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Globalization of Technological Development and Opportunities for National Innovation Systems of Developing Countries

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Abstract

Prior literature expects a lower marginal cash value for weaker governance firms. We test this empirical hypothesis by using the sample of publicly traded Korean firms from 2005 to 2013. To measure the quality of governance structures, we employ the corporate governance scores provided by Korean Corporate Governance Services. The empirical model of Faulkender and Wang (2006) is adopted to estimate the marginal value of cash. Our empirical analysis shows a higher marginal value of cash for the good governance firms in the examination of the total governance score. This finding is consistent to the agency view of cash policy predicting a larger marginal value of cash for the firms with higher governance scores. However, this positive relationship is not robust for a subset of detailed governance scores; a lower marginal cash value is observed for the firms with better qualities of board structure, auditing, dividend policies. Moreover, our empirical analysis verifies a quite low level of marginal cash value for Korean firms, which supports the existence of severe agency conflicts in Korean corporations. Our results verify the significant role of agency conflicts between a manager and shareholders in the determination of marginal cash values in the Korean firms.

Keywords: Cash Policy, Corporate Governance, Manager-Shareholder Conflicts, Marginal Value of Cash.

JEL Classification Codes: G30, G31, G32, G35.

1. Introduction

Today the highly developed countries are on the verge of another technological revolution, associated with the further development and integration of biotechnology, nanotechnology and information technology (Rifkin, 2016; Toffler & Toffler, 2007). In developing countries, which include Kazakhstan was formed a contradictory situation. On the one hand, they have not exhausted the potential of the technologies of the previous technological revolution. On the other hand, it should overcome the existing gap requires proactive measures on creation of economic, institutional, scientific and technological conditions for the development of promising technologies. In this regard for developing countries is great importance of the skillful use of advantages offered by globalization.

Globalization opens up new ways of overcoming the global technological inequalities, more and more countries get wide channels of access to new technologies and their application. Occurs expansion of the geography of technological development, in the group included only developed countries starts to enter a number of developing countries. Around the world there are new centers and networks of technology development. Overall, there is positive experience of using factors of globalization technological development aimed at strengthening the innovation systems of developing countries. This experience deserves further dissemination.

The aim of this research to study the possibilities of development of the national innovation systems of developing countries in the context of globalization, innovative and technological spheres. The present study is determined trends of development of global innovation and technological scope are associated with the formation of global economic relations global flows of investment, knowledge, technologies, growing internationalization of R&D and the formation of global innovation networks. The study shows that globalization opens up new opportunities for the development of national innovation systems in all countries. These capabilities are of particular importance to

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developing countries, which the skillful use of advantages of globalization can strengthen the capacity of all links in NIS.

2. Literature Review

2.1. Globalization of Technological Development

Globalization as the leading vector of modern economic development has an impact on different aspects of the life of society. The main areas of development is largely determined by the globalization are innovations and technologies. Today, the emergence and spread of technology and innovation increasingly extends beyond national borders and often is part of the emerging global innovative-technological sphere. The main trends of its development are:

- to strengthen the role of external factors in the development of most national economies;
- to create of important areas of global economic relations global flows of investment, knowledge and technology;
- to include innovative technological links in global value chains, strengthen territorial decentralization, when research and development are located in one country, manufacturing in another, distribution in another, and management company based in a fourth country;
- intensive development of cooperation in the field of innovation and technology;
- to strengthen of internationalization of R&D that is performed in many cases with the involvement of foreign partners or beyond national borders;
- development of new technology fields (ICT, biotechnology, new materials) that can be fragmented (divided into modules) in this regard, there is the possibility of transmission of ancillary modules on outsourcing to developing countries;
- the changing geography of technological development, the fast accumulation of innovation capabilities in a number of developing countries, enhancing their competitiveness in the world markets of high-tech goods and services;
- transformation of global TNC strategies, which will bring manufacturing facilities, research programs and innovation and technology centers for developing countries;
- formation of global innovation networks that involve producers, suppliers, consumers from different countries in the world.

Based on globalization of innovation and technology is the process of international relocation that is carried out primarily by the efforts of transnational corporations (TNCs). They are interested in the expansion of its international expansion. This expansion is carried out both by increasing exports of goods and means of capital exports. These two streams complement each other.

The main objective of TNCs has always been savings in production costs, especially if they have to compete with other companies, including on the markets of third countries. According to some, when you move production overseas, the total cost saving can reach up to 40% (Fokin, 2004). At the same time, the transfer of enterprises is often associated not only with cost savings but also due to the search for new markets and a skilled workforce. Important role in expansion abroad are the motives of entry into new markets, such as the desire to outperform competitors.

The process of relocation of production is possible due to fragmentation. Large TNCs, being multifunctional, produced a wide range of products. A lot of technical chains of value creation can be split into multiple steps, and then to fragment and their spatial distribution. TNC can to fragment each function, and to strive in advance to link their needs and the attractiveness of the local economic environment, as well as to consider the comparative advantages of a particular geographic area.

Particularly favorable conditions for the fragmentation of economic activity in the service sector emerged with the development of information and communication technologies. Today many services can be represented irrespective of their geographical localization. Fragmentation in the service industry can get a much more extensive development than in industry due to relatively low capital intensity: it does not require the construction of factory buildings; it is possible to manage office premises with the minimum of equipment. In ICT sector about 95% of the largest companies, which occupied the first thousand places in the list of journal “Fortune”, intend to move jobs abroad (INSEAD&WIPO, 2012).

TNC was engaged in the displacement production to new countries. They are world leaders in the field of spatial distribution of innovative and industrial activities. TNCs are the "driver" development of global innovation and technology sector. TNCs are a major player in the global market of research, technology and innovation. In General, TNCs are investing a lot of funds for innovation and technological development. For example, Cisco, which is included in a list of 20 of the largest innovative companies in the world, spends more on research and development about 14% of their annual income that is 5, 3 billion USD. Cisco’s share account is about 3% of USA investment in research and development (Betsis & Tolmachyeva, 2011). The share of TNCs in the global financing research and development stands at around 50%, while world production is even higher – up to 2/3 (Markov, 2015).

