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13th European Conference on Innovation and Entrepreneurship

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20-21 September 2018

Edited by

Professor Carlos Costa, Dr. Manuel Au-Yong-Oliveira and Dr. Marlene Paula Castro Amorim

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Using the Case Study Method in Studying the National Innovation System: Cross-Country Comparative Analysis

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Abstract: Innovative development of the economy is considered now as a necessary condition for increasing its competitiveness. The most important mechanism for implementing this strategy is the development of the National Innovation System. In developing the directions and mechanisms for the development of the Kazakhstani innovation system, the experience of foreign countries in the field of stimulating innovative activity and the formation of effectively functioning national innovation systems becomes particularly topical. The developed countries (the United States, Great Britain, Germany, Finland, Sweden, Switzerland, Japan, etc.), as well as the states that are intensively developing innovative systems (South Korea, China, Hong Kong, Singapore, the countries of Latin Of America). These countries are characterized by high dynamics of the development of research and development (R & D), significant expenditures for maintaining and stimulating innovations, active support of the education and research complex, and careful attention of governments to the development of national innovation systems. Experience South Korea is particularly interesting due to the fact that this country is one of the most dynamically developing in the innovation plan. The article examines the methodological aspects of the study of the innovative eco-environment by the example of a cross-national study of Kazakhstan and South Korea. The author, relying on the results of the study of actors of the innovative eco-environment in Kazakhstan and South Korea, demonstrates the possibilities of combining qualitative and quantitative research methods, placing emphasis on interviewing and case studies for the derivation of the theory. This article describes the most problematic issues in the collection and analysis of actors in the innovative environment in different countries, taking into account country differences. Recommendations are formulated to conduct research on various representatives of the innovative environment. Along with this, the opportunities for applying the resource-oriented approach for analyzing the internal environment of the innovation company are also described. As a result, an author's qualitative model is proposed for analyzing the innovative environment in a cross-national perspective, which allows describing the environment statically and dynamically, and can also be modified depending on research tasks, national innovation environment.

Keywords: national innovation system, case study, innovative eco-environment, innovation research methodology, cross-national research, qualitative research models, innovative environment of Kazakhstan, innovative environment of South Korea, resource-oriented approach.

1. Introduction

The necessity of forming the National Innovation System (NIS) in Kazakhstan is an opportunity to overcome the raw material orientation of the economy, transforming it into a knowledge economy. Today, knowledge becomes not only the most important production factor, but also a factor in the rapid development of high-tech industries, the basis for ensuring the competitiveness of the national economy and its security. Thus, the investigated problem is multifaceted, when evaluating its development, it is also necessary to take into account research related to the development of theoretical, methodological and practical aspects of NIS construction. At the same time, up to the present time such aspects of the problem as the relationship of NIS with the economic development of the country remain insufficiently developed; factors that influence the formation of NIS in modern conditions; concept of the innovation system of developed countries. In this article we attempted to determine the basic principles and guidelines for innovative development of the economy of Kazakhstan, to identify the features and factors of NIS development, to conduct a conceptual analysis of the NIS of developed country – South Korea.

In this regard, there is an important issue of implementing a set of measures for the transition of the Kazakh economy to an innovative type. One of such instruments is the legislative initiatives of the Government of the Republic of Kazakhstan.

2. Research Methodology

The study was conducted in three stages. At the first stage, a toolkit for the quantitative analysis of innovation networks was created, which is necessary for the study of the innovative eco environment. The second stage of the research emphasizes the role of the context for the analysis of innovations rooted in the local economy

and culture in particular, which is proved by the network theory. The third stage is represented by a qualitative research method - the case study method. At this stage, a cross-national study of innovative systems in Kazakhstan and South Korea was carried out.

