The role of human capital in the system of education of Kazakhstan

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Abstract

This paper provides an overview of the economical evaluation of the current state of the higher education in Kazakhstan and the role of human capital in implementing the tasks of national economy. The authors of the article used the method of statistical analysis to determine the current trends in the development of the system of higher education. As a result, the present work systemizes the theorist-practical aspects of research of human capital in the education system based on the held researches. Moreover, relevant conclusions are made based on the findings, including taking into account the internal costs of research and development.

Keywords: Education, Human Capital, Competitiveness of Education.

El papel del capital humano en el sistema de educación de Kazajstán

Resumen

El documento proporciona una visión general de la evaluación económica del estado actual de la educación superior en Kazajstán y el papel del capital humano en la implementación de las tareas de la economía nacional. Los autores del artículo utilizaron el método de análisis estadístico para determinar las tendencias actuales en el desarrollo del sistema de educación superior. Como resultado, el presente trabajo sistematiza los aspectos teórico-prácticos de la investigación del capital humano en el sistema educativo basado en las investigaciones realizadas. Además, las conclusiones relevantes se hacen en base a los hallazgos, incluso teniendo en cuenta los costos internos de investigación y desarrollo.

Palabras clave: Educación, Capital Humano, Competitividad de la Educación.

1. Introduction

Modern world development is characterized by a transition to a new phase of the society formation - construction of the economy, base of which is the generation, dissemination and usage of knowledge. Knowledge and intelligent resources in recent years acquire a specific importance in socioeconomic development of the society (Efimov, 2005; Perthaya, 2014; Karpenko et al., 2013). Establishment of the national economy, has marked the necessity of development of innovative approaches in management. It also revealed unsolved problems with regard to the most important factor of economic growth - human capital (Mikheev, 2018; Maydyrova, 2004; Turmakhanbetova et al., 2016). This sharpened relevance of studying the human resource as an important link of the single viewed priority field: education system, including studying process of modern management of formation and use of human capital. Because human capital is no longer a money-guzzling thing, but a material- and social profit-deliver, we faced with a challenge of shaping a new development paradigm. Within its framework, human capital comes to the front of national wealth (under 80% or so in developed countries) (Fitzsimons, 2015; Lutz et al., 2017).

Human capital is a set of knowledge and skills, which are targeted to meet multiple needs of a specific individual or society. First coined by Theodore Schultz, the definition of the term was stretched by Gary Becker, who justified the benefit from investing in human capital and formulated an economic approach to human behavior (Aryee et al., 2016). At the starters, human capital was considered an investment in a person for productivity/knowledge/skills boosting purposes (Siegel & Griliches, 1992; Schultz, 1961). Later, the term was broadly defined, as the World Bank added consumer spending on the agenda (family expenditures on food, clothing, housing, education, health, culture, and government expenditures on otherwise). In a broader sense, human capital is an intensive labor-saving factor of economic/social/family development that includes educated human resources (professional workers and managers), knowledge, and living and working settings that add to the efficient and rational functioning of human capital (Folloni & Vittadini, 2010; Lutz et al., 2017; Aryee et al., 2016). Education acts as the key factor that increases the country's competitiveness. In any advanced country gross domestic product counted per capita and labor productivity based on the various fields of the economy are closely tied to the level of knowledge.

In higher education, human capital has special features of its own, which can be characterized by three key aspects (Bowen, 2018):

1. Human capital is being formed and reproduced in the same system, defined as the system of education;
2. By intellectual characteristics, human capital is a set of imbalanced qualities that are being developed in an asymmetrical manner;
3. The investment period is long.