The main direction of TNC is to focus on developing new markets of globalization, technology and innovation. This orientation presupposes to create of conditions in accordance with the requirements of their products and services with a connection to this process of local innovation capacity. While foreign affiliates of TNC are evolving from simple enterprise to becoming a leading enterprise that can create new products, processes and technologies for the entire company. To do this, they create new markets for a variety of scientific and technological centers. At the same time the special importance acquires the process of creating full of innovation and technology centers in new markets. One of the first passed this way “General Electric” company, which has research facilities not only in New York, but also in Bangkok and Shanghai (National Science Board, 2014).

2.2. Concept of National Innovation System (NIS)

The concept of NIS has appeared in 80-ies of the last century in the West in the framework of institutional theory. At the same time, the concept of NIS is to be realized in practice in developed countries. Under the national innovation system in developed countries it is accepted to understand set of the interconnected organizations (structures) occupied with manufacture and commercial realization of scientific knowledge and technologies within national borders (OECD, 1997; Lundvall, 2007; Johnson, Edquist, & Lundvall, 2003). Also national innovation system is understood as a set of institutions (economic, financial, legal nature), ensuring innovation processes.

History proves that concept of national innovation system was created based on the experience of countries with a high level of income, with a strong knowledge base and long experience of market economy. The concept of NIS existed on the basis of functioning markets have long formed a stable institutional framework and a very good infrastructure to support innovation. In studies of innovation systems there is a view that national innovation systems are virtually impossible to copy. It is based on the fact that innovation systems are characterized by evolutionary development, and the results can occur only with time. Because of the complexity of national innovation systems it is difficult to create a universal or optimal for all NIS countries. Each country has its own technological, cultural, social, and political path of development, which affects the choice and implementation of strategies.

According to the authors of the concept of NIS, the innovation system established in countries with a high level of income cannot automatically be transferred in medium developed and underdeveloped countries. Since these countries already have a knowledge base, less developed infrastructure and institutional environment. The concept of NIS as an analytical concept in the early studies has proposed approaches that allow a comparative analysis and typology of NIS.

By comparing the indicators of technological capabilities and national institutions C. Freeman noted that Asian countries in the 1950s began with a lower level of industrialization (Freeman, 1995). In the 1960s and 1970s, the countries of Latin America and East Asia were included in one group of fast growing countries. In the 1980-ies began to show the contrast: the growth of GDP in Asian countries 8%, whereas in most Latin American countries, including Brazil, this figure has dropped to less than 2%. These contrasts are explained by the fact that Asian countries were more radical social changes such as land reform, reform of general education. For the countries of South-East Asia (South Korea) characterized by the expansion of universal education with a high proportion of engineering, importation of technology combined with local initiatives, the growth of the level of spending on R&D, the development of strengthening the scientific and technological infrastructure and linkages with industrial R&D. Countries of South-East Asia has had a special influence factor of the high level of investment, including Japanese investment with a strong yen during this period and the strong influence of Japanese models of management and networking. Asian NIS differed investment in the most advanced industry – telecommunication infrastructure, production growth and export of electronic industry, development of extensive feedback from users in international markets (Sergeyev, Alekseyenkova, & Nechaev, 2008; Shapiro, So, & Park, 2010).

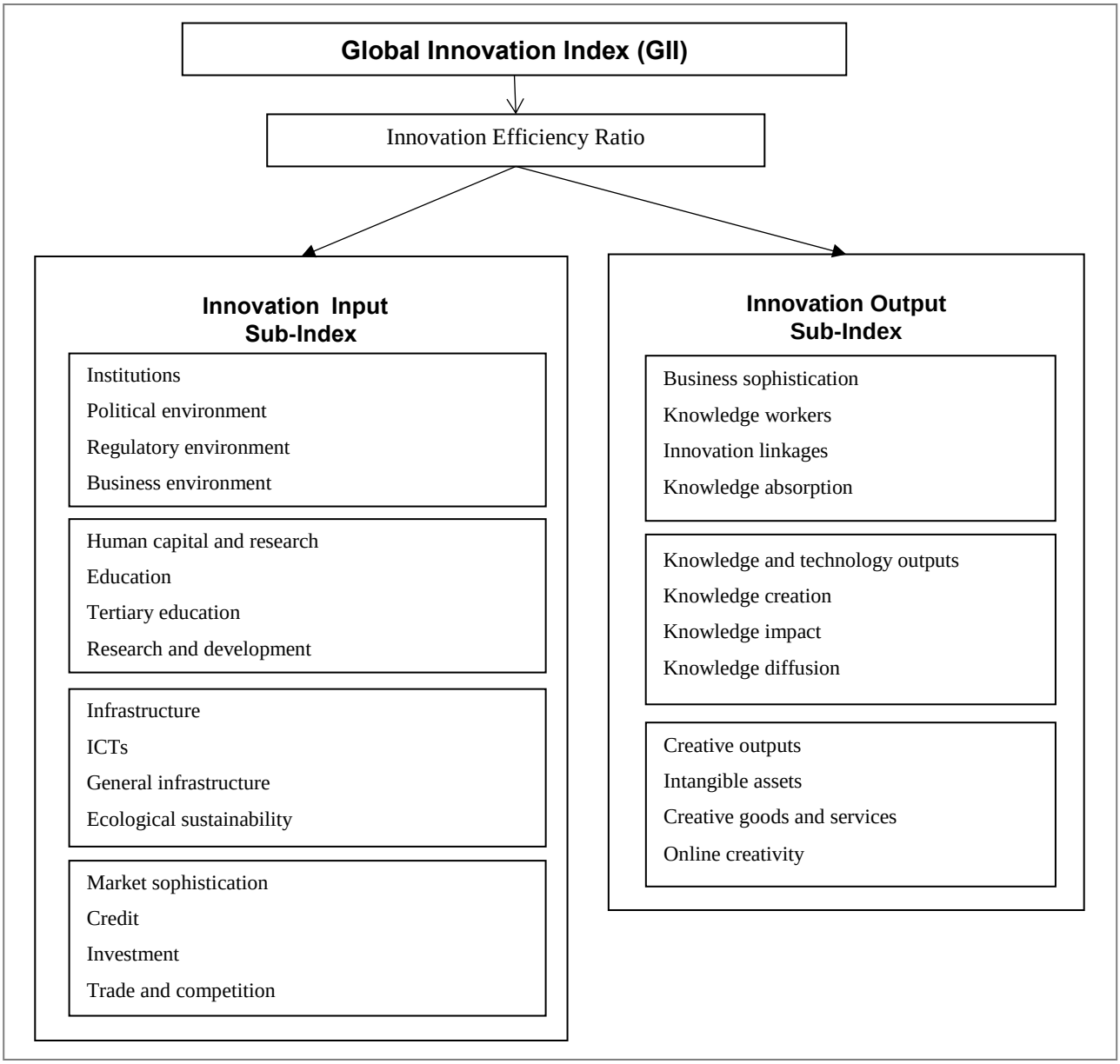
In turn, in Latin America (Brazil) there was deterioration in the education system with a proportional decrease in the training of engineers. A significant amount of technology transfer, especially from the USA, with low R&D firms and their low integration with the technological transfer had no impact on the improvement of the technological level. Unlike Korea, where the proximity of culture and worldview allowed them to quickly perceive the Japanese model of management and production, in Latin America the perception of American style of management was complicated by the presence of differences, conditioned by cultural factors. Industrial R&D remained at the level of 25% or less, the deteriorated state of scientific-technological infrastructure and links with industry. So, there was a decrease in foreign investment in Latin America (mainly from USA). The development was weakest in the telecommunications industry, electronics industry and training international marketing.