3. Literature review

3.1 Innovative economic environment

Currently, there is a significant amount of research in the field of innovation. However, despite the fact that a wide range of economic, social and technological incentives are offered as driving forces for innovation, there is hardly a consensus on how and to what extent innovation activity is deterministic of changes in the social or economic environment. In fact, modern studies confirm that there are many theories that determine the factors that influence the development of innovation and that the universal theory in this case seems unrealistic. Nevertheless, it should be noted that the perspective that takes the driving forces of innovation is often associated with technological shifts and a long-term evolution of the economy, not least evidence of lengthy and still ongoing discussions about the driving forces of the industrial revolution and the origins of industrial capitalism (Crafts, 1985, 1995; Mokyr, 1990, 2009; Allen, 2009; Bottomley, 2014).

A study of many sources allows us to emphasize the set of "positive" driving forces for innovation, for example, the growth of market demand for innovation and "negative" factors, the closure of the innovation process. In many economic models, innovations are motivated by the expected private return on innovation, which is more or less secured by intellectual property rights, for example, patent laws (see Nordhaus, 1969, Scotchmer, 1991, Moser, 2005, 2013) or due to increased market demand and the needs of consumers (Schmookler, 1962; Lundvall, 1985, 1988, von Hippel, 1994). Other structures view innovation as a result of progress in the field of knowledge (Arrow, 1962, Romer, 1990, Aghion and Howitt, 1992), useful knowledge (Mokyr, 2002), new technological possibilities (Klevorick et al., 1995) and diffusion of general-purpose technologies (Bresnahan and Trajtenberg, 1995; Lipsey et al., 2005).

3.2 Network theory of innovation

In his original article titled "In Search of a Useful Innovation Theory," Nelson and Winter (1977) sought "to outline some areas that would seem to be fruitful" in innovative research and policy based on "selected aspects of the prevailing theoretical understanding of innovation" (page 36). Nelson and Winter (1982) followed this book, The Evolutionary Theory of Economic Change, which was based on the field of technology and innovative research (Fagerberg, 2005). Although the innovation process is socially contextualized in the evolutionary economy - in terms of subprograms, trajectories and regimes - the sociological perspective has so far remained largely a complement to the further development of this field of research (Ahrweiler, 2010; Fagerberg, Fosaas, & Sapprasert, 2012; Leydesdorff & Van den Besselaar, 1994).

The constructivist turn and increased attention to reflexivity in research in the field of science and technology led to the fact that sociologists of science and technology theorized innovation as an evolutionary factor in the transition to a knowledge-based economy (Martin, Nightingale and Yegros-Yegros, 2012; see Schumpeter , 1943, 1964, pp. 62ff.). However, various metaphors, such as the "transdisciplinary mode-2 knowledge production" (Gibbons et al., 1994), "trajectories in landscapes" (Geels, 2002), "Risk Society" (Beck, 1992, see Beck, Bonn and Lau, 2003) and the triple spiral of university-industry relations and government (Etzkowitz & Leydesdorff, 2000) provide averages that have informed economic and geographic analysis in a wide range of applications (Geels, 2007).

Theories of diffusion studies and technology assessment focus on the consequences of the enhanced role of organized knowledge in society (eg, Rip, Misa, & Schot, 1995; Teece, 1986). In addition, a social network analysis (eg Powell, White, Koput, Owen Smith, 2005) makes it possible to study the relationship between media in neoinstitutional organizations (Powell & DiMaggio, 1991).

In our opinion, the evolutionary model and the dynamics of technological changes, nevertheless, were refined in the main works of sociological literature, but, unfortunately, in disintegrated, and sometimes mutually antagonistic ways. In a special issue of Mind and Society, one of us called for the sociology of innovation from the point of view of cultural theory (see Adolf et al., 2013; Ahrweiler, 2013; Ahrweiler & Keane, 2013; Mast, 2013). In this study, we collect elements from three or four sociological traditions and determine the prospects for empirical research on this basis.

Thus, the two levels - historical organization and evolutionary self-organization in the environment of choice - can be viewed as independent incentives for innovation that lead to action. Unlike historical changes with a time arrow, innovations absorb reflexivity in interpersonal communication as one of the sources of "creative destruction" (Schumpeter, 1943, pp. 81-86). Thus, historical ties can be dissolved and replaced in anticipation of performative improvements.

