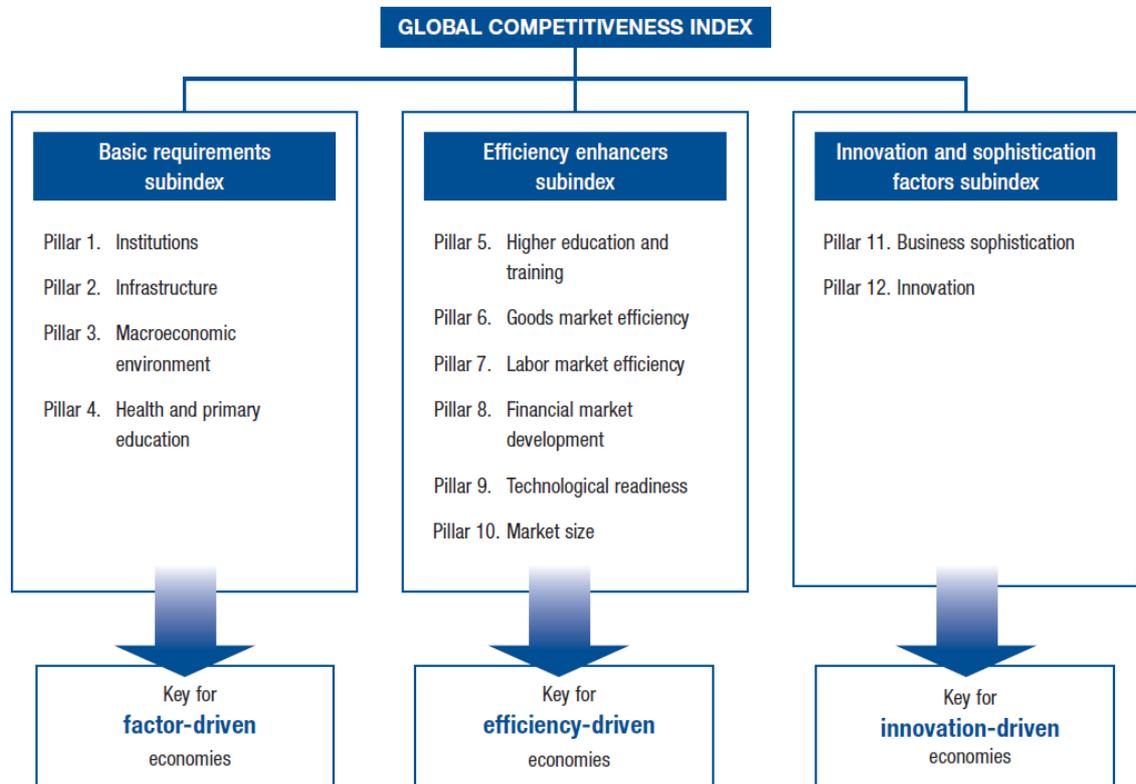
4.1. The transition to the innovation-driven economy

The economic crisis of 2014-2015 years spawned deep pessimistic expectations about the prospects for the development of the Russian economy (Vjugin, 2016). Since the end of 2012 the growth of GDP almost had stopped, while investments were ceased due to the deterioration of the macroeconomic environment. Falling raw materials market and unstable political situation made the situation even worse. In order to return the economy to sustainable growth, the reassessment of existing paradigms and search for new sources and drivers of economic development should be implemented. One of the available solutions for the problem is to shift the economy to the innovation-oriented model of development (Pavlocheva, 2012).

Global competitiveness is a fundamental factor in assessing the performance of national economies. In order to range the countries and identify the most competitive nations World Economic Forum (WEF), non-governmental organization located in Switzerland, created Global Competitiveness Index (GCI). Using this index, countries could evaluate their competitive position on the world market. The WEF defines competitiveness as the set of cooperating institutes, policies and factors leading to the increase of productivity. Overall, methodology includes 114 indicators reflecting the level of economic productivity. Indicators of each category are used to calculate the cumulative GCI of each country. WEF identifies three sub-categories, corresponding to the three stages of economic development: basic, effective and innovative (Figure 18). According to the last report of WEF, Russia holds 43 place out of 138 countries with GCI equal to 4.51 of 7 (Global Competitiveness Report, 2016), improving it from 4.4 and climbing up on 2 positions in comparison to the previous year.

Strengths of the Russian economy are expressed in developed infrastructure, highly-qualified education and health care, good macroeconomic position, and most importantly a huge domestic market (Figure 19). Given the GDP, equal to 1.857 trillion of US dollars, WEF experts position Russia in the transitional stage from the efficiency-driven to the innovation-driven economy. In practice this means the growing importance of innovation factors for further development. In order to finalize the transition and achieve innovation stage Russia

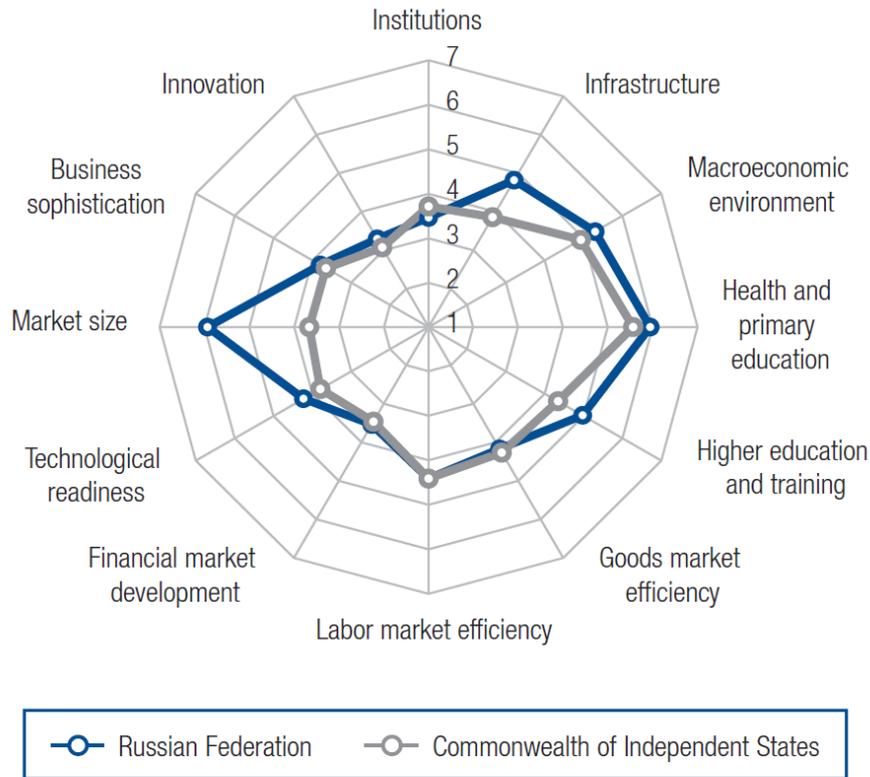
needs to develop and improve its NIS. In the long term it will lead to increased competitiveness of the national companies and the economy as a whole.



Source: Global Competitiveness Report, 2016

Figure 18. Stages and factors determining competitive development

To enter the new era of development, Russia have to overcome the inertia of the previous development trajectory, i.e. its path dependence from outdated economic and political institutions (Acemoglu and Robinson, 2012). This phenomenon creates certain limitations and barriers in the transition to the new socio-economic paradigm, hindering the development of the country, and forcing to interlace historical experience with new goals. It is known that Russia in the late XX century, has undergone a radical change in the socio-political, economic and social structure, and therefore in order to determine the parameters of the new innovative NIS, beforehand the negative impact of the Soviet past should be adequately assessed (Smorodinskaya, 2011).



Source: *Global Competitiveness Report, 2016*

Figure 19. Determinants of Russian GCI

NIS of the USSR was a classic example consistent with the planned economy model, having the same list of advantages and disadvantages. The ideological basis was communism, and the development doctrine was focused on the defense industry and the military sector. In the context of the Cold War, the Soviet Union sought to maintain its leading position of power in a bipolar world. It resulted in the creation of powerful R&D institutes for military and space industries, supplied with the best resources, both material and human. At the same time, the civil sector was supplied by the “leftovers” that had a negative impact on the level of technological advances in many industries.

Innovations in this system were complementary and incremental by the nature, focusing on the development of the defense industry. Any innovation of radical nature demanded the revision of both current and future plans, as well as regulations, so met stiff resistance at all levels. Combined with the complete absence of knowledge transfer, secrecy of information obtained from the academia, often duplication of scientific researches, lack of both competition and cooperation, there were no incentives for the researchers to follow the way of

drastic changes, especially in an environment where the remuneration was limited to paper confirmation, and patenting is a long bureaucratic process (Kozhevnikova, 2011). The state actually appropriates the private developments, turning them into a public good, and opening production capabilities for these developments. It would seem that this should have a positive impact on the pace of innovation, however the problem was that there are also no incentives for the use of knowledge by society (Kozhevnikova, 2011).

Huge human resources allow the state to choose the extensive way of development, leaving the performance in individual industries at a very low level. As a result, the productions were fulfilled by low-skilled workers and the efficiency of R&D was significantly decreased. Academic institutions had reached enormous size, increasing demands on management, suffer from higher transaction costs and difficulties with assessing the contribution of individual scientists to the results of collective work.