In Kazakh education, the new stage of development is more about the innovation-based human capital management, which is responsive to the scale of knowledge demand. The role of knowledge in the modern innovation-geared economy was put on fill display by American scientists. They calculated that those, who have been learning for at least 14.5 years, make 51% of US GDP. The remaining 49% accounts for those, who have 10.5 to 12.5 years of educational experience (Fitzsimons, 2015). In the modern world, the value of higher education and the role of universities have changed. The universities are active participants of innovative development, which creates new knowledge and increases efficient use of the present resources. Change that is happening in the academic field does not allow higher education institutions to support a steady development only at the expense of state support and the increase of the number of the students. Nevertheless, analysis of publications shows that a given area of scientific direction is not sufficiently investigated, in connection with that, author's research is directed to studying the role of human capital in the education management system in its current phase further.

2. Data and Analysis

The term human capital means knowledge and skills received during the educational process, based on experience, and which transforms into a long-term capital asset, that is capable of bringing income (Tuzovsky et al., 2005; Drucker, 1993; Pastukhov, 2012). Human capital is the set of congenital and acquired knowledge, abilities, competence, measure of progress of human practice, earning skills, processes of macro and micro level connected with the complex of behavioral strategies and interactions within social, political, economic and intellectual development (Harlow, 2008; Chang et al., 2012; Tayauova & Amirbekova, 2013). The government plays a leading part in inclusive development. Its importance is expressed not only by redistribution of gains of economic and social growth, but it is important for ensuring the creation of institutes that interrelate the economy and society. Acceleration of socioeconomic development rates of the country and transition to innovative technologies have resulted in increase of the human capital role. The key role in the formation of intelligent capital creating the economy of knowledge is relevant for the educational system as a social institute (Tayauova, 2014; Smirnova & Temirbekova, 2014; Harrington & Voul, 2008; Abdikeyev & Kiselev, 2011). General national approach to the solution of issues is related to the efficiency of the human capital in terms of creating a competitive economy of knowledge. Modern civilization offers a new economic model to the world, where intelligent capital and efficient knowledge management enable dramatic development of the country to reach the list of the most advanced countries of the world.

Under investigating conceptuality of the system of knowledge management, the term knowledge is related to the terms of information and data. Data is a set of objective facts about objects, situations, phenomena, processes, and the information is data that has importance and purpose. Data needs to be registered in the organization since it is the source for the creation of information, which, in turn, is transmitted, by formal means (documents) and informal means (discussions and meetings) of communication in the organization. Formation of knowledge in the

organization takes place by the way of acquisition of life experience, training and improvement of professional skill of the employees. Based on the knowledge formation process the data and information transforms into effective organizational actions (Ignatenko, 2017; Tuguskina, 2016; Kusainova, 2017). Competitiveness of Kazakhstani education requires interference in the field of development of domestic education, since the evolution of educational system falls behind from modern society needs. It is important to note that conservatism of educational system practically excludes an opportunity of designing socially required development inside the system of education management. The domestic educational system will inevitably enter the international educational media. This integration depends on new approaches and stating purposes (as, for example, six provisions of the Bologna Process declaration for creation of the Zone of European higher education) substantially.

Reaching new quality of domestic educational system, its steady development is impossible without serious changes in the system, processes, and mechanisms of development of the top education system (Mau, 2012). The effect of received results from the project implementation and its influence to the development of science and technology is determined by the presence of high intelligent capital and its influence on system engineering of knowledge management system in the university and managerial resource of the domain of education. Social mechanisms of the Kazakhstani system of accumulation of knowledge do not satisfy objective modern needs of the population and do not promote a socially expedient steady development of the educational system as a whole.

Universities are the main tools of the formation of the economy based on new knowledge. In connection with that, universities become the centers of generation and transferring new knowledge, implementation to nonacademic sector and commercialization. In the meantime, universities influence the development of the business community, enriching it by graduates that have appropriate competence. In 21stcentury, scientific organizations, including universities are becoming active partners of business in developing control of knowledge management besides performing their main functions (2014). 127 higher educational institutions (including branches) (Picture 1) with the total number of 496 209 students (Picture 2) were functioning in the beginning of the 2017/2018 academic year in the Republic Kazakhstan. There were 269 649 female students or 54,3% out of the mentioned quantity. The number of students decreased by 4% in the current academic year in comparison with the previous academic year.