3.3 From system expertise to system level comparisons

One of the first comparative studies of NIS was carried out by Porter (Porter 1990). This and other early comparative studies did not correspond to the formalized structure and covered only two or three countries. None of the authors of the early comparisons took into account the social, economic and political situation of the respective countries. This had the same effect on their ability to develop and use technological knowledge as systemic, that is, material characteristics. Therefore, one can state whether it is possible to use the national NIS, unlike other national influences, as a tool for managing the competitive environment of another nation.

Nevertheless, the way to benefit from these comparative studies is to keep political consequences. Institutions such as the OECD or the EU encourage policy-oriented studies that often combine the NIS approach with the idea of benchmarking. The OECD Working Group on Technology and Innovation Policies (TIP), for example, conducted a four-year study on policies related to a systems approach to innovation (OECD, 1999). Some of the conclusions in this report stem from previous OECD studies, such as the 1998 publication "Technology, Productivity and Job Creation: Best Political Practices" (OECD, 1998). In 2000, the EU decided to "develop indicators and a methodology for comparing national research policies" (European Commission, 2000, p.3).

Research of this kind is aimed at identifying "best practice strategies" and "better behavior" among the countries studied by examining different indicators of innovative results or efforts. Based on the results of the search for best practices, recommendations were developed.

Nelson (Nelson, 1993) responded to the lack of a clearly defined analytical framework. He conducted a study in fifteen countries, which was intended to highlight the institutional arrangements that supported technical innovation in these countries. He stressed the similarities and differences and initiated, at least, a preliminary discussion of how these differences arose and seem to matter (Nelson, 1993b).

In the future, we will consider in more detail the NIS of South Korea and Kazakhstan. We will study the composition and strength of these systems by looking at them at the system level in a formalized manner, and not just by comparing system characteristics.

4. Comparison of South Korea and Kazakhstan

4.1 Institutional functions

4.1.1 Development of a policy on technology and innovation

In Korea, various independent ministries and departments carry out activities in the field of science and technology (R & D), which may include research and development (R & D). Duplication and conflict between individual politicians create inefficiency within the system. In order to minimize this inefficiency, a policy coordination and budget coordination process is underway (Chung 2001).

To coordinate policy, the Ministry of Science and Technology (MOST) is the legally central point of policy in the field of science and technology. Ultimately, long-term technological forecasting was added to the role of MOST. Every five years, MOST uses the Delphi method and returns results to policies and research and development (Chung 2001).

In many respects inefficient due to the lack of political power and financial resources, MOST actually acts as the secretariat of the National Council for Science and Technology (NSTC). The NSTC was established in accordance with a special law on scientific and technical innovations in 1997 under the chairmanship of the President of Korea. The NSTC solves the political agenda, policies, priorities for the distribution of R & D and the evaluation of national R & D programs. The Ministry of Planning and Budget (BCH) carries out budgetary coordination, which includes the preparation of the annual budget guidelines and the allocation of budgets.

Previously, MPB had the greatest power in S & T policy; However, it is likely that the balance of power in the future will shift towards the NSTC (Chung 2001).

Innovative policies play an important role in Kazakhstan's economic strategy. To improve the sustainable development of Kazakhstan, on the basis of diversification and modernization of the economy, clear goals and tasks are set for moving from a raw material economy to a knowledge-based economy through the use of revenues from the oil, gas and mining industries. An increasingly important focus in Kazakhstan is on innovation, the country strives to develop scientific and technological capabilities and to close integration of science and business.

Kazakhstan has concentrated considerable efforts on activating innovative activity as a means to accelerate economic development and diversify the economy. Initiatives are aimed at improving the components of the national innovation system, in particular, on the creation of state institutions to support innovation. Attention was also accentuated on increasing the productivity of companies, regional features of the innovation system and the demand for innovation. However, despite the political decisions confirmed by some program documents, practical activities were focused mainly on improving institutional support.