Through these comparisons, we have concluded:

- in the dynamics of national innovation system, there are processes of divergence and asymmetries, when the

innovation system of some countries can demonstrate progress, while others lag behind and substantially to degrade.

- development of innovative systems of critical social changes, accumulation of human, creative and cultural capital;
- for innovation systems in developing countries are of importance the formation of innovation infrastructure and the development of industrial R&D and innovation based on tacit knowledge;
- in emerging innovation systems great attention should be paid to attracting foreign capital especially for the development of new sectors and new industries with the acquisition of advanced management and international marketing.



Source: Cornell University, INSEAD&WIPO, (2015)

< Figure 1> Framework of the Global Innovation Index 2015

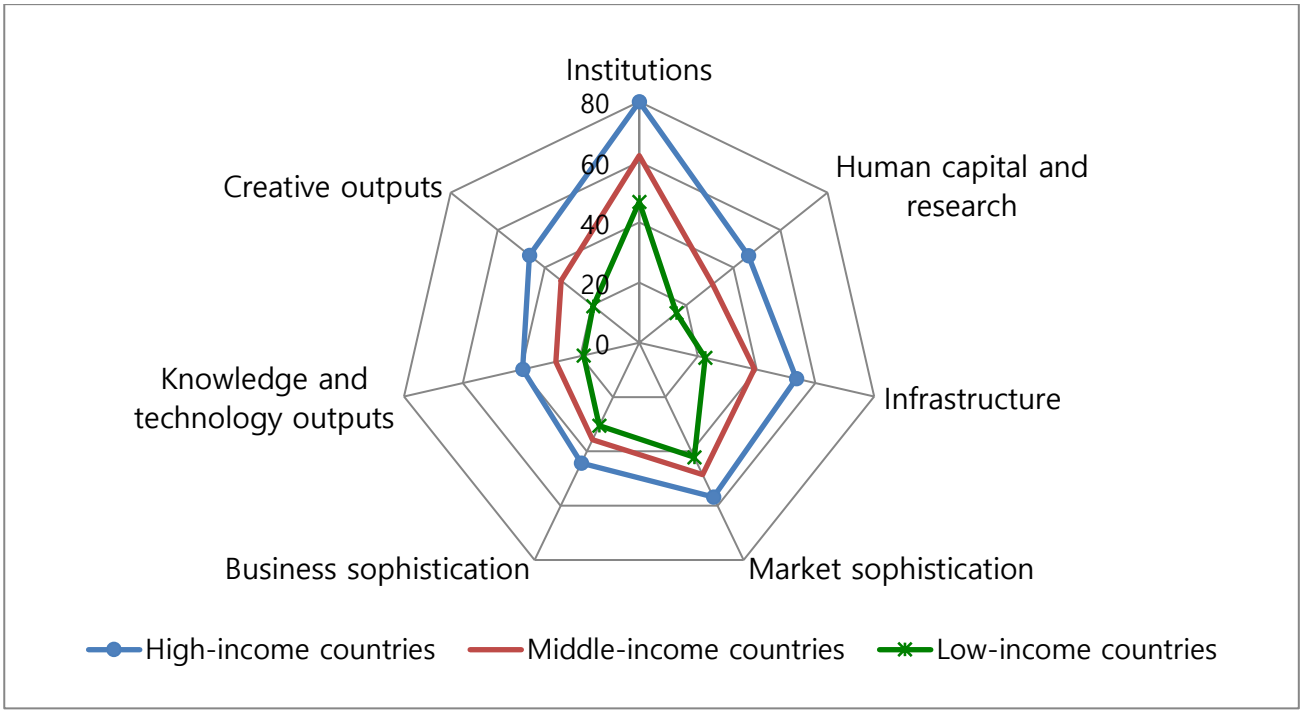
The comparative evaluation is conducted by three main groups of countries: countries with high-income, middle-income countries, countries with low income levels. In addition, the analysis is carried out by regional groups: Northern America, Europe, South East Asia and Oceania, Northern Africa and Western Asia, Latin America and the Caribbean, Sub-Saharan Africa, Central and Southern Asia.