By the early 1990 this system almost exhausted its potential. To survive it requires excessive resources far beyond the social optimum which at the same time were almost exhausted (Bondareva et al., 2006). With the collapse of the USSR, NIS has undergone tremendous changes. Thanks to demilitarization of the economy, the civil sector of the industry started to grow. Despite the fact that sustainable supply chains, traditional technology and industrial communications were ruined, at the same time there were new more complex linkages with feedback that appeared. There is a gradual process of reorganization of both the NIS and its regulatory framework. Significantly reduced government funding of science and innovation resulted in the prioritization of research projects. Financing was given only for the most promising from the state's point of view scientific programs. The new system was based on the fact that NIS, as well as the economy as a whole, will be operated by free market mechanisms ensuring the survival of an efficient science and recalling resources from inefficient. However, the actual tools that implement these priorities are often absent, and the lobbying of powerful industries (like Oil and Gas) did not allow to implement them fully.

At the same time, the creation of new organizational and institutional elements, development of research and innovation infrastructure and new legislative framework was launched. Investment climate has become more friendly. The room for entrepreneurship has appeared. Small innovative business started to grow. All these changes prove the fact that transitional innovative system was formed in Russia, combining elements of old and new innovation systems (Dezhina and Saltykov, 2004).

4.2. Problems of Russian NIS

The distinctive features of the current NIS are: the fragmentation of the innovation infrastructure, since many of its elements are created, but do not support the continuous process of innovation throughout the stages of generation, commercialization and innovation implementation (Strategy-2020, 2011); lack of integration between science and education, and the lack of an innovation culture in universities and research institutes; inefficient government funding; bureaucratic patenting and licensing processes, etc. (Dezhina and Saltykov, 2004).

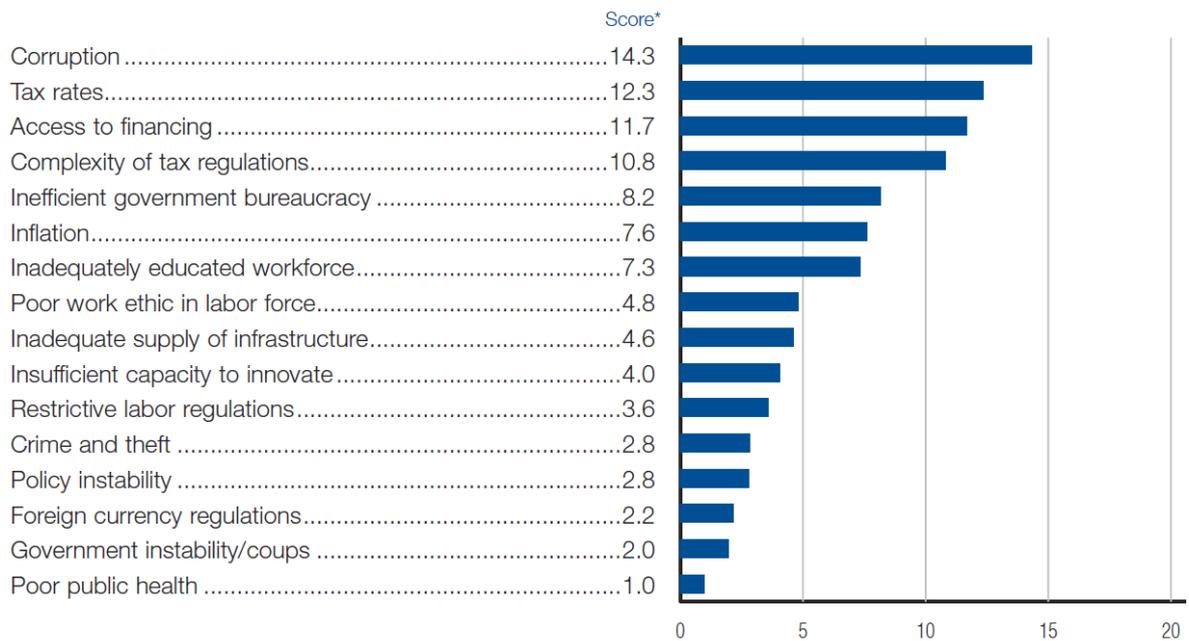
The state policy of the Russian Federation in the field of innovation did not have a well-defined overall concept until recently, but it is possible to say that a priority of its development was devoted to creation of an institutional framework (Kozhevnikova, 2011). Originally, it was built on the belief that market forces will be able to revive the demand for innovation and force companies to improve their performance, while the state, in turn, will take responsibility for the creation of physical, organizational and financial infrastructure. However, in recent years it becomes clear that the system needs refinement, implying the establishment of reliable communication links between all elements of the NIS. The scientific, technical and innovation policies are managed by a number of ministries and agencies. The coordination of efforts between them is weak. At the same time, non-departmental advisory bodies are more and more often engaged in the process of policy development. There are business representatives, experts, professional communities among them, but in half of cases they are likely to lobby only their interests (Dezhina and Kiseleva, 2007). It is quite hard to achieve fundamental changes in the system at the moment.

Business in the Russian NIS shows low activity in the field of innovation. According to statistics, only 9-10 % of industrial enterprises were innovatively active over the last few years (Indicators of innovation activity, 2014). Trends of recent years show that the main form of innovation in all industries is the renewal of machinery and equipment: it is carried out at 63% of innovative enterprises. Companies, even innovative, are allocating less efforts on R&D. Over the last decade the share of innovative enterprises involved in their implementation, were reduced almost by half. R&D accounts for 16.4% of expenditures on technological innovation (in 1995 - 27%), while in Austria, Germany, Denmark this figure reaches 55-57%, in Netherlands, Norway, Finland - 69-75%. Traditionally, there is a small set of enterprises, acquiring new technologies (less than 17%), including rights on patents and patent licenses (10%); the corresponding share is only 2.7% of innovative cost structure

(Watkins, Frouman. and Dezhina, 2006). Accordingly, update is occurring with the use of not-advanced foreign technologies. Thus, it is almost impossible to overcome the technological gap between Russia and Western countries in a such way.

At the same time, positive tendencies of growing expenditures on R&D by large business have emerged. Big companies create their own research units or institutions or buy the former industrial institutes. The expenses of companies on the research projects carried out in the public sector of science and higher education institutions are also increased. However, there is still no big high-tech firms in Russia.

Fundamental barriers for doing business have their negative impact on the development of innovative systems in the country (Figure 20). According to the WEF report (Global Competitiveness Report, 2016), there is an extremely high corruption component in the Russian economy, severe tax rates, difficult access to financing and complex tax regulation. All of these factors adversely affect the efficiency of business processes and inhibits innovation development.



Source: Global Competitiveness Report, 2016

Figure 20. The most problematic factors for doing business in Russia

Russian science has undergone significant changes since the Soviet Union collapse. The complexity and uniqueness of the situation was that the state has received a large-scale pub-

lic scientific sector, whereas the share in GDP for government spending on science was significantly cut. As a result, the number of scientific personnel was decreased more than twice. Most of former scientists changed professional orientation, some of them went abroad. Many of scientific organizations had not been able to adapt to new conditions and continued to exist mainly because of single efficient laboratories and research groups, or unscientific income (such as renting out the premises). Because of their noncompetitiveness, research institutes were closed in many of research areas. Overall, this situation had a negative impact on the aggregate level of technological progress.

On the other hand, the relative integration of Russian science in the world scientific community finally took place. Relative, because, on the one hand, the ideological barriers forming scientific and technical insulation have fallen, and on the other, the inner motivation of the Russian scientific society did not reach the level required to create an open research environment. According to sociological surveys, 41% of the research organizations are carrying out their own research projects, 17% - are collaborating with academic research institutes, 13% - with industry research institutes, 8% - with higher education institutions, and only 1% - with businesses (Sheregi and Strikhanov, 2006). International cooperation is also underdeveloped. According to the Center for Science Research and Statistics, only 11.6% of research organizations have collaborated with colleagues from CIS, and 17.3% - with colleagues from other countries.

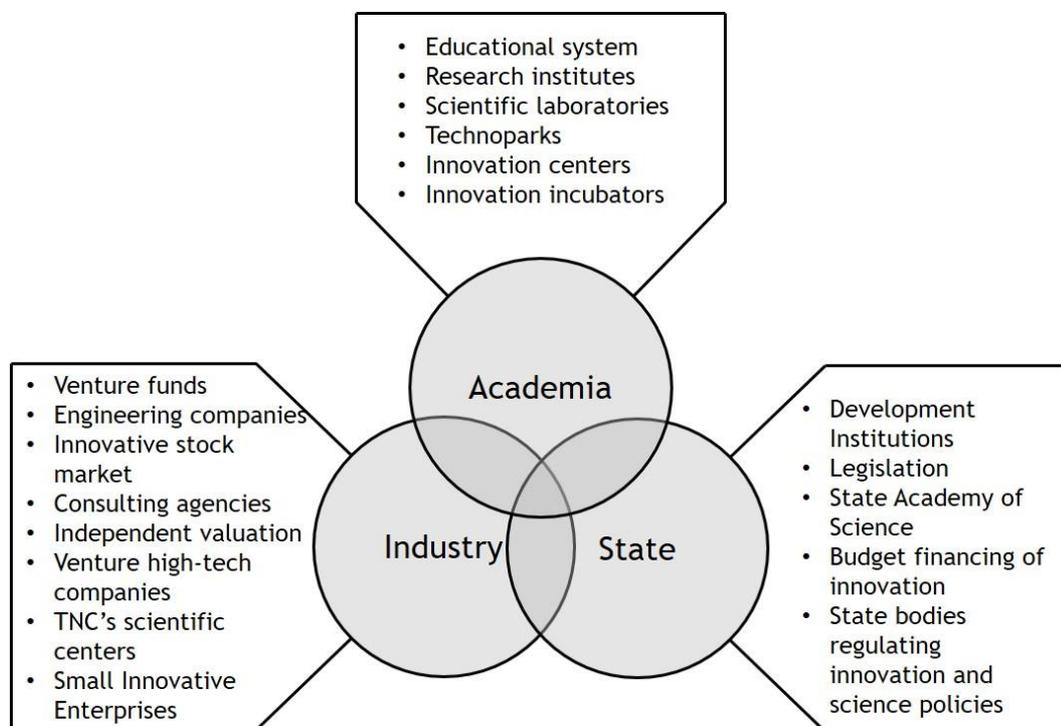
An important feature of Russian science, which distinguishes it from foreign counterparts, is the dominance in fundamental research of the Russian Academy of Sciences, not universities. At the same time, the universities carry out the bulk of educational and training work with relatively weak scientific basis and modest scale R&D funding. Building of the infrastructure to facilitate the development of relations between science and business in such a system is a non-trivial task, since the formation of infrastructure around the university will be affected by the lack of scientific potential, and in the case of creating it with scientific organizations - the lack of young personnel (Dezhina and Kisileva, 2007).