However, the legal environment for innovative regulation is not sufficiently developed in Kazakhstan. Not developed a number of laws that would help in innovative regulation, as well as in the innovation process.

The authorized state body, the leading stages in the creation and implementation of policies in the field of industrial and innovative progress, is the Ministry of Investment and Development of the Republic of Kazakhstan, whose tasks include:

- the generation of ideas and the direction of development in the Government of the Republic of Kazakhstan on the main lines of innovation;
- implementation of innovative grants;
- conducting an accompanying monitoring of implementation and evaluating the effectiveness of the introduction of innovative projects produced through innovative grants;
- state control over the implementation of the legislation of the Republic of Kazakhstan on state support of innovation activities, including the progress of the complex of measures for innovative development.

The organizational structure of the innovation policy in the Republic of Kazakhstan is as follows (Figure 1).

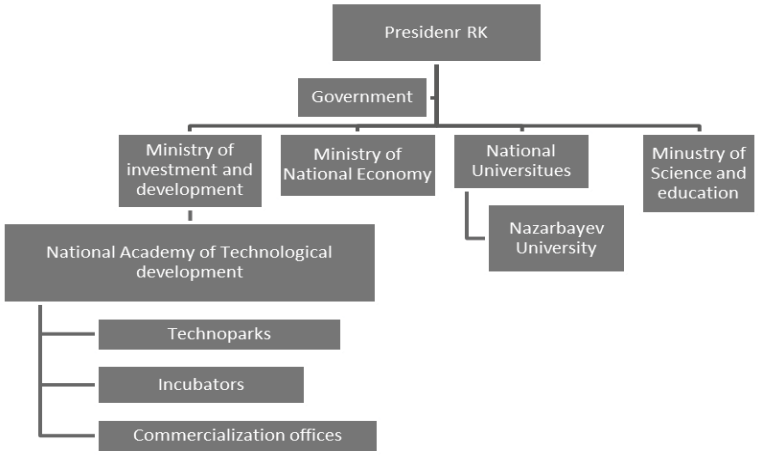

Figure 1: Organizational structure of innovation policy in the Republic of Kazakhstan

The Ministry of Education and Science of the Republic of Kazakhstan is the authorized body responsible for the formation, implementation and coordination of all fundamental and applied research conducted in the country, the state and development of the research infrastructure, the training and professional development of scientific personnel, and the conduct of the State Scientific and Research Expertise scientific projects and programs implemented at the expense of the state budget.

4.1.2 Performing research and development

Over the past two decades, the Korean government has shifted its position from the fact that since the 2000s it has been actively engaged in research and development and encouraged private firms to do research and development. South Korea is spending heavily to achieve its goal. In 1999, the country's investment in research and development (R&D) totaled 2.07% of its gross domestic product (GDP), just below the average for nations in the Organisation for Economic Co-operation and Development (OECD). In the latest figures, the country has stretched out a clear lead at the top. The 4.29% (63.7 trillion won, or US$60.5 billion) that South Korea invested in R&D in 2014 outstrips runner-up Israel (at 4.11%), as well as regional competitor Japan and the United States.

The low level of innovation activity of R & D in Kazakhstan results from the structure of industrial production with its raw materials orientation and foreign direct investment. Contrary to the fact that in recent years the development of the oil and gas complex has served the country's economic development, the demand for R & D has not increased and production growth has not been observed. Large enterprises in the extractive industries use often imported technologies, which national R & D institutes do not produce.