The study of innovative system based on social and institutional changes. So, according to index in the first ten countries were not included leaders with scientific and technical positions, but included countries with relatively small scientific-technical potential, developed and dynamic institutional system. Although the composition of 10 innovative leaders has changed little in 5 years, but within this group of countries is constantly undergoing changes. Such changes indicate that innovation systems are constantly in motion, compete, adapt and evolve.

4. Analysis of National Innovation System in a Global Context

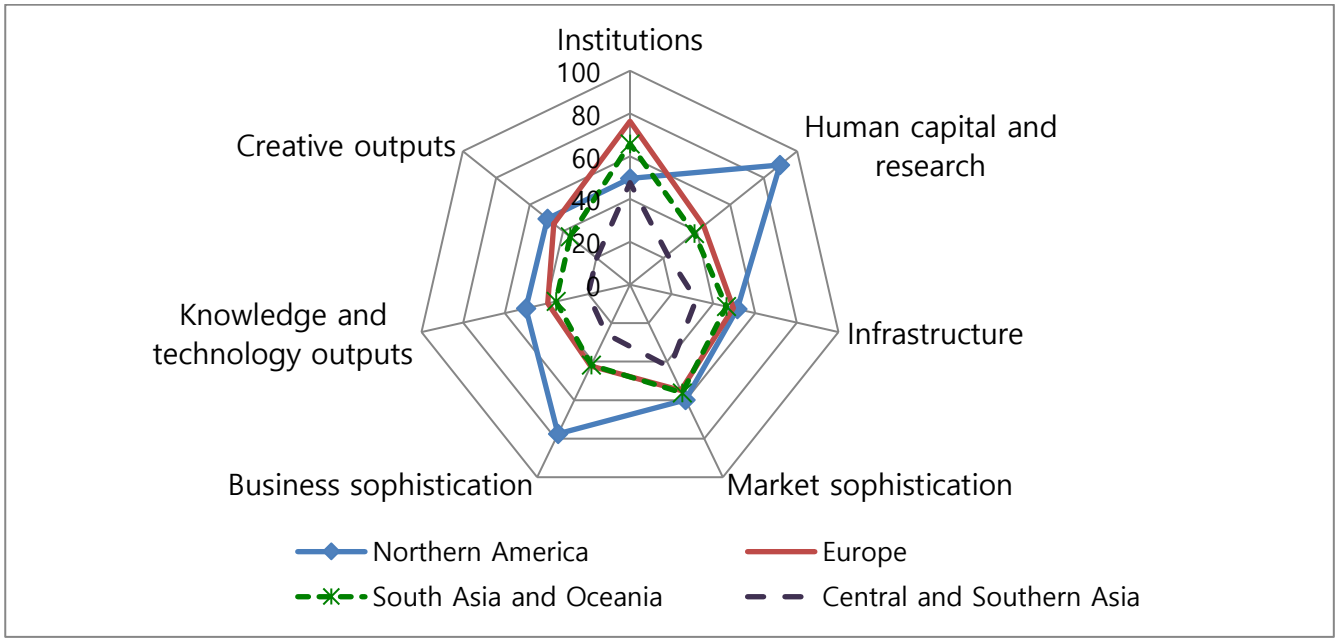
In comparative studies of innovation systems an important issue is the technological gap. The technological gap is the result of the uneven distribution of countries on innovation capacity and scientific knowledge. This gap exists within the group of countries with high income. But even more significant it is when comparing innovation systems of countries with high, medium and low-income and least developed countries <see Table1, Figure 1, 2>.

There is a gap in innovation between countries not only on income but also on their regional affiliation. Among regions leaders and regions outsiders in assessments of the Global innovation index, the gap is more than 2 times. If we consider the gap in scoring, and the dynamics of real variables, this gap will be much larger.



Source : Cornell University, INSEAD&WIPO (2015)

<Figure 2> The gap in innovation development by groups of countries by income



Source: Cornell University, INSEAD&WIPO (2015)

<Figure 3> The gap in innovation development in regions

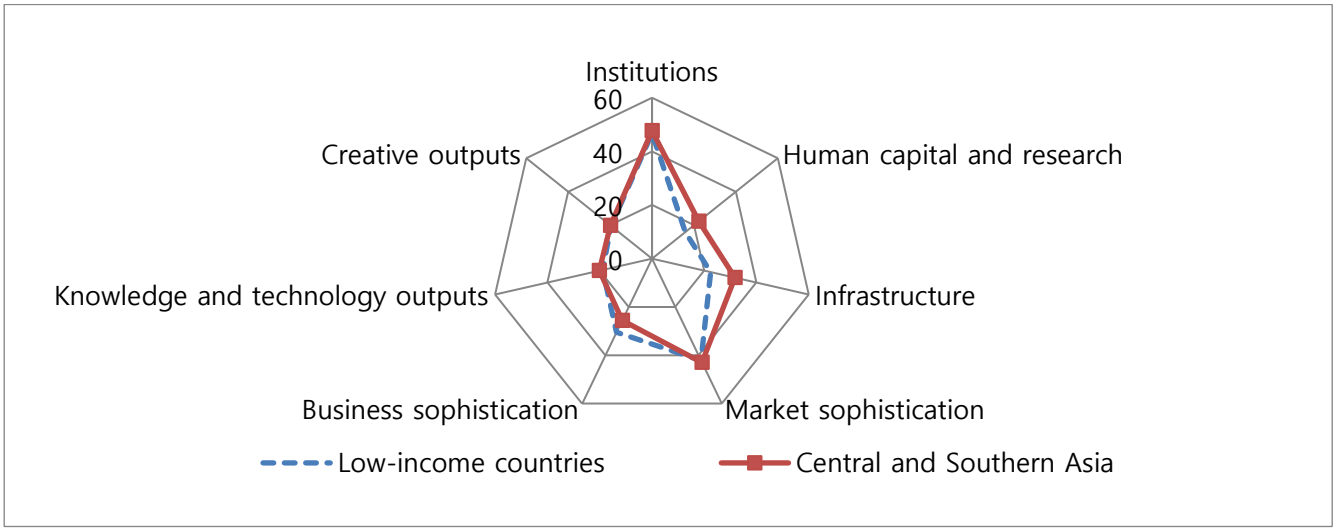
<Table 1> Comparison of national innovation system across regions and income, in points