4.3. Features of the Russian triple-helix

Russian Triple Helix is still in a very early stage of its formation. At the moment, this is not complete a system, preferably paired relationships between academia and industry, state and academia, state and industry. This science is relatively isolated area, business - not enough

motivated to innovate, and the sector of small innovative entrepreneurship – undeveloped (Dezhina, 2011). At the same time, most of the elements required for the effective operation in NIS have already been established (Figure 21).

The government is trying to establish links between science and business, and stimulate the development of small innovative firms, but there is no thorough strategy behind the policy. At the same time the state participation in the scientific and technology sectors of the economy is too intensive, it is rather dictates than controls. This reflects the specifics of the Russian model of the emerging "triple helix": the state takes precedence over science and business, and because of this policy cannot be considered as a partner.



Source: Author

Figure 21. Elements of Russian NIS

State corporations are good examples of such relationships. Their governmental decisions are not based on the economic benefits, but on the basis of the strategic goals of the state. This leads to increased transaction costs and reduced production efficiency, thereby narrowing the innovation potential of the economy (Dezhina and Kisileva, 2007). Often state interventions are redundant and have a detrimental effect on the development of network communications, the emergence of new initiatives "from below" and their natural distribution.

That is why the horizontal links, intermediary institutions, flexibility and diversity of interactions between science and business are the components that are necessary for the development of the triple helix.

4.4. Initiatives for encouraging businesses to innovate

The number and scale of the Russian government's initiatives in the sphere of innovation is increasing every year. Understanding of the importance of development of relations between science and business resulted in a number of initiatives aimed at strengthening them. In order to stimulate innovation activities of state-owned companies, government obliged them to finance the corporate innovation development programs and introduced a standard for innovation expenditures (Dezhina, 2011). The aim is to intensify the innovation activities of enterprises and increase the demand for innovation. That could be made through active introduction of third-party R&D results, carried out by domestic academia or business research units, as well as the use of advanced technologies, products and services developed by small and medium-sized innovative enterprises. Thus, it is not only an attempt to encourage state-owned companies to innovate, but also link them to scientific organizations, to increase the volume of R&D outsourcing (Dezhina, 2011).

The special emphasis of many recent governmental projects is placed on cooperation of state companies with universities. It is assumed that companies will establish close relationships with a range of supporting universities and research institutions to carry out joint research and technological activities. Such work may relate to formation of joint research programs, exchange of scientific, technical and marketing information and market trends studies, forecasting scientific and technological development. Moreover, companies are expected to work with universities on the implementation of programs improving the quality of education and professional training in high-tech industries.

In the case of private companies, which are harder to be directly forced to innovate, other measures were introduced. For instance, private companies can participate in competitions to receive budget funding for innovation activities, carried out in partnership with universities. Special tax regulation, as well as recently elaborated technical regulations and standards, will be applied for them. Ministry of Economic Development is considered about the introduction of special contracts with the state, according to which the state undertakes to support the interests of the companies on markets (e.g. lobbying increase of imports fees for

competing equipment) in return for the intensification of innovation activities (Kantyshev, 2016).

Thus, the state is trying to directly or indirectly encourage businesses to innovate, exploiting its administrative resources. At the same time the focus shifts to supporting partnerships with scientific organizations and universities. This policy direction is consistent with the logic of the triple-helix theory (Smorodinskaya, 2011).

4.5. Development institutions of Russian NIS

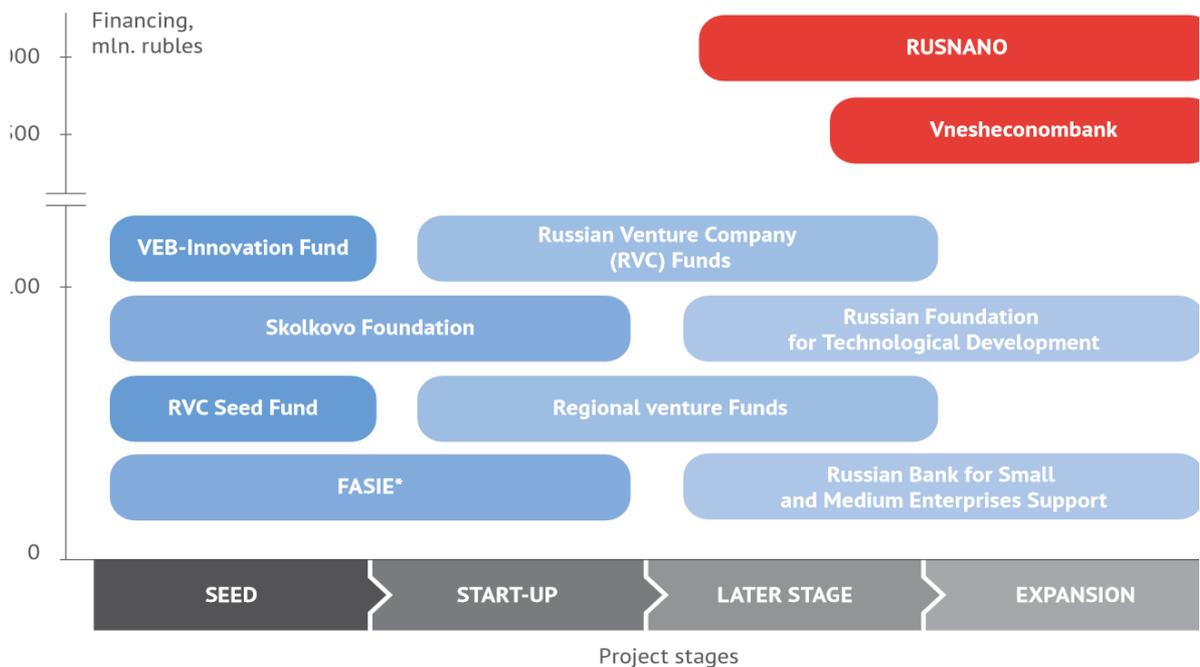
In order to develop innovative economy in Russia, government with the direct participation of Ministry of Economic Development formed the system of institutions in charge of state support for innovation activity. There are numbers of projects that couldn't be financed from private funds alone, because of the high risks of the Russian market. At the same time, such projects often play an important role for the economy, being technologically sophisticated and promising in terms of development of the country's economic sectors. That was the reason to create special entities, which would accept high risks in return for high value for the economic development (The Ministry of the Economic Development, 2013).

Development institutions (Vnesheconombank, Fund VEB Innovations, RUSNANO, RVC, SME Bank, FASIE, Skolkovo Foundation, the Russian Foundation for Technological Development, The Fund of Infrastructure and Educational Programs) support innovative projects by different means at all stages of their lifecycle, promote the establishment of venture capital funds. They are also involved in the transfer of technology and competencies in the Russian Federation, thus becoming a catalyst of economic growth in key sectors. The total amount of funds given to development institutions by the state exceeds \$ 1 trillion of Russian rubles (Innovations in Russia, 2016).

There are two main activity areas of development institutions. Firstly, it is financial support for innovative projects in the form of grants, direct investments in the charter capital of the portfolio companies or providing loans. Such support could be provided directly or indirectly, through investment in specialized venture capital and private equity funds. Secondly, it might be the non-financial support, implying e.g. the creation of project flow eligible for investors, development of innovation infrastructure, implementation of educational programs, assistance for the domestic and foreign market promotion for innovative products, incorporation of companies in the value chain, integration in mechanisms of procurement of

goods and services for state and municipal needs, export promotion, improvement of technical regulation etc.

Every development institution is created to solve specific problems in the field of innovation and providing support at a certain stage of the innovation cycle. In order to improve the system of development institutions and ensure continuous support for their projects, Ministry of Economic Development together with MOEX (Moscow Exchange), RVCA (Russian Venture Capital Association), OPORA Russia (national non-governmental organization for small and medium entrepreneurship) and the Federal Agency for the Youth established the system of Innovation lift. It is expected to be the main tool for coordination of development institutions and exclude the possibility of competition between them (Figure 22).



Source: Ministry of Economic Development, 2013

Figure 22. Innovation lift

There are four main stages in Innovation lift, each is complemented with assigned development institutions.

- Knowledge generation stage, providing seed financing (FASIE, RVC Seed Fund, Skolkovo Fund, RUSNANO Fund of Infrastructure and Educational Programs);
- Formation stage, proving venture capital investments (VEB-Innovation Fund, venture capital funds, RVC, regional venture capital funds);

- Growth stage, providing direct investment (IDF, SME Bank, Rosinfocominvest);
- Expansion stage (RUSNANO, Vnesheconombank).

Ministry of Economic Development carries out a systematic review and revision of the institutions' activities and development strategies according to the change in external environment and the state policy in the sphere of innovation.

4.6. Development of innovative entrepreneurship

The development of innovative business in the Russian Federation is based on three main components: the development of competencies and improvement of the quality of the education system; development of the regulatory framework; development of the market of venture capital investments and financial support from the state (Innovations in Russia, 2016).