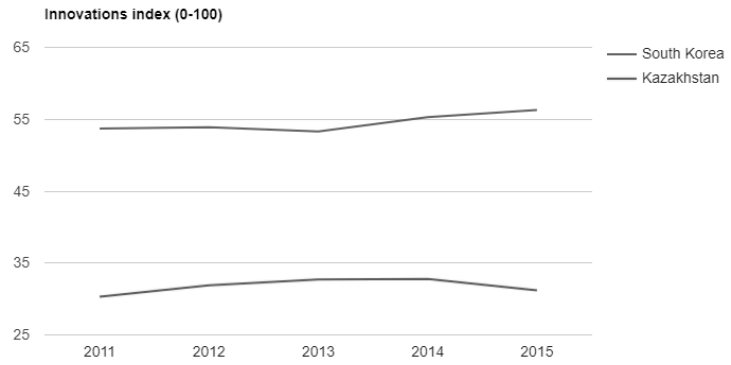

Figure 2: Innovation Index of Kazakhstan and South Korea

For the period 2004-2015 in the Republic of Kazakhstan there was a continuous increase in the costs of enterprises for technological innovation. A characteristic feature is the prevalence of the acquisition of ready equipment and machines. Comparatively not significant funds were allocated specifically for research and projects. An even smaller share of costs was received by the industrial design, that is, the preparation of buildings and structures for the installation of equipment. And very little money was allocated for training and training of production personnel, purchase of software, patents and licenses. On the one hand, this is due to the extreme deterioration of the basic technological equipment and the inevitability of its urgent replacement. And on the other hand, low interest of foreign investors in the full intellectual content of their actually pro-production technologies in our country. The wide development and dissemination of electronic means of communication makes it possible to remotely control almost completely automated production processes in real time.

The type of research and development carried out in Korea has shifted to the development of technology in comparison with the basic ones. In addition, Korean state-owned companies, cheybols, have reached the technological frontier from reverse engineering, and efforts have been directed to research and development to enhance international competitiveness. On the contrary, the most common type of innovation in Kazakhstan is gradual. Alcorta and Peres (1998) set out three reasons for this behavior:

- Great management capabilities. Managers tend to "react, emphasizing commercial and financial decisions, rather than technological ones." Therefore, when problems arise, they are looking for solutions in terms of reducing overhead, rather than improving the product.
- Lack of knowledge in the field of innovation. Firms still view human capital as a value, not as a resource.
- Lack of medium-term / long-term vision. Firms do not have a vision of long-term competitiveness.

4.1.3 Financing R & D

Research and development expenditure (% of GDP) in Kazakhstan was reported at 0.16944 % in 2015, according to the World Bank collection of development indicators, compiled from officially recognized sources.

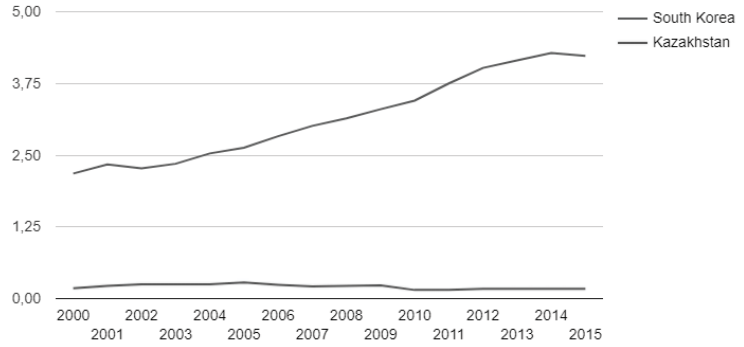

Figure 3: R7D expenditure, percent of GDP

South Korea spends hugely on R&D. Led by technology companies such as Samsung and LG, it invests more than most advanced economies. It was narrowly beaten by Israel to the title of top R&D spender, devoting 4.23 per cent of gross domestic product in 2015, compared with Israel's 4.25 per cent, according to OECD data.