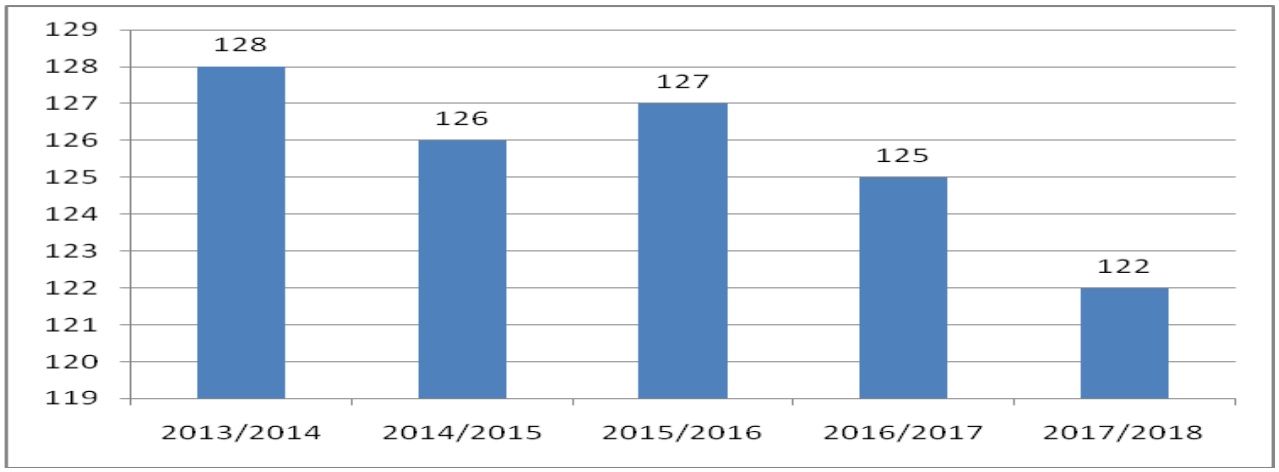

Figure 1. Amount of higher educational institutions in Kazakhstan

Some reduction in the quantity of high schools in Kazakhstan is observed in 2015. On the present stage, conducted state policy that is oriented at reducing the number of high schools is strategically not rational, since systematic attention to the intellectual development quality improvement of knowledge of students, master and doctorate students is promoted. Dynamics of increase of students' number illustrated on the Figure 2 confirms this statement. This number has increased to 36840 students since 2015.