Education system plays a key role in the formation of competences of innovative human. At the same time, modern trends require its modernization in order to provide up-to-date knowledge in the field of the innovative business. Leading universities open new departments related to science-intensive business, invest in innovative infrastructure and climate, facilitating the intensification of entrepreneurial activities. Favorable environment, fostering the commercialization of technologies is an object of special attention. Thanks to adoption of Federal Law 217 (№217-FZ, 2009) budgetary scientific institutions could easily (in notification order) establish own entities devoted to commercialization of results of intellectual activity. Since that time the patenting and commercial activity of such entities has grown substantially. Current practice shows that the development of technological entrepreneurship is gradually becoming a trend in Russia. More and more young people are involved in the technology business and participate in programs promoting innovators provided by development institutions.

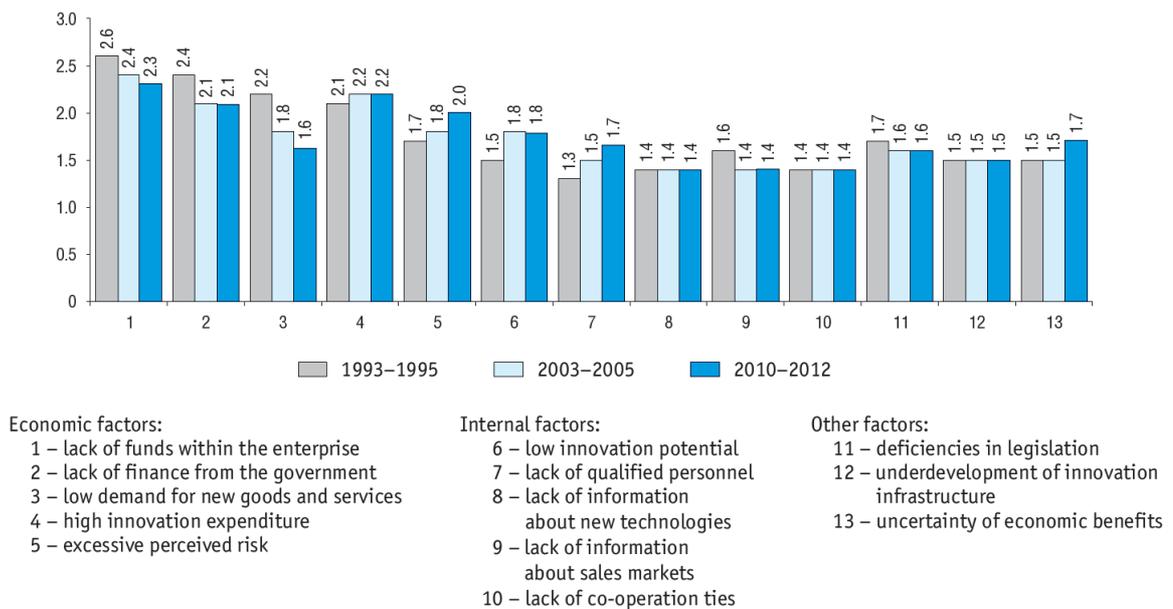
Development institutions and the venture capital market play important role in the development of innovative entrepreneurship, which is one of the basic elements of the innovation ecosystem. Recently, government approved the principles of co-investment in the Russian and international venture funds. These principles are now being introduced in the practical activities of the state companies. They include the principle of competition, including the selection of venture capital funds for participation; own priorities of state companies; transfer of technology and management skills to Russian state-owned companies; cooperation in

order to participate in venture capital funds; the priority of the Russian jurisdiction for venture capital fund; the access to consulting and organizational support from the relevant development institutions (Dezhina and Saltykov, 2005).

4.7. The conditions for development of SIE

Nowadays in Russia, flexible well-managed entities conducting research projects are actively formed. Some of them fall under the class of SIE. However, their number is still not enough to drive the Russian economy, while innovative infrastructure supporting their development is not fully created. Abroad, where the operation and support of small innovative businesses are well studied, there are a number of effective programs to support SIE. However, the direct transfer of international experience to Russian realities will not give similar results. In order to adapt the development tools to Russian conditions it is necessary to study the features of Russian SIE in the process of reforming the current transitional NIS (Dezhina and Saltykov, 2005).

The most significant constraints of technological innovation, hampering the development of SIE are of financial nature (lack of internal and external funding and high cost of innovations). In recent years, statistics also indicate increased uncertainty and risk of doing business, lack of highly-qualified staff and low innovation potential (Figure 23).



Source: Indicators of Innovation in the Russian Federation: 2014

Figure 23. Factors hampering technological innovation by rank of importance

The formation of the SIE is undergoing by different ways (Dezhina and Saltykov, 2005):

- Scientists or engineers are developing the technology or product which has a commercial potential. They create a small company, and then try to find customers for their product;
- Scientists leave the academia, engage in trading and brokering. Then form the initial capital and create the SIE;
- Entrepreneurs interested in the production of high-tech products, study the market demand, find scientist and developers, produce own R&D and then create their own production.

The origin of the initial capital may be diverse, but mostly dominated by own funds of the company founders. A list of sources of funding (in decreasing order of frequency of use) consists of own funds, business angels' investments, bank loans, federal budget funds, attracted customer funds, regional budget funds. Funding of R&D is supported due to the re-investment of profits from orders, as well as the grants from development institutions.

Market expansion usually occurs either due to the diversification of activities, or through access to foreign markets. The latter is usually implemented by means of partnerships with foreign distributors, networking with potential customers at the trade shows and conferences, development of new market niches. Internationalization process is usually followed by considerable problems for firms. One of the specific issues is the distrust of foreign consumers towards Russian products (Dezhina and Saltykov, 2005). At the same time, in the case when potential foreign customers are aware about competitive advantages of offered products (technologies), they are trying to buy carriers and owners of ideas, instead of buying product. They offer Russian specialist to move abroad or show readiness to buy controlling stake of the company shares (Dezhina and Saltykov, 2005).

There are several common characteristics and specific features of successful and competitive SIE (Dezhina and Saltykov, 2005):

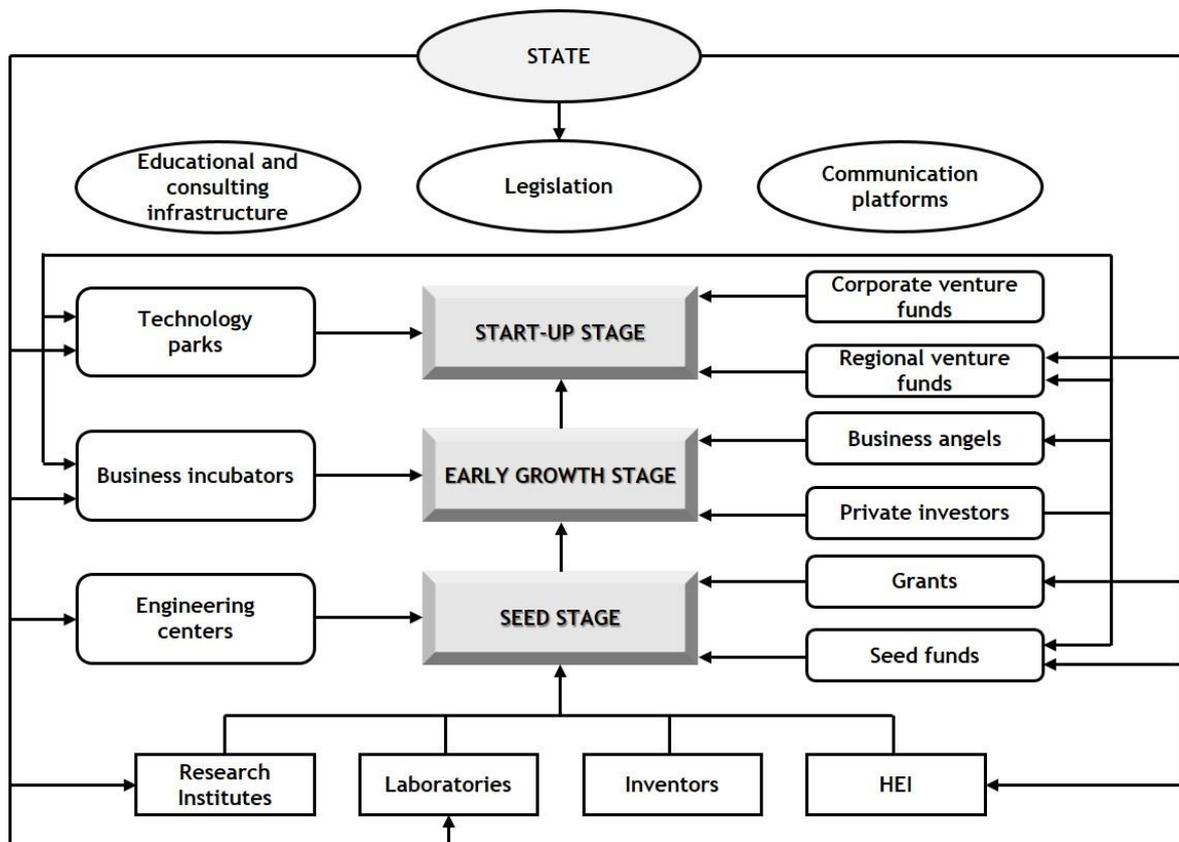
- Support from the laboratories and departments of scientific and technical institutions and universities with highly developed theoretical scientific base;

- The original focus on the domestic market and learning in the process of commercialization. The internationalization process is started on the later stages of development, mainly on the markets of CIS countries. At the same time, companies are not expected to internationalize at all due to the high capacity of the domestic market.
- The presence of leader in the company;
- High motivation of the staff to work, willingness to experience tough times and failures together with the firm;
- Knowledge and skills, improving during the lifetime of the company, implying transition from the production of individual parts and components to the production of products;
- Growth through the creation of support services (service, marketing) and own production and training systems or their outsourcing.
- Continuous study of foreign experience in management, marketing, pricing and servicing;
- Gradual market diversification, orientation on different industries, if the type of product (technology) allows it;
- The development of different pricing strategies, forms of products (varying prices depending on further cooperation, the willingness to carry out the first contracts for half the price, free offerings in order to advertise the product for potential customers, etc.);
- The buyout of the property rights on the rented facilities at a certain stage of development. Rent payments increase uncertainty, because of the dependence from rentier's behavior.