Groups and regions	GII	Institu-tions	Human capital and research	Infra-structure	Market sophistic-ation	Business sophistic-ation	Input	Knowledge and technology outputs	Creative outputs	Output	Efficiency
Countries By Income Groups											
Middle-income countries	37,01	62,10	31,15	39,25	48,55	35,66	43,35	28,33	33,10	30,67	0,69
High-income countries	49,63	79,98	46,35	53,51	56,81	44,27	56,18	39,64	46,50	43,07	0,76
Upper-middle-income countries	34,58	58,90	29,85	38,75	46,17	33,31	41,40	25,10	30,44	27,77	0,67
Lower-middle-income countries	29,10	49,90	20,60	30,04	43,53	29,34	34,68	21,41	25,61	23,51	0,68
Low-income countries	25,35	46,76	15,88	22,49	42,14	30,48	31,55	18,86	19,43	19,14	0,61
Countries by Region Groups											
Northern America	57.91	49.65	89.73	51.50	59.87	77.48	66.18	49.94	49.36	49.65	0.75
Europe	57,99	76,37	44.15	49.61	54.95	42.29	53.48	39.44	45.56	42.50	0.79
South Asia and Oceania	42.68	65.87	38.43	46.25	56.16	41.70	49.68	35.53	35.84	35.69	0.72
Northern Africa and Western Asia	35.26	61.05	32.08	41.74	46.24	30.44	42.31	24.83	31.59	28.21	0.67
Latin America and the Caribbean	32.49	54.87	25.29	35.37	44.29	35.37	39.04	21.01	30.86	25.94	0.66
Sub-Saharan Africa	27.05	51.66	16.89	25.60	41.37	30.29	33.16	19.34	22.53	20.94	0.64
Central and Southern Asia	27.03	47.67	22.41	31.77	43.0	25.60	34.09	20.12	19.82	19.97	0.59
Kazakhstan	31.3	61.4	29.6	43.3	43.4	27.2	41.0	21.9	21.1	21.5	0.5

Source: Cornell University, INSEAD&WIPO (2015)

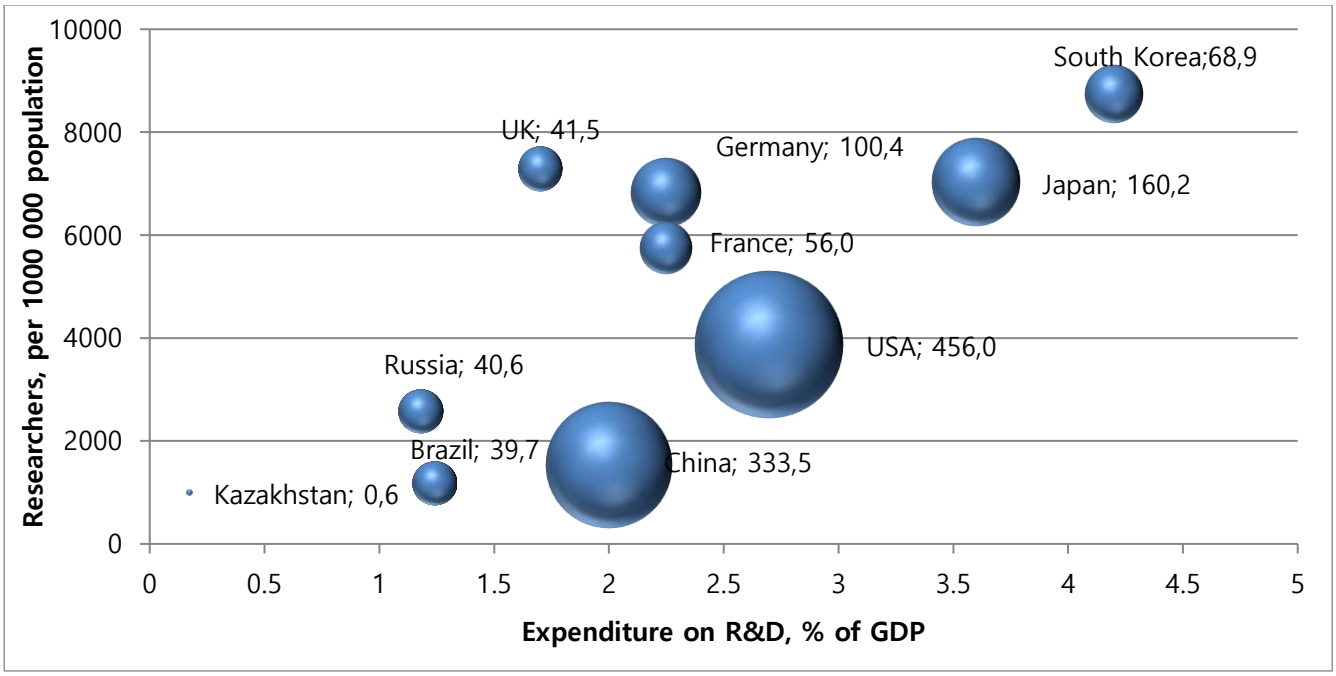
It should be noted that Central and South Asia is referred to regions with the lowest level of innovative development. Key indicators of these regions are within the indicators group of countries with the lowest income < see Figure 3>.