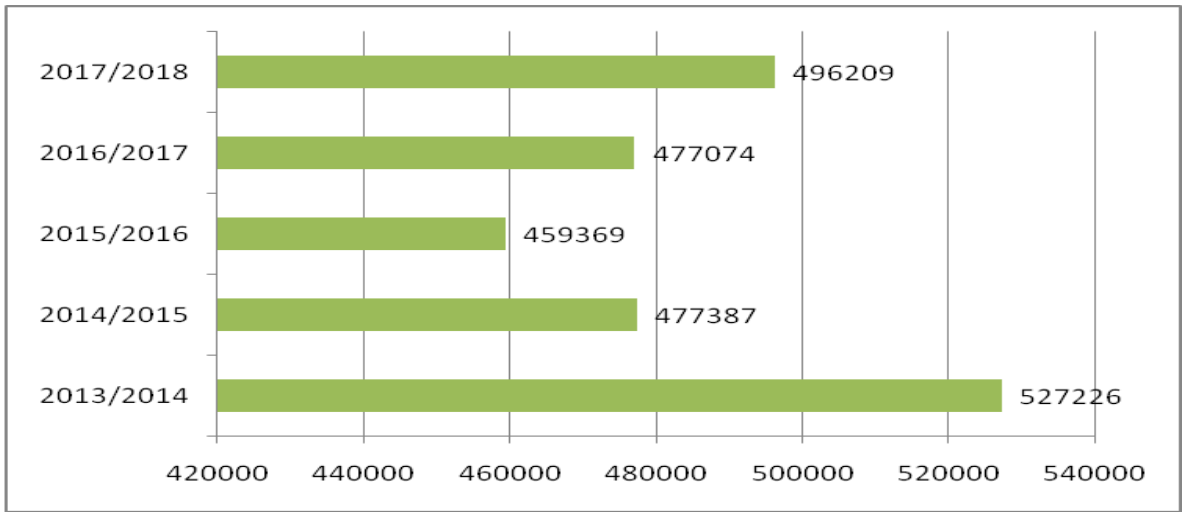

Figure 2. Number of students in higher educational institutions of Kazakhstan

According to the information given in the Figure 3, 38212 teachers were working in Kazakhstani higher education institutions in the beginning of the 2017/2018 academic year. Out of this, 3251 (8,5%) teachers were Doctors of science, 13276 (34,7%) teachers were candidate of science, 2349 (6,1%) teachers were professors and 5 983 (15,7%) teachers were associate professors. Quantity of teachers that had a scientific degree of philosophy doctor (PhD) equaled to 1 854 persons (4,9%), and 208 (0,5%) persons were profiling doctors. The number of the teachers that had master's degree accounted for 12098 (31,7%) (Figure 3).