The existence and development of SIE within Russian NIS is presented on Figure 24. It shows the main stages SIE undergo through their lifetime before converting into big enterprises, and other elements of NIS affecting the process (Butryumova, 2011). The most well-established pattern of SIE support at a very early stage of development is the START program, provided by FASIE. The program stands out for the so-called seed financing for the implementation of innovative projects. This initiative resembles to some extent the SBIR (Small Business Innovation Research Program) program of the US. Due to the high risk, the success rate is assumed to be around 10%. This rate is accepted worldwide as a success

criterion for high-risk innovative projects. Similar programs are implemented by Skolkovo Fund, VEB-Innovation and RVC.

SIE on the later stages of Innovation lift receive financing through other FASIE programs, called Development, Commercialization and Internationalization. Venture financing is provided by RVC, private venture investors and business angels. With further development it is possible to obtain financing from regional venture funds and corporate investors.



Source: adopted from Butryumova, 2011

Figure 24. Model of interaction between SIE and innovation infrastructure on different stages of development

4.8. Synthesis on the case environment

Finally, summarizing the information obtained from different sources (academic articles, papers, reports, data books, decrees) it is possible to say that Russia is still on the way of creating favorable conditions for SIE development.

From the one hand, considerable work is done on the way of promoting SIE. There are lots of development institutions created in order to provide government support for innovative

business. The program of Innovation lift ensures the continuous support on every stage of their development. Despite the presence in different reports (Global Competitiveness Report, 2016; Indicators of Innovation in the Russian Federation, 2014) the problem related to the lack of financing from the government is seemed partially solved, at least in case of SIE. The government also promotes innovative entrepreneurship in universities, establish special educational programs to entrepreneurial mindset. It encourages state-owned companies to heavily invest in R&D, closely cooperate with academia. It would seem that such activities should positively affect the development of innovative economy in the country.

However, from the other hand, there are still many issues that are needed to solve in a short term prospective. The academia is almost divorced out from business, universities do not exploit their innovative and scientific potential. Business is not interested in innovations or just not aware about their existence. Companies perceive high risk of development and uncertainty about future benefits. Institutional conditions are still underdeveloped. There is no trust to political institutions and courts, law enforcement authorities. Business is suffering from corruption, tax rates and bureaucracy.

Input factors, like big domestic market, developed infrastructure and high-quality workforce could not solve the problems of Russian NIS alone. The government should take further actions to improve the economic situation in the country. In the meantime, one of the biggest problem is excessive state regulation, which is trying to govern all the transactions inside NIS. The government is better to create conditions, not regulate. Such strategy hampers the transition to the triple-helix model of NIS and the competitiveness development of Russian business.

5. RESULTS

This chapter reveals the reasons for the choice of the companies and the industry for research and presents the results of the conducted interviews.

5.1. Enterprise selection rationale

In this study, two interviews with representatives of science-intensive business were conducted. In order to answer research questions and achieve research goals the scope was set on two types of SIE, based on the way of their origin: I type SIE, originated from universities, research institutes or academies; and II type SIE, founded by private entrepreneurs. Interviewees were asked a series of questions to evaluate the factors that constitute the basis of SIE's competitiveness. The questions concerning the relations between SIE and development institutes were deliberately emphasized to form a deep understanding of the effect the latter have on the development of small business in Russia.

For the purpose of the study the focus was set on composite materials industry being considered as a high-tech, knowledge-based and innovation-driven one. It was the Soviet Union along with the United States, Britain and Japan, who was a pioneer of its development. However, the collapse of political system made a deep imprint on the leadership, which was in fact lost. Currently, the industry has ambitious and large-scale tasks. In accordance with the program *Development of composite materials and derivative products* (Strategy 2020, 2011), the volume of production of composites in Russia in 2020 should reach 120 billion rubles, while their consumption per person increases from 0.5 to 1.5 kg. The volume of world consumption is going to reach 70 thousand tons of carbon materials per year, while the annual growth rate of the market is estimated at 5-10% (Fakhretdinov, 2014). In the conditions of increasing economic isolation of Russia, the development of SIE in composite industry, which in fact has both military and civil mission, is a strategic goal for Russian government.

These facts justify the high relevance of composite industry's SIE for the study. BMSTU Interdisciplinary Engineering Center Ltd. also known as Composites Russia was chosen as the I type SIE. Inginity Ltd. was chosen as a II type SIE.

5.2. Composites Russia

The interview was conducted on July 2016 with the deputy director and chief designer of the company – I. Chudnov.

In 2011 Rector of Bauman Moscow State Technical University (BMSTU) A. Alexandrov initiated the establishment of Research Educational Center (REC) for composite materials on the basis of BMSTU. He invited the highly-qualified team, possessing deep expertise in the field of composites. These specialists had already worked in aviation industry and were famous for establishment of the engineering center RT-HimKompozit (Rostec holding structure). Initially, the REC "New materials, composites and nanotechnology" was created. It was originated as a part of the university and performed work under contracts with the state. The Center actively participated in competitions and tenders, which allowed it to be self-sufficient without any investment from BMSTU.

At the end of 2013 REC won the contest held by the Ministry of Industry and Trade and the Ministry of Education and Science for the creation of pilot projects of engineering centers at universities to support the real sector of the economy. One of the conditions of competition was the creation of an independent organization, which could result in further state financing by the program. Thus, in 2014 the company was split between independent BMSTU Interdisciplinary Engineering Center Ltd. and REC under the structure of the University - Interdisciplinary Engineering Center of Composite Materials. In practical terms, the centers constitute a single entity, acting in the market under the single brand name Composites Russia.

At present, the company has about 70 employees who are able to provide a full cycle of composite products creation. Company constantly utilizes the infrastructure and facilities of the University for research and production purposes. The key activity is research and development and single unit production performed under third-party orders. Most of the contracts involve the development of product creation technologies, and therefore imply both the process and product innovations. In addition, such contracts are accompanied by the exchange of experience and personnel training of staff. Composites Russia cooperate both public and private enterprises. At the same time, up to 20% of the resources are spent on the development of their own initiative, ensuring innovative development of the company.

Composites Russia do not seek for vertical growth, setting themselves the goal of horizontal development, i.e. creation of a network of related companies, existing in the same industry. At the moment, the company estimates the domestic market demand is potentially high and does not set strategic objectives to achieve new markets. However, Mr. Chudnov noticed: "We are also working with foreign agents from Germany, China, Kazakhstan, but only in the framework of public contracts on joint projects".

The basis for the competitiveness of the company is a "multi-disciplinary knowledge and competencies of BMSTU, providing access to specialists from different industries". Moreover, there are also successful market experience and good advertising of the services which play an important role in the competitive shift. The company has some unique developments in the field of polymer binder materials, as well as the use of pre-forms. These intangibilities are able to significantly improve the quality of the product and productivity of labor. That is why, they constitute the competitive advantage of the firm. However, the underdevelopment of the market in Russia and low awareness of the business about potential of composite materials hampers the development, preventing the active growth. Mr. Chudnov stated: "We need to explain to industrial companies that use of products made of composites can reduce the cost of the product lifecycle, and therefore can even at a higher initial cost be beneficial to the end user."

Another problem of the Russian market is the weak development of the network of materials suppliers for composite production. Mr. Chudnov explains: "In the market there are several producers of fibers retained from Soviet times. They supply mostly the space and aviation industries, nevertheless, by its characteristics, this material is seriously lagging behind their foreign counterparts, made in Japan, US and other countries." It is known about the beginning of the production of fibers in Yelabuga under company controlled by RUSNANO, but at the moment it is too early to talk about the results. For civil manufacturing, imported fibers are used, which possess high quality and, most importantly, have several times lower price. In fact, Mr. Chudnov added: "The situation with binders is significantly better, they are produced inside the country, but when it comes to component base, it should be mentioned it is almost fully foreign."

The company participated in the creation of the Moscow composite cluster - regional public organization, whose main objective is the development of the industry of composite materials and products on their basis, the development of infrastructure, R&D, as well as the effective commercialization of intellectual property. Due to the continuous and close cooperation between the members of the cluster an adequate picture is formed about the current trends and industry problems. Collaboration allows to formulate and submit proposals to adjust the regulatory base, to identify the most relevant area of research and to focus joint efforts and competencies to solve a variety of technological, industrial and administrative issues. Despite the fact that the work of the cluster has already brought a number of joint

projects, and the number of members has reached hundreds, the company notes that its effectiveness is still at a low level.

Within the cluster activities, the company is working with the Government of Moscow, which gives out areas for the creation of high-tech industries, which leads to the growth of the city jobs and generates a market of products needed for the renovation of urban infrastructure. Thanks to this support, company has special preferential treatment on taxes and renting. Moreover, collaboration between Composites Russia and the Government of Moscow has already resulted in a pilot project of basaltic grid plant, which could supply the city and its construction industry with innovative products. Also, the regional program for the development of the composite industry has been developed, in which more than 20 projects have already obtained state funding.