Kazakhstan according to GII is included in the group of countries with above-average incomes, but has the settings of the innovation system on the level of efficiency of innovative development below the average of low-income countries in its regional group. The only indicator that exceeds the average by region and income group is institutions. But judging by the overall assessment of the effectiveness, the intensity of institutional change has little to do with the results.



Source: Cornell University, INSEAD&WIPO (2015)

<Figure 4> Comparison of countries groups with low level of innovation development



Note: The size of circle shows the volume of annual expenditure on R&D in billion USD.

Source: World Bank (2015)

<Figure 5> The gap in scientific and technical sphere between the countries

According to Human Development Report-2014 from 102 countries with very high and high human development, 34 countries have expenditures on R&D more than 1% to GDP, of which 9 countries – 2~2.9% to GDP, and only 7 countries – 3% of GDP and above, 12 of the countries with the lowest expenditure on R&D below 0.25% to GDP (UNDP, 2014; National Science Board, 2014). The reasons for this gap due to the uneven distribution of resources, among which are human capital, R&D, institutional environment, infrastructure, market environment.

Research which considered of development opportunities focused on the potential creation of scientific knowledge. In general, the gap in the field of resources of knowledge production can be reflected through the indicators gross domestic expenditure on R&D (GERD) is measured in million USD and percentage of GDP and number of scientists per 1 million population. Based on these indicators the situation in the field of global scientific and technical sphere is presented in <Figure 4>.

Different levels of the basic components of changes in the basic conditions of innovation systems can lead to disparities in development. So, the reduction of level of investment in Brazil in the field of R&D compared with other sectors of the economy has led to a significant lag from South Korea as from the point of view of human resources, and from the point of view of intensity of growth of costs. Now in the global scientific and technical context positions of these countries are very different <see Figure 5>. This suggests that the internal imbalance of elements NIS contributes to the widening gap between countries.

Over the past 20 years, according to National Science Foundation USA the highest increase in funding in the field of R&D had two countries – China and South Korea. In the period 1991-2011, indicator GERD as percentage of GDP increased in China in 2.5 times (from 0.73% to 1.84% of GDP) in South Korea is 2.2 times (from 1.8% to 4.03% of GDP). While absolute spending on R&D in China increased 27 times, in South Korea 8 times. Among European countries the most visible results in the Czech Republic, Hungary and Estonia, which for 18 years (1995-2013) increased GERD as percentage of GDP in 2 times, although the target indicators in these countries have not been achieved.

Cyprus had to start from the same level of spending on R&D of 0.2% of GDP like Kazakhstan. But Cyprus for the last 15 years increased level of spending on R&D in 2.4 times and approached the indicator of gross domestic spending on R&D of 0.5% of GDP.

5. Results & Discussion

It should be noted that the processes of globalization and internationalization have become widespread in innovative activity. So, there were allegations that formed the global innovation system (Archibugi & Michie, 2003). The arguments in favor of the existence of global or macro-regional (e.g. European) innovation systems based on the following points: firstly, the effect of national policies is reduced due to the development of international business and new technologies; secondly, an increasing number of political territories controlled by regional organizations.

Thus, the processes of integration and globalization are growing in breadth. But elements of NIS can have the same level of development in different areas, even within integration unions. Therefore, to assert the existence of a global innovation system in the full sense premature. Now we can mention a concept such as global innovation and technology sector. It is quite heterogeneous and, on the one hand, it includes different potential and maturity of the innovation system of developed and developing countries, on the other hand, it includes global production and supply chains and innovation networks, extending far beyond the national borders.

Certainly, national context is a somewhat reduced role under the influence of globalization. But globalization is affecting for specific institutional "social and cultural" peculiarities of countries in the development of science, technology and innovation. Particularly, we can distinguish the importance of a global innovation system that influences the individual links and an element of national innovation systems. For example, research and development become more globally organized and based on two main factors: the search for specialized regional centers that transmit the experience in key technological areas and their presence in the leading markets (Kaiser & Prange, 2004).

The decentralization strategy of the global flows in the field of research and development, which implements the TNCs at the initial stage, was formed as subcontracting and outsourcing. So, such form was applied to specific technical services that are supportive in nature and require significant labor not of the highest quality. Also, at the initial stage, was developed "operational" works, for scientific-technological support of production activities of TNCs through adapting to local markets. These activities were based on low cost engineering and technical personnel in developing countries and existing infrastructure. Subsequently, TNCs began to practice outsourcing more complex processes that require a locally well-developed scientific base. TNCs used local potential, traditional knowledge, and develop their own research, development of new products and technologies that lead the global market.

Finally, in modern conditions, TNCs have created "offshore" innovation-technological centers. TNCs have transferred in these centers the main part of the cycle of development of new products, primarily intended for local markets. "Higher" degree of globalization of research and development in developing countries is the involvement of "offshore" centers in the global network in some technological niches of the world market. This is particularly true of the advanced areas of the technological revolution (microelectronics, software, biotechnologies and pharmaceuticals) that have a smaller geo-referenced to production units than in traditional industries. So, such well known corporations as IBM, Microsoft, Ericson, General Electric, Intel on emerging markets (China, India and Brazil) have major technological research centers that are included in the network by creating a primary product line of these corporations, intended for the whole world market.

Globalization opens up new opportunities for development of national innovation system for all countries where innovations has become drivers of economic growth. But the effects of globalization are manifested in different ways depending on the degree of maturity of innovation systems. Developed countries, characterized by a fully formed national innovation system that increase their effectiveness through exploration of new emerging markets and technological niches. NIS of developed countries expanded and diversified their technological competencies, optimized the costs of performing research and development, created new products to markets, used of new business models and competitive strategies.

Developing countries through of globalization, at the stage of formation of innovation systems, possess opportunities to strengthen the capacity of all parts of NIS. The arrival in these countries TNCs and their affiliates, placement of offshore innovative and technology centers contributes to the emergence of NIS structures, with significant financial resources and has extensive experience in the creation and market mastering of innovations.