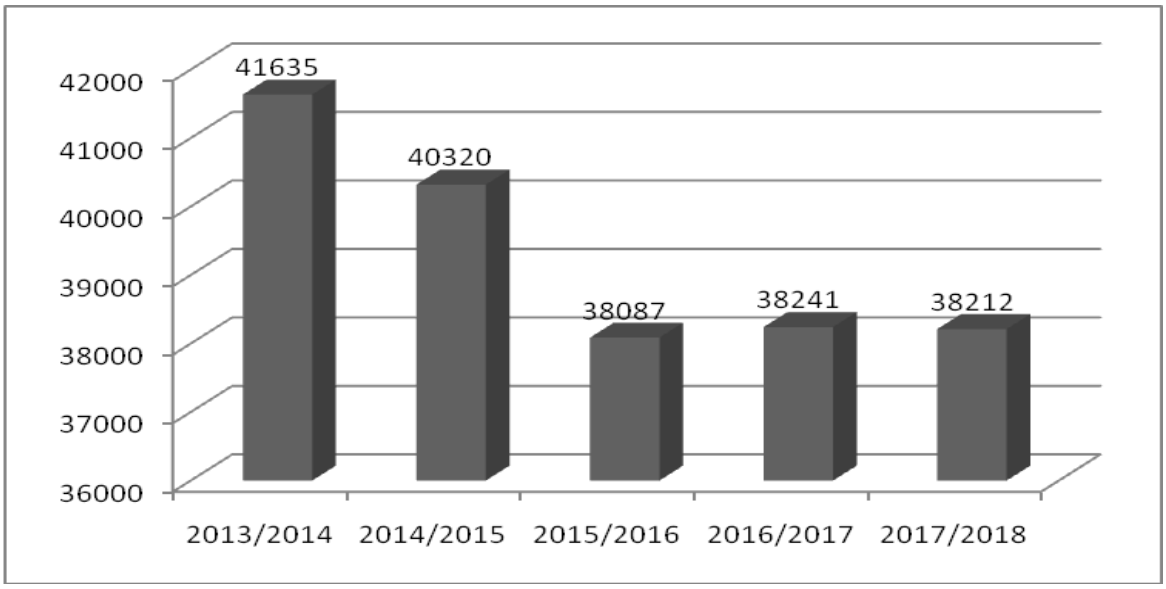

Figure 3. Faculty quantity

The government is currently conducting a purpose-oriented preparation of doctors for regional higher educational institutions and scientific organizations. At the same time, higher educational institutions in partnership with foreign universities offer doctoral studies. In these cases, the foreign adviser is necessarily attracted. There is a specialized organ in Kazakhstan, which is called Centre of the international programs JSC (further referred to as center). The main subject of the center's activity is an implementation of the complex of events on international programs of preparation, retraining and specialists' continuing education and advancing qualification including international stipend Bolashak of President of the Republic Kazakhstan. There were 10346 stipends awarded and 6282 graduates from 1994 to 2013. Teachers' professional skill advancement is conducted at the expense of both republic budget and extra-budgetary means. During 2017, 9378 (22%) teachers passed refresher courses based on higher educational institutions, enterprises, engineering laboratories, and trade centers. At the same time, work conducted at the mentioned direction in higher educational institutions is not systemized, financing of the professional skill advancement programs is not provided.

The government has extended the higher educational institutions' right to define the content of the curriculum of bachelor's degree to 55%, master's degree to 70%, and doctoral studies to 90%. It increases an academic freedom and the mobility of higher educational institutions, allows taking into account features of the labor market for the relevant specialty of the particular region. Education management system (EMS) is a set of organizational procedures, organizational divisions and computer technologies that provide integration of diverse sources of knowledge and their collective use in business processes. Under current conditions, the universities should consciously control processes connected to new knowledge creation and its transfer to involved parties. EMS of university is based on three foundations such as infrastructure, info-structure and info-culture. Each of the mentioned elements may affect the success or failure of the project on EM. Moreover, it is a productivity factor of the university's performance.

For the successful formation of the EMS of the university, the organizational knowledge base is necessary. It will promote training and exchange of knowledge between employees, researchers, students and other participants. In such a manner, EM base includes the relationship between the mentioned elements, which influence the success of functioning of the higher educational institution. Respectively, infrastructure of EMS should represent the platform of advanced integrated information systems. The majority of the advanced countries of the world has accumulated sufficient skills and practical experience of effective application of the EMS on industrial enterprises and in the service organizations including educational services. In the domain of formation has been already accumulated. Many projects connected to education management in the state education are realized. In a number of countries, there are structural divisions that manage knowledge. Knowledge management in educational establishments should provide the set of designs for people's interrelation, processes and technologies, as well as to encourage politics and practice, which will assist people to exchange and to manage the knowledge. The universities are key players in knowledge triangle: they participate in the generation (research), in dissemination (formation) and application of knowledge (innovations).

Additional vocational training is the main structural element of continuous education and is designed to react to the enquiries of the society and national economies immediately. Presence of generated general and professional competences of a specialist that determine his competitiveness testifies of professional competence that makes up the human capital. Gradual development of the conception of knowledge management shows that the first phase of knowledge management is based on implementation of knowledge management in organizations through the creation of the

database or knowledge storage facility. The second phase of knowledge management is focused on the creation of knowledge as collective resources, which in the future will be capable to help enterprise during changes in the environment. The third phase of knowledge management considers knowledge as competence, which is capable to develop new knowledge and innovations in the future. Evolution of development of knowledge management shows that initial function of knowledge and the concept of knowledge management, methods and approaches in knowledge management, as well as necessary skills for knowledge management changed.

Education management is a multivariate phenomenon and covers the most of aspects of the activity of the organization. Knowledge as a strategic resource begins to be used to the full extent when accessible models, strategies and control system of knowledge are developed. The organization creates knowledge through the interaction of obvious and implicit knowledge, which is called knowledge transformation. Knowledge transformation is a process of social interaction, which is not limited to one person. Base of the model Socialization- Externalization – Combination – Internalization (SECI) is that the knowledge is created by the workers and transferred to others within the organization. Socialization is a process, in which individuals exchange experience, sights and ideas. This process takes place at the exchange between the employees of the company and buyers or suppliers. The organization receives information from them, transforms it into the knowledge, and hereinafter uses for the achievement of purposes.