There is a constant cooperation with both small and large companies, an active transfer of knowledge within developing industry. The company works closely with educational institutions and research institutions, including the BMSTU, Moscow State University, Kazan National Research Technical University named after A.N. Tupolev, Saint Petersburg State University, Russian Scientific Research Institute of Aviation Materials, Central Aerohydrodynamic Institute, etc. Participants exchange scientific and technological competences, share high-tech equipment, outsource certain activities. Scientific institutes usually ordered conducting researches and tests on the company's facilities. For its part, the company is involved in the training of professional staff on the basis of the BMSTU. It organizes workshops, seminars, laboratory works, connects students to the projects, providing them with practical knowledge. At the same time, talking about the country as a whole, the spokesman said: "There is a serious gap between academia and the real industry requirements. Many disciplines are taught more on the basis of the Soviet methods. However, the technology is developing by leaps and bounds." Nevertheless, the widespread of REC at universities (such as in BMSTU) significantly improves the quality of education.

In terms of cooperation with development institutions, the company receives funding from the Foundation for the promotion of innovation (Fund for Assistance to Small Innovative Enterprises in Science and Technology, FASIE) under the program Development, in the meantime being an expert of the Fund. There is also cooperation with regional institutes, e.g. Moscow Centre of Innovative Development (CID). It subsidizes engineering services for small businesses, which affects both the SIEs who provide these services, as well as those

who consume them. The company along with the other members of the project for the Russian PLM (Product Lifecycle Management) system development raises funds from VEB.

Composites Russia noted the high importance of public investments by development institutions: "Without these investments the company would not be viable, because we do not have this volume of financing." State support facilitates the development of the company. On the other hand, in the recent times there are much less budget money and the executives of the company understand the need to refocus the business on the free market, which will provide the majority of the orders from the private sector.

The company believes the current innovation system in the country is sufficiently developed, and considers the lack of necessity to create any other business support institutions. Finally, Mr. Chudnov summarized: "Government have to improve the efficiency of existing institutions rather than create new ones."

5.3. Inginity

The interview was conducted on July 2016 with two partners and founders of the company – G. Suvorov and V. Arkhipov.

Inginity Ltd. is a private Russian engineering and manufacturing company. It was founded in 2013 by three partners and successfully grows to this day. Conceived as a basis for a whole network of small innovative companies, company provide a full range of services in the field of development, design and manufacturing of products made of composite materials. Currently, Inginity is the fast growing technology startup, rapidly gaining the Russian market. Founders have already implemented another project - company named Tectonica, which is a resident of Skolkovo. While Inginity is focused on R&D, applied research, technical testing and manufacturing of products directly from composite materials, the Tectonica is specified on the fundamental researches of material properties, the study of physical processes and improving manufacturing techniques.

Inginity team consists of 12 employees working in high-tech workshop. They could cover the entire cycle of development and production of individual products at their own facilities. Currently the company is focused on the production of technologically complex prototypes and small series, the preparation of products for serial and mass production. Thus, the company operates in B2B segment, while the main product is a R&D service for other companies. The company actively cooperates with other market participants and involves external

contractors, as well as production, design and technology teams, if the problem is beyond the scope of basic competences, or where the use of its own production resources is economically or technologically impractical.

Although, Inginity is a science-intensive SIE, not all individual processes could be considered as innovative. "Things that can be made by thousands of people in the country are not an innovation for us, - says the partner G. Suvorov, - innovation is something completely new, which could be practically implemented." Assessing the intensity of innovation activities, it is necessary to understand that in most cases, customers come to the company to carry out their research and development on the company's facilities. Thus, R&D investments are up to 100% of the proceeds. Mr. Suvorov added: "Each project moves us forward and teach us something new. When we have free resources, we launch an initiative project." In general, more than 50% of the resources are spent on the development of product innovations, 30% on organizational innovations and only 20% come for production itself.

A key barrier for the company at the moment is the underdeveloped market. Mr. Suvorov noticed: "There are a lot of talks about composites, but no understanding of what it is and why they are needed. The market does not know what the composites actually are." While the market size is tremendous, the development is weak, in other words the numbers are not transformed into quality. Russia is characterized by a very low awareness of the potential of business innovations, so the first priority is their marketing. Inginity spends considerable resources to market their service and explain to potential customers the advantages of using composite materials in production. In fact, composites are able to radically change the characteristics of the product and endow it with specific properties, raising the level of customer satisfaction.

In order to survive on the market, organization constantly has to transform its proposal to effectively meet the needs of potential customers. Mr. Suvorov concluded: "In actively changing environment, organization needs to be flexible, to more quickly and accurately respond to the market demands." It is necessary to improve technological and organizational processes. He added: "The composite industry is very underdeveloped from a technological standpoint, there are a lot of extra efforts, characterized by high volatility and complexity of the scalability of the processes." Therefore, the company is constantly evolving, reinvesting almost all the profits for improving productivity and increasing efficiency of organizational

processes. It is worth mentioning that the only kind of external investments the company has received to finance itself was a small grant from one of the development institutions.

"Ingenuity exists at several stages of the innovation elevator at the same time. Therefore, the company interacts directly with the institutions of different levels. We closely communicate and interact with the Skolkovo fund, RVC, VEB-Innovations fund. There was also a collaboration with ASI about National Technological Initiative." - said Mr. Suvorov. At this point, it is a conceptual interaction, where the company participates as an expert in programs, while institutions in turn provide an understanding of trends of industry development. In the future, such cooperation should transform into commercial proposals, but at the moment the company is too small. There are also no deals made with Moscow Composite cluster. Nevertheless, the company receives support from FASIE under the program Start. Tectonica, being a resident of Skolkovo, can receive benefits in accordance with its status, such as access to centers of collective usage, tax incentives, etc.

Ingenuity actively participates in the various business development events: RVC accelerator GenerationS, Skolkovo Startup Village, Foresight Flot by ASI. However, the company notes a weak effect of such events on the development of SIE. RVC and private venture capital funds, the Skolkovo Foundation have evaluation techniques that do not meet the company's needs. "These funds are not able to work with process innovations" - said CEO V. Arkhipov. In principle, there is no technique designed for a service. Institutions are only able to think in terms of product. "

Relationship between SIE and development institutions are burdened by cultural differences and contrary approach to development. Mr. Suvorov added: "There is a big gap between development institutions and those they need to develop. Entrepreneurs' task is to survive, to get to the next stage and get capitalized at time, while some people working in the institutions, simply see out to their paycheck. " The key point is the lack of motivation of employees of institutions, absence of desire to really change something.

Development institutions have no comprehensive understanding of how business works, while evaluation models of SIE's activities are underdeveloped. The reasons behind are at some point a lack of experience, sometimes education. Moreover, different risk levels made their impact on personal involvement in the performance of organizations. Mr. Arkhipov concluded: "If the former business owners were sitting in the development institutions, they

would have worked." Institutions do not understand how to spend their budgets, because there are no specific targets and "one motivation to achieve results at different administrative levels (from operational to strategic)."

Despite small size, the company is involved in professional training and works towards the development of human potential of the country. Mr. Suvorov noted: "Training level of secondary school and higher institutions graduates does not meet the requirements of the near future, nor even today's." Inginity actively engages students and graduates of technical universities, including the BMSTU, for training in the enterprise. Thus, it becomes possible to evaluate them and find someone with whom the company can continue to cooperate. At the same time, the educational level of students is raised, they receive the necessary knowledge and modern understanding of the industry. The company along with Composites Russia initiated the creation of competence "Composites Technology" at the competition WorldSkills Russia 2016. Company's spokesmen said: "In our opinion, this is the only effective institution of development, but at the same time not even having that status." WorldSkills goal is to develop the education system and to produce skillful professionals for the economy. This championship sets the level of necessary skills required in the industry, creates standards and determines the level of professional training based on the opinion of the expert community, composed of people united by the same occupation. The mission of WorldSkills is the dissemination of knowledge: educational institutions should be aware of the requirements of the industry and to adjust the training program in line with market needs.

The company notes a problem with the suppliers for composite raw materials and the availability of related industries. Mr. Suvorov explained: "Sometimes we spend weeks waiting for raw material to manufacture simple products, however, it's hard to imagine if the company would be in, for example, Germany, where the delivery would be made within 24 hours." Related industries, same as consumer markets, is still not fully aware about the benefits of composites, therefore their absence or presence cannot be considered as an advantage. Competition in the industry at the moment is almost not existing and in the meantime companies are trying to cooperate in order to evolve.

Among the problems of Russian NIS in a row with market imperfections, weak network of suppliers, ineffective educational system and cultural contradictions, the company also notes the structural problems of the system. Despite the relatively easy access to government sup-

port and funding, the system cannot be called highly efficient. Receiving state support demands high expenditures on labor, which should ensure service and maintenance of these grants. Interviewees stated: "Grants from development institutions are like a drops in the ocean. The company wastes them in a few weeks." In practice, companies have to be constantly distracted from the creative activity to bureaucratic formalities. It turns out that the grants spend themselves. In addition, the process for their receiving requires a formal approach to the process, which is counterproductive, and sometimes extremely difficult for people with an entrepreneurial mindset, who are not inclined to work with a formal documentation. Thus, the orientation of the permanent provision of grant support inevitably increases costs and reduces business productivity. Mr. Suvorov is sure: "It is important to be focused not on grants, but on the market, that is the only way, which will lead us to a long-term development."

The most disastrous consequence of business funding strategy persuaded by development institutions is the decrease in intrinsic motivation to develop within the SIE - "irretrievable investments are causing addiction". State support should be provided to those companies which are able and know how to work on the free market, set up an internal system, otherwise such investments will never pay off. In other words, it makes no sense to fund non-competitive enterprises, because free subsidies will inevitably reduce their performance.