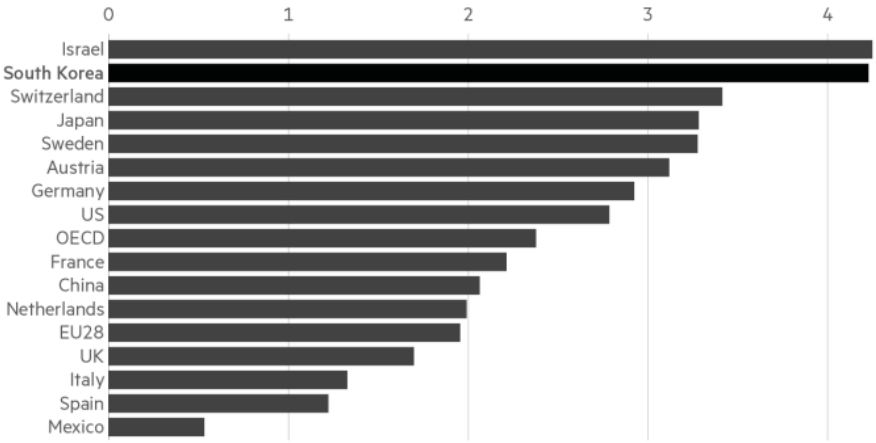

Figure 4: Spending on R&D, as a share of GDP (%)

Investment has been driven mainly by the private sector, although public R&D spending is high. Almost three-quarters of South Korea's R&D is business-led; nearly 90 per cent of that is invested in manufacturing, with the focus tilted towards applied research for industrial competitiveness. Industrial R&D also favours technology industries such as electronics.

An R&D scene dominated by conglomerates has come at a price, however. Industry watchers bemoan that the country lacks "blue sky innovation", especially in software and services, as R&D activities are concentrated on big companies and state-run research institutes. There are too few upstarts with innovative ideas as the chaebol's dominance hinders new entrants.

4.1.4 Promotion of human resources development

The illiterate labor force in the 1950s (22.0% in 1953) to almost 90% of the literacy rate for two decades demonstrated the high priority that Korea has for education. Expenditure on education in comparison with general government expenditures increased from 2.5% (1951) to 5.07% (2015). Despite the high costs, this still represents only one-third of the total cost of education; the rest - through private firms and parental contributions. This rapid growth created a highly skilled workforce. Foreign education has also become the main factor - a hangover since the US assistance in Korea after colonization (Kim 1993). In Kazakhstan in 2000 expenditures were 3.26% of GDP, in 2015 - 2.79%.

Although the number of students has increased dramatically, the quality has declined in both countries. In Korea, according to the Ministry of Education in higher education institutions, there were 19.9 students per teacher in 2000, and in 2015, 13.2 students per teacher. The number of universities increased from 107 to 175 over the period from 1990 to 2007. Kim (Kim, 1993) argues that because of this

Tracing the change in the number of personnel engaged in research and development by sector of activity, one can note a slight increase in their number in the public sector - by 2.7 thousand people, or 35%; in the IT sector - by 0.4 thousand people, or 0.3%; in the NCO sector there is a negative trend, that is a slight decrease of 0.2%. At the same time, the decrease in the number of personnel engaged in research and development in the business sector, by 0.5 thousand people, or 11%, is of particular concern. After all, in the modern market economy, the entrepreneurial sector accumulates a large part of its scientific potential. This is the case in South Korea, where about 2/3 of the total number of researchers are employed in the business sector. These data reflect the low investment interest of domestic entrepreneurs in innovation and development, thereby further exacerbating the prevailing common negative situation.