Basic channels and forms of impact of globalization and technological development at national innovation systems in developing countries and benefits presented in <see Table 2>.

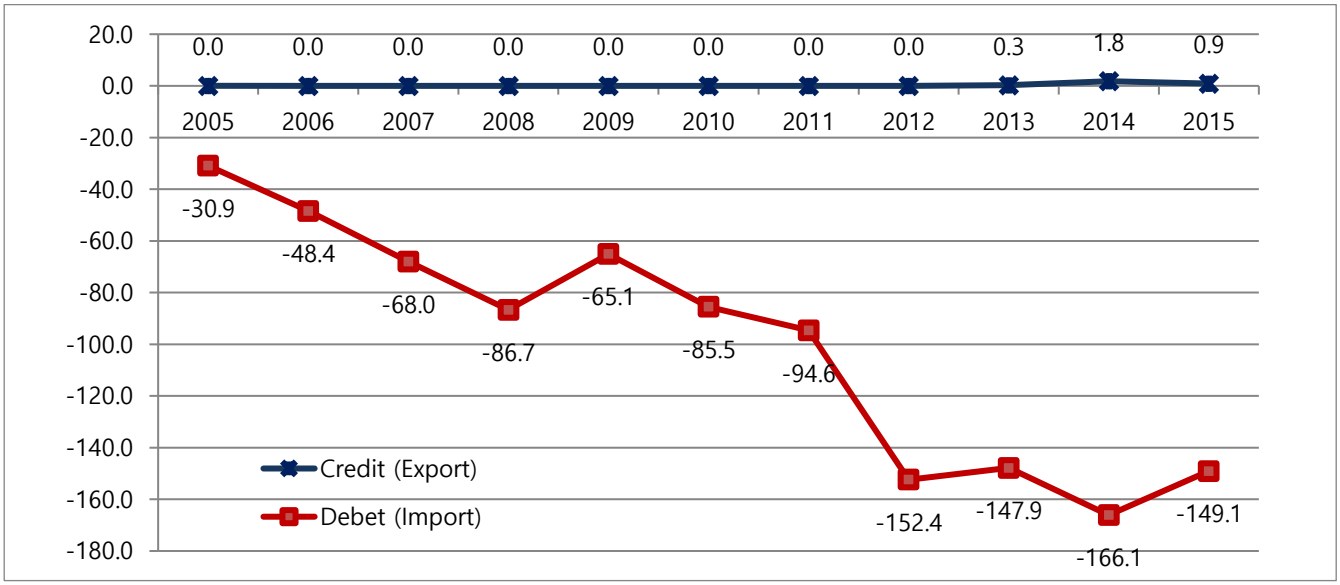
<Table 2> The impact of technological globalization on the national innovation system of developing countries

Channels and forms of impact	Elements of NIS	Effects of impact to NIS
Foreign direct investment, transnationalization of production	Production	The emergence of high-tech enterprises Strengthening of financial security of innovative projects
	Science	Expansion sources of funding R&D
	Institutions	Introduction to advanced management and new business models
Transfer of foreign technologies	Production	Strengthening of technological potential of enterprise as the basis of link NIS
	Science	Capacity building through participation in adaptation of foreign technology
	Institutions	Development of methods for the dissemination of tacit knowledge
The development of global value chains. Internationalization research and development	Production	Improving the competitiveness of national businesses
	Science	Development and more efficient use of capacity on the basis of sharing risks and costs with foreign partners
	Institutions	Development of new business models (model of open innovation)
The formation of innovation and technological centers of TNCs in developing countries. The development of offshoring and outsourcing in the field of R&D	Production	Development of the market potential of local businesses (new markets)
	Science	Expansion of financial sources of activity of the research centers
	Institutions	Introduction to advanced international standards of local firms and research centers
Creation of international technological alliances	Production	Expansion of investment sources and technologies
	Science	Emergence of local innovative sites
	Institutions	Access of local companies to new technologies and knowledge
Formation of global innovative, technological and research networks	Production	Strengthening the technological capacity of national companies
	Science	Development of human capital of universities and public research organizations
	Institutions	Development of innovative and entrepreneurial environment

<Table 3> Services in the field of R&D in Kazakhstan, million USD

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Export	7,2	10,7	10,5	14,0	25,7	31,8	14,0	2,5	4,6	6,5	5,6
Import	8,8	8,3	8,3	17,0	32,1	16,0	112,4	15,8	16,1	15,2	9,3

Source: National Bank of Kazakhstan (2016)



Source: National Bank of Kazakhstan (2016)

<Figure 6> Payments for use of intellectual property, million USD

In Kazakhstan, the benefits of globalization and technological development are poorly used in the interests of strengthening the national innovation system. At that foreign direct investment in greater volume concentrated to Kazakhstan, but they focused in the primary sector. The share of foreign investment in the financing of innovation is 0.81%. It should be noted that the transfer of foreign technologies is carried out in the simplest forms, and in fact is aimed at the supply of machinery and equipment. External sources of innovation are used in a few cases: in 2011 (latest available data) overseas 38 were purchased 38 acquired the rights to the patents and licenses for inventions, 6 know-how and agreements on technology transfer and paid 97 million USD. In 2014 for these purposes was sent only to 166,1 million USD <see Table 3> and <see Figure 6>.

In Kazakhstan, the growing gap between import and export scientific and technical services, which have showed a negative balance technological balance of payments. The main reason is the low level of development of the national scope of R&D. Kazakhstan is almost a net importer in the use of intellectual property. There are problems in the management of intellectual property, including in the maintenance and protection of patents abroad that requires certain resources.

Global production and supply chains relate primarily to sales of parts of Kazakhstan, rather than production and technology. In Kazakhstan are not any branches of the TNCs in the manufacturing sector. In Kazakhstan, poorly developed internationalization of research and development, and funding the share of foreign sources accounted for only 0.7%. It should be noted that badly developed R&D outsourcing for foreign partners, and created only three foreign science and technology centers.