It seems much better strategy to create favorable conditions for development instead. The first step is to reduce the lease payments of startups. Most of them work only in order to pay off the rent that vastly inhibits their development. The paradox of Russian NIS is surprisingly high, unjustified rent payments, dictated not only by administration in metropolitan area, but also in innovative clusters. Mr. Arkhipov noticed: "For example, renting a lab in Skolkovo Technopark is comparable to the rent of an office in Moscow City towers. However, there were also examples of well-organized special areas, such as production sites in Nanotechnology Composite Center, offering a really low rent. But most of them were occupied by the rentier, arranging sub-rental business there."

From the company's point of view taxes in Russia do not make a strong effect on business, as well as corruption. Indeed, company's representatives say that this could be explained by the small scale of the activity and specificity of the industry. Also, there is practically no problem with technological support and infrastructure, vice versa there is a problem with a lack of understanding of how, why and for whom this infrastructure should work. While that

is not an issue to obtain funding for established companies, venture financing on the early stages is underdeveloped. The stumbling block is the prototyping stage, when considerable investments are needed. At the same time, there is no guarantee that the innovations will be capitalized in future. That is a reason, forming high entry barriers for the most of SIE. The state has already recognized the need for the provision of state support for business through granting high-risk R&D investments on the early stages. Mini- and micro-grants by Skolkovo foundation were supposed to solve this problem, but at this point the system still does not work, mainly because of the high bureaucratization of the process.

At present, company's priority is expansion on foreign markets. Strategically, Inginity is focused on creating products for global markets, noting the presence of specific global competitive advantage. According to Inginity mindset, an important advantage is "the talent of the Russian people and the unique way of thinking, capable to solve complex engineering problems. This type of thinking would not work in the routine. In order to produce outstanding results, it should be put out of the comfort zone. Also, to compete on a global scale the company should be highly adaptive to changing business conditions, flexible and efficient from the managerial standpoint. Important role is played by an internal motivation and a culture that promotes innovative development. Inginity notes that at present in the composite industry the factor conditions, are not as important as an effective management.

On the issue of the impact of development institutions, the company notes a minimal effect they have on their competitiveness and development of the SIE. Moreover, Inginity believes that the existence of organizations constantly receiving funding from the state budget strongly undermines the country's economy. Resources that could be spent more effectively are consumed, while such enterprises are losing the internal stimulus to compete and develop. Finally, Mr. Suvorov summarized: "The world started the race for efficiency. Our country will not survive if it does not begin to benefit both itself and the global society. It is time to learn how to create a market-efficient business in Russia."

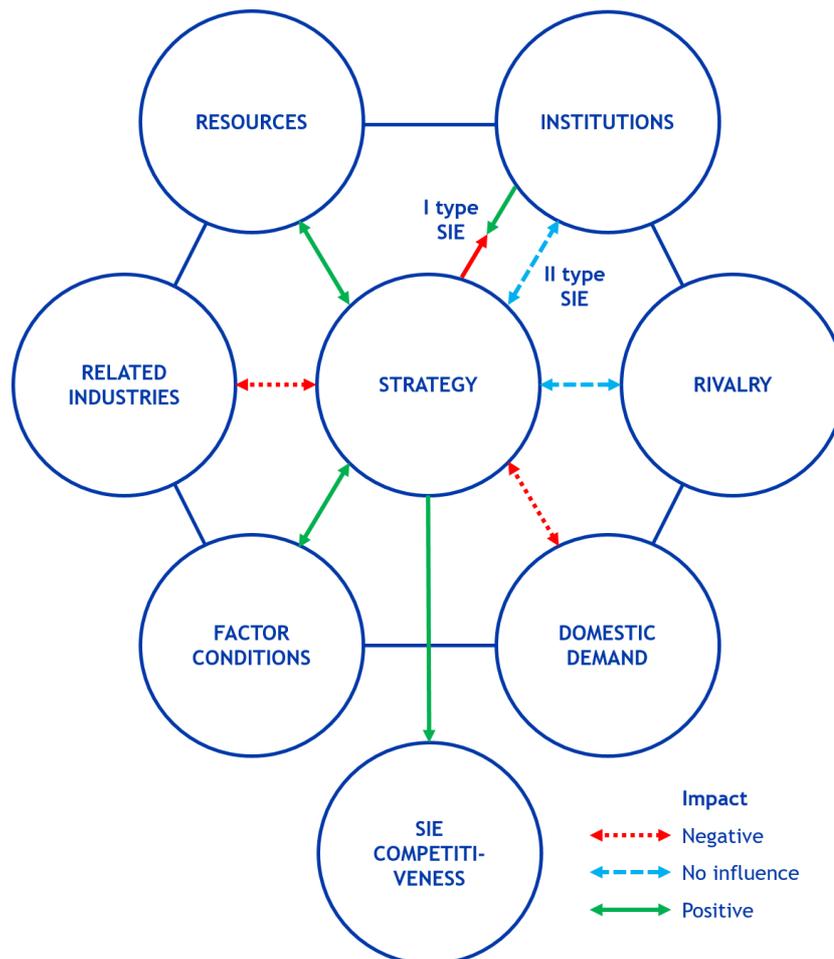
6. DISCUSSION

Discussion chapter provides answers on the research questions by combining all the information and results from previous parts of the study. Discussion section integrates literature review, analysis of secondary data about case environment and results obtained from the interviews.

6.1. Analysis of interview results

On the basis of interview results it is possible to analyze and compare the vision of different SIE on their competitiveness and the role of Russian NIS in its development.

In assessing the factors shaping the competitiveness of the company, representatives of two organizations generally have almost similar idea about the conditions of the development of composite materials industry (Figure 25).



Source: Author

Figure 25. The impact of factors on SIE competitiveness

Thus, both companies see the key barrier for industry development in the low quality of domestic demand in the country, despite large volume and high potential of the market. Companies recognize the need to take permanent steps towards improving market conditions, awareness and understanding of business representatives about existing innovations. At the same time, the II type SIE realizing low domestic demand tends to enter the foreign markets. While I type SIE is focused more on the local market and is not intended to face global challenges at near future.

Companies are either like-minded about related and supporting industries. Among the problems with logistics there is a high dependence on foreign materials with high consumer properties. At the moment, weak development of supporting industries in the country negatively affects the competitiveness of the companies.

Talking about factor conditions, none of companies sees problems with the development of infrastructure. Enterprises face some issues with professional qualification and the modernity of the educational system, but at the same time they are working to improve quality of education by means of cooperation with educational institutes and universities. In terms of rental payments II type SIE is facing considerable issues dealing with constant financial pressure, while I type SIE successfully avoids this problem operating on the facilities of parental organization. Moreover, it develops close cooperation with the regional authorities for rebates on rent for further projects. In general, factor conditions in the composite industry could be considered quite favorable for its development.

Both companies see their resources and competencies as a key success factor at this stage of development. While I type SIE prefers the quantity of resources and extensive development, II type SIE emphasizes the effectiveness of resource management and intensive development. The competitive environment at the moment has not yet been formed, due to the weak development of the industry in the country. Broad cooperation and the free transfer of knowledge prevail between the actors. Close cooperation with universities and research institutes is very intensive for I type SIE, which could be explained by the origin of the company.

Companies have different opinions about cooperation with development institutions (Table 2). I type SIE see the development institutions, as a key source of financing and development

of the company and the state, as an important partner. The company's activities mostly involve the executing of government contracts; therefore, the company is almost entirely dependent on the state. Such relationships are determined by the origin of I type SIE, which understands how the system works and successfully integrates in the budget cash flow. However, at the same time the company is aware about the importance of the transition to an independent market model, when the primary customers and investors would be found on open market. Nevertheless, the company underlines the room for development of the existing institutions and possibility to improve their effectiveness.

Table 2. Relations with Development Institutions

Type of SIE	Impact	
	Interviewees standpoint	Results of analysis
I type SIE	Development institutions provide essential support, facilitating the development of SIE. Government financing helps the company to grow.	Constant exploitation of gratuitous funding decrease competitiveness of the company, forcing it to focus on the service of state contracts.
II type SIE	Development institutions can't help companies to establish competitive business, as they require the distraction of resources from current operations.	As long as company prefers to stay away from development institutions support, they have no impact on its competitiveness.

Support from development institutions is assessed by the representatives of II type SIE as quite useful on the very early stages of development, but such interactions on a regular basis are recognized to be ineffective. High bureaucracy of the process of obtaining this support requires the diversion of significant amounts of resources from the real productive activity that adversely affects the performance. In addition, permanent gratuitous financial infusions into the business budget are considered addictive. Fundamentally different approach to development makes its impact on low efficiency of development institutions, as well as inability to respond to real problems of innovative companies. Thus, I type SIE notes a minimal effect of the institutions on the competitiveness and development of the company.

Obviously, because of their origin, II type SIE, in contrast to the type I, feels much more unstable, since it does not depend on anyone's support and survive on an open market. On the other hand, in the opinion of the author of the thesis, it is this feature that makes II type

SIE more competitive. Risks of existence on the free market require continuous improvement of its business processes and organizational innovations that raise productivity. For comparison, I type SIE do not have such incentives, and hence do not feel the need for change. The organization becomes less flexible and it is more difficult to respond to the competitive challenges of the external environment.

Thus, the effect of development institutions on the competitiveness of SIE is contradictory. On the one hand, intuitions facilitate the growth of the companies and foster the development by injecting public funds in SIE. But from the other hand, companies could use these funds to the detriment of themselves, losing the internal motivation to improve productivity.

6.2. Data triangulation

Overall, the results of secondary data review are quite consistent with the findings from interviews. Assessment of factor conditions is similar across different sources. Market demand on innovations is recognized as weak, despite the actual large potential market volume. The quality of professional education is qualified as good, but to the certain extent unsatisfactory for present needs of the science-intensive industries. The efforts of the government in the direction of the establishment of business entities on the basis of universities is proved by the case itself. Constant financial support from development institutions proves the point that government financing is not a real problem of SIE.

However, there are lots of contradictions between the data. In the case of SIE, close cooperation between business and academia could be seen on the every-day basis and the gap is seemed to be not so crucial. This proves the point that SIE itself is an element which could exist only in the framework of triple-helix NIS. Macroeconomical problems, such as corruption, taxes and underdeveloped legislation contrary not seen as actual hampering factors, that could be explained by the size of studied firms. From the development institutions standpoint there is certain inconsistency, which is very interesting from the researcher's point of view. As soon as development institutions are considered as the most important element of NIS in terms of cooperation with SIE, such contradictory effect makes a strong impact on the result of the study. Thus, answering RQ1:

What is the effect of Russian NIS on SIE competitiveness?

It is possible to say that in terms of cooperation with institutions it varies depending on the stage of development of SIE and duration of interaction. Short address support certainly

makes a positive impact on the development and increase the competitiveness of SIE. But long-lasting exploitation of government funds has nothing in common with increasing competitiveness. Moreover, due to the limited generalizability of the findings it is impossible to unequivocally state that institutions have the same effect on the whole range of SIE. Concerning RQ2:

Do the I type SIE have competitive advantage over the II type SIE?

In observed cases II type SIE is more focused on the development of productivity and more opened for open competition, that is why it could be more competitive than I type SIE. At the meantime, integration of the I type SIE in existing academia system and ability to exploit the competences and facilities of parental organizations provides certain benefits to them, which, however, do not outweighs the lack of motivation to develop.

6.3. Results comparison against theoretical findings

Obtained results display the high utility of examined theories. The approach to competitiveness, based on the modification of Strategy tripod (Peng, 2009) and Diamond model (Porter, 1990) supplemented with resource factor (Barney, 1991) was effectively adopted to the studied case. The phenomena of SIE competitiveness could be explored through the prism of commonly used approaches: market, resource and institution-based. At the same time, the focus on the relations between companies and institutions was proven to be defining in conditions of developing economies. Such result is consistent with the works of Peng (2008) and Torvinen (2016).

The well-studied phenomena of innovations forcing productivity and driving competitiveness (Porter, 1990a; Atkinson, 2013) was once again proven by the studied cases. Both of the companies are seeking new competitive edges by means of innovative activities.

The important role of effective institutions in the economy was extensively demonstrated by example of Russian NIS. In accordance with NIS theories (Lundavall, 1992; Freeman, 1995) Russia have own set of interrelated agents and institutions. At the same time, the system is consistently transforming. The Soviet Union legacy left a strong print on the trajectory of Russian NIS development. Linear innovation model, existing in planned economy NIS of Soviet Russia was explained in the work of Etzkowitz and Leydesdorff (2000). Moreover, as they described, the system was evolving and transforming to free market NIS and then triple helix. In case of Russia the condition of free market NIS was almost skipped, because

of the rapid changes in the world's economy. Nevertheless, current Russian NIS has not reached the condition of triple helix yet (Smorodinskaya, 2011; Dezhina, 2011). The spaces of triple and quadruple interactions are still forming.

In accordance with Carayannis and Campbell (2009) approach Russia is on transition to non-linear innovation system, where the role of innovation generation is shared by different actors. The same idea is mentioned in the works of Etzkowitz (2002, 2008). It turns out that formation of SIE is a result of NIS evolution. The relevance of the theory is proved by the attention to the phenomena of SIE from government, which is looking for the source for the economic development and having high hopes for the future of SIE. As it was expected by Dezhina and Saltykov (2004, 2005) SIE have taken their place in Russian economy to play an important role in the structure of Russian NIS.

7. CONCLUSIONS

This chapter presents summary of research findings, implications and suggestions for further study.

7.1. General conclusions

In the current macroeconomic environment in order to turn the economy on the growth path it is especially important to set long-term priorities of economic development. Most experts agree that small innovative enterprises can become the locomotive pulling the development of the whole country. Innovation is seen as a future foundation of Russian competitiveness in the global market. In this context, it is particularly important to develop state innovation policy, regulatory aspects and support innovative entrepreneurship.

Despite the fact that the triple-helix model in Russia is still in a very early stage of its formation and characterized by mainly pairwise interactions of system elements, most of these elements have already been created. Innovation lift program was established to support innovative entrepreneurship in the country. It consists of a wide range of development institutions that provide support to young business entities at different stages of their life cycle. However, cultural differences, lack of motivation of institutions' employees, lack of desire to change and absence of understanding of the innovation business problems reduce their real effectiveness. At the same time the main type of support is government funding.

Thus, it is possible to conclude that the national innovation system in Russia is spending huge amounts of resources for the financing of small innovative businesses. However, this approach does not always lead to an increase in its competitiveness. Gratuitous cash infusions weaken incentives for innovative development, productivity increase. Instead, the right way is the creation of favorable conditions for business development, including:

- the provision of preferential rental conditions;
- reduction of the tax burden;
- creation of the favorable investment climate;
- development of the legal system and the improvement of legislation, including the field of intellectual property rights;
- revision of industrial standards;
- development of domestic competitive environment;

- stimulating the domestic demand for innovations from the business;
- increasing of educational quality.

At the same time, it is necessary to highlight excessive state regulation in the country's scientific and technological complex. There is a vital need to reduce control from government in order to enable market mechanisms for regulating the economic processes.

7.2. Theoretical contribution

During the elaboration of the research model, the multifactorial model of competitiveness was developed based on the different approaches to competitiveness. It combines the works of M.Porter, J.Barney and M.Peng and complement the existing scientific knowledge in the field of competitiveness. Thus, this model could be exploited in further researches which are aiming to analyze competitiveness in a holistic and comprehensive way.

7.3. Practical implications

This thesis provides a holistic analysis on the problem of SIE interaction with elements of Russian NIS. The study results into a list of recommendations for Russian NIS improvement. Thus, it could be exploited by the corresponding authorities in order to analyze current efficiency of innovation policy in Russia.

Implementation of measures presented below will inevitably contribute to the development of Russian NIS. The country will get an opportunity to find multiple sources of growth and develop the innovative society, able to create a competitive business on a global scale. Thus, it will be possible to overcome the technological backwardness of the country and return its economy to a leading position in the world.

7.4. Suggestions for further research

This research covers issues related to a single industry of composite materials. In order to generalize the findings and build broader understanding of the studied phenomena, complementary researches in other industries filled by SIE should be conducted.

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APPENDICIES

Appendix 1. Interview questions

1. Could you tell about your company?
 - 1.1. What is the historical cause of the foundation?
 - 1.2. What do you offer to market?
 - 1.3. What is the organizational and legal structure of the company?
 - 1.4. Could you disclose key financial statistics?
 - 1.5. What are the approximate number of employees?
 - 1.6. Who is the founder of the company?
2. Is your company innovative?
 - 2.1. Do you have R&D department?
 - 2.2. What kind of researches do you have?
 - 2.3. What is the intensity of R&D (the ratio of investment on R&D to revenue)?
3. What is your stage of innovation lift?
 - a. knowledge generation stage
 - b. formation stage
 - c. growth stage
 - d. expansion stage
4. What is the degree of internationalization of the company?
5. Who is a global leader in your industry?
6. What is unique about your offer on the market?
7. What is the basis of your competitiveness in the market?
8. How intensive is the competition in the domestic market and in the world?
9. How do you assess the factor conditions in Russia for the development of your business?
10. What is role of Russian legislation in the development of business?
11. Could you rate domestic sources of demand?
12. Does global demand exist?

13. What is the degree of development of related and supporting industries?
14. What is the role of related and supporting industries in your development?
15. Do you belong to any clusters, technology parks, SEZ?
16. If not, do you plan to join them in the future?
17. Do you cooperate, and how often with the following organizations?
 - a. Universities
 - b. Research Institutes
 - c. Other companies on the market
 - i. Direct competitors
 - ii. Not direct competitors
 - iii. Companies from other sectors
 - d. Technology transfer and commercialization centers
 - e. Venture capitalists and business angels
 - f. Technology parks, SEZ, clusters
18. Could you assess the level of training provided by universities? Does it meet your needs and expectations?
19. Could you assess the development of research activities in the universities? Does it meet your needs and expectations?
20. Do your employees participate in the academia life?
21. Do you use universities' facilities for the implementation of joint projects?
22. What is the impact of such cooperation on productivity, innovation, competitiveness?
23. Do you exploit the benefits provided by development institutions?
24. Have you received support from the following organizations?
 - a. Agency for Strategic Initiatives
 - b. Vnesheconombank
 - c. RUSNANO
 - d. SME Bank
 - e. RVC
 - f. MOEX

- g. FASIE
- h. IDF
- i. Fund VEB - Innovation
- j. The Fund of Infrastructure and Educational Programs
- k. Skolkovo Fund

25. What kind of support?

- a. grants,
- b. loans and credits,
- c. state orders for R&D,
- d. participation in the chartered capital,
- e. consulting support;

26. Do you have any kind of tax reliefs?

27. Could you rate the importance of state support for the development of the company?

28. What are the main reasons for the use of the state support?

29. What is the influence of development institutions and government on the company's competitiveness? In comparison with other sources of competitive advantage?

30. What are the main problems of your development at this stage?

31. Do you think that Russian NIS favors the development of your company?

32. What would you like to change in Russian NIS?