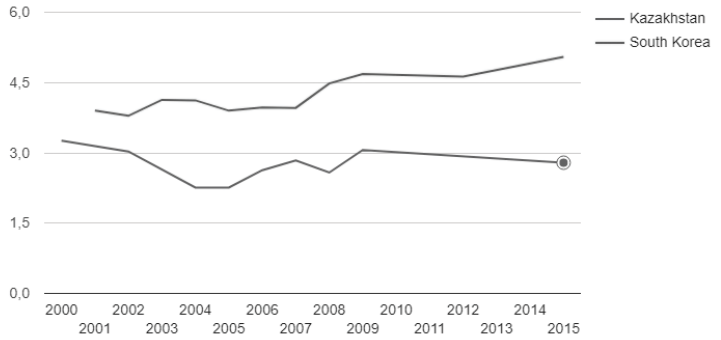

Figure 5: Public spending on education, percent of GDP

4.1.5 Encouraging technological entrepreneurship

Despite their importance, in the 1980s, the chabols began to abuse their economic power and stifled entrepreneurship in small and medium-sized firms (SMEs) (Kim 1993). To respond, the Korean government has taken two actions - they have created sanctuaries and a venture industry. In the sanctuaries 205 business-terrorist acts operate, in which shabols and related subsidies cannot enter - this allowed SMEs to flourish in the high-tech sectors (Kim 1993). Secondly, the first venture company was created within the framework of a special partnership between public and private companies. The subsequent Law on the Formation of Small and Medium-sized Enterprises in 1986 led to the creation of 12 more venture capital firms financed by a combination of public and private sectors (Kim 1993). In addition, the Law on the Promotion of the Financing of New Technologies in the Field of Commercialization, created in 1986, helped to form financial institutions that financed only the high-tech sector (Kim and Dalman 1991).

While entrepreneurs in Korea have a constant capital stock, Kazakhstan does not have the same luxury. There is little venture capital in Kazakhstan, and it is debatable whether there are business opportunities. There is no literature on this, but it seems that the lack of innovations in industry, applied research in the university and capital will lead to stagnation of the entrepreneurs' proposal.

4.2 Interaction of institutions

4.2.1 Cooperation in the field of R & D

Cooperation in both countries is very weak. In Korea, MOST estimates that only 35% of its national research and development is carried out by a combination of universities, research institutes and industries (Chung 2001). Cooperation between universities and the private sector is the weakest link in the Korean NIS. Due to insufficient funding from universities, as mentioned above, industry views universities as not having sufficient capacity for their own purposes, and therefore they attract very little from the private sector. Instead, informal cooperation is more common through the use of consultations from individual members (Kim 1993).

Between branch and state research institutes, cooperation is more frequent, since the government provides subsidies and financial incentives for such cooperation. Recently, large private firms have preferred to keep their R & D secrecy in order to maintain a competitive advantage, despite short-term financial incentives. These interactions are mainly used to support SMEs.

In official forms of R & D among institutions in Kazakhstan, no literature was found. Indeed, it is doubtful whether there is any industry in the industry, since such a small number of firms perform R & D. At the same time, the experts of the JSC "Center for Trade Policy Development" note that the degree of innovation in SMEs in Kazakhstan is limited, which is also indicated by the relatively low percentage of income from new products - 28% in 2015. Despite the fact that the Government highlights the development of entrepreneurship and innovation as priority directions, emphasizing their decisive importance for economic diversification and improving the country's competitiveness, the GPIIR for 2015-2019 does not provide for specific target indicators related to the increase of innovative activity in the business sector. Secondly, a large number of innovative enterprises face barriers such as lack of knowledge and experience among staff, a lack of investment in innovation, a lack of risk capital for innovative projects, and a lack of demand for new products among the local population. Thirdly, in the sphere of innovative activity development, there are gaps in the provision of venture capital to new innovative enterprises that are in the early stages of development.

4.2.2 Diffusion of technology

The role of foreign direct investment (FDI) in both countries varies widely. Kazakhstan's gross direct inflow of foreign investment was $ 7.9 billion in 2005, and rose to $ 20.6 billion in 2015, and Korea received only $ 3.6 before 1986, and it's no wonder, that their role in the Kazakhstan NIS is of paramount importance. Since the 1960s, there has been a clear government policy in attracting FDI. "This was not only to protect the local market, but also to provide significant subsidies and a special regime for foreign investors." (Dahlman and Frischtak, 1993). However, with weak intellectual property rights, foreign companies tend not to invest their most advanced technologies (Dahlman and Frishtak, 1993). However, in Korea, the lack of foreign direct investment is deliberate. The government's policy in Korea requires that all foreign investment be approved by the state - an attempt to neutralize the independence of Korean companies from multinational enterprises (Viotti 2002). This turned out to be decisive in the 1980s: while Korean companies could specialize and switch to innovation, Kazakhstan formed its scientific innovation system from the "fragments" of the Soviet innovation system and there was no interest on the part of enterprises in innovations, the introduction of new technology was necessitated fulfillment of relevant tasks from above.