6. Conclusions

Unlike other developing countries, globalization of technological development has not penetrated into Kazakhstan yet. In order to fit into the main trends of development of the innovation and technology areas need a special sound policy. In this regard, we highlighted the priority directions to strengthen the innovation system of Kazakhstan. These directions includes– the transfer of foreign technologies, inclusion in global production and innovation networks, in particular through the arrival of the non-oil TNCs, the use of the scheme "raw materials in exchange for technology", R&D-outsourcing.

In Kazakhstan, these directions are under development. So, supplies of machinery and equipment dominated in the field of technology transfer, at the same time, the acquisition of know-how and licenses poorly developed. The main share of payments accounted for about 1,0% for services acquisition of license. The transfers of foreign technologies are widely spread in world practice. It covers the most developed, medium developed, and especially developing countries. In Kazakhstan, the technology transfer can take various forms. The forms and channels of technological development of globalization in the future will be developed.

Therefore it would be undesirable to go beyond mere "following of foreign technology". In order to have beneficial long-term effects, the import of technology should be accompanied by a mandatory improvement which will allow return to the external market as the exporter of the relevant products (process of "reverse innovation").

Successful experience in this case may be a movement from the simple to the complex. This is evidenced by the experience of TNCs on the more complicated nature of research and development performed in the developing countries. In the 1990s and early 2000s was dominated the adaptive works to improve products and technologies in accordance with the needs of local markets (process of "glocalization"). These adaptive works was carried out mainly based on subcontracting and outsourcing, but was limited mainly to the implementation of quite simple auxiliary time-consuming and technical services: testing, troubleshooting, manufacturing simple components. In recent years, the research divisions of the TNCs in developing countries have gained the necessary experience from the processes of adaptation of technology to participate in the development of new products displayed by the parent company to the world markets. The gradual accumulation of knowledge, experience and capital will allow Kazakhstan to penetrate the markets of technologically sophisticated products.

This approach to the distribution of borrowed modern technologies and technological modernization led to widespread development of innovative activity. This is potentially useful for the impulse of self-deployment of the modern directions of science and technology. The result is the attainment of self-sufficiency in scientific and technological development, which is reflected in the nature of economic development, the structure of the national economy, the export structure.

Global manufacturing, technology and innovation networks usually were initiated by transnational corporations. In Kazakhstan, there is nearly no manufacturing unit of non-oil TNCs. If they are present in the national economies only like retail units. Basically, the interests of TNCs are concentrated around the commodity sector and production of low repartitions. It is argued that is needed a special policy on "duress" TNCs, which will come to Kazakhstan, to implement innovative projects in our country. It should to encourage them to transfer their newest technologies in exchange for resources and the opportunity to work in Kazakhstan. In the Strategy Kazakhstan 2050 emphasizes that it is necessary "to allow investors to extract and use-from our raw materials only in exchange for creating new production facilities on the territory of our country". In other words, it is necessary to start the mechanism of "raw materials in exchange for technology". For example, China continuously introduces new "rules of the game", forcing foreign corporations operating in the country, to share their technologies with Chinese state-owned enterprises, especially in sectors such as air transport, energy, high speed railways, IT, etc. (Emelyanov, 2011).

Kazakhstan is particularly interested in using the experience of oil producing countries included in the global innovation-technology networks through the interaction with TNCs. So, in Saudi Arabia, many TNCs locate their offshore centers of innovation (INSEAD&WIPO, 2012). The best known example of a joint innovation project became the Valley of technology in Dhahran. This is a specialized technology cluster, which activities are focused on oil refining. This cluster established by National University of oil and minerals. In this cluster placed R&D centers as different TNCs and local ministries. Another example is Park of technological development of plastic materials. This park is a joint venture of the local oil monopoly Saudi Aramco and Japanese Sumitomo Corporation. This triple partnership shows cooperation between of the national big business, TNCs and local technological structures. This triple partnership is useful to creation of a petrochemical cluster in West Kazakhstan.

Generally, it should be develop all available forms of cooperation with TNCs. Then, can be started with participation in operational networks, joining in the cooperation in the field of marketing and servicing. For this purpose it is necessary to stimulate arrival on domestic markets of world leaders - suppliers of equipment and service companies, which usually seek to place their service centers closer to markets. For example, it can be major suppliers of oil and mining equipment. During drilling operations in Western Kazakhstan is already working for some foreign companies. Interaction with suppliers can begin also with such areas as design, standards and quality requirements.

With the increase in the share of the consumer market technologically sophisticated products, it should be expected of placement in Kazakhstan technologically more sophisticated industries through outsourcing and subcontracts with performance, for example, testing technologies and manufacture of the individual components. This refers to industries that use domestic labor and foreign technology platforms. Further in these markets may experience scientific and technological centers developing technologically advanced products (innovation offshoring). Kazakhstan already has such experience. It is the center in the field of metallurgy of Eastern Kazakhstan (Kazakh-French Center of technologies transfer), the center for digital engineering (CICA), developed by the Fraunhofer society (Germany) on the basis of the Caspian University of technologies and engineering in Aktau.

Also useful special measures aimed at increasing the attractiveness of Kazakhstan as an international platform for the implementation of research programs by foreign companies. There can be used various options, primarily focused on the desire of TNCs to the relocation of R&D. Thus, at the Nazarbayev University used regime of free economic zone. The University formed infrastructure and qualified personnel that can become a serious motive for the creation of laboratories of a number of large TNCs in the field of information, communication, biotechnology etc. For example, the largest Association of institutes of the Fraunhofer society is great interest in building an engineering center in Nazarbayev University. In this case there is the potential for the development of a new model of innovation on the principles of "triple helix" involving international business.

It should be noted that the development of the triple helix model places high demands on the composition of academic staff, quality of scientific and technological infrastructure. The closest to these requirements in Kazakhstan are Nazarbayev University (Astana) and Park of innovation technology (Almaty).

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