There is a "strong dependence" on foreign licensing and technology expertise (Arocena and Sutz 2001). This compensates for the lack of internal R & D. While the situation in Korea is the opposite, Chaebols have aggressive own R & D laboratories for "absorbing, assimilating and adapting imported technologies" (Kim 1993). In the 1980s, the Korean government created state research institutes for the sole purpose of spreading technology. The lack of resources meant that they could not create prototypes or perform any effective research and development. Although this may seem like a failure of goals, it actually gave the same effect as researchers from these institutions, and also from state-funded companies joined the industry to lead the research and engineering departments, carrying with them the knowledge gained from government institutions.

In addition, the Korean NIS does not have any "explicit policy instruments" (Kim and Dalman 1991) about the spread of technology. Indirect instruments, such as consulting engineering firms and manufacturers of commodities, allowed the government to focus on these agencies to promote the diffusion of technology. In addition, in connection with the supply and demand for technology, two main tools were used. For SMEs, six government agencies provide various technical services that range from training and automation to assisting firms with product quality. Secondly, scientific and technical information is disseminated through scientific articles in technical information centers (Kim 1993).

4.2.3 Staff mobility

No literature was found on the mobility of personnel in both countries, which indicates its insignificance in both NIS. Kim (1993) notes that the Korean war, in spite of the destruction of large parts of the industrial infrastructure, actually helped "... further economic development by completely transforming the traditional rigid society into a highly mobile one, forcing geographic mobility" (Kim 1993). It is clear that mobility played

an important role in the initial process, and the Koreans probably retained this mobility, because Korea is a relatively small country compared to other industrialized countries such as Indonesia or China.

However, in Kazakhstan there are no hints at the role of mobility, since public R & D is largely dominant, the role of mobility - if it exists - will be insignificant, since they will be carried forward only within the same type of institutions, not from -institution.

5. Conclusion

Drawing conclusions from the comparison between South Korea and Kazakhstan, it must be repeated that there is no such thing as a full-scale institutional structure that would include all possible interdependencies between different institutions.

The above approach mainly revealed differences in the characteristics of the two countries. A systematic approach to innovation is established as a useful basis for studying technical changes and their determinants, but one can state whether generalizations can be made and whether Kazakhstan, if it copied the Korean NIS, would have the same success.

We fill in the weaknesses with the map of Chang and Shi. The four fundamental groups proposed by Chang and Shi to capture this abstract functioning of the system either were not documented in the literature (mobility of staff and informal interactions) or did not show great differences (R & D cooperation). Only technological diffusion of foreign knowledge has shown significant differences in the practice of countries, but the spread of innovations created in the respective countries does not have any significant references in the literature. Authors such as Viotti (Viotti 2002) who innovate the templates disprove the usefulness of the NIS concept in the case of technological backwardness when it indicates: "The NIS approach is not suitable for processing the processes of technical changes typical for industrialization of the economy that are very different from the economically industrially developed countries".

However, the fact that only fragmented innovation systems were only empirically discovered in low- and middle-income countries does not mean that the structure of NIS is useless in these conditions. Sagieva and others (Sagieva & Zhuparova, 2013) do not refrain from using the NIS approach, and have weaknesses, it has nevertheless proved to be a useful and astute tool for analyzing South Korean and Kazakhstan NIS. Within our framework, we have analytically discussed ten aspects of the NIS, and we hope that with the help of such studies it will be possible to make wider implications for public policy. Consequently, governments of industrialized countries can learn and improve their economic progress.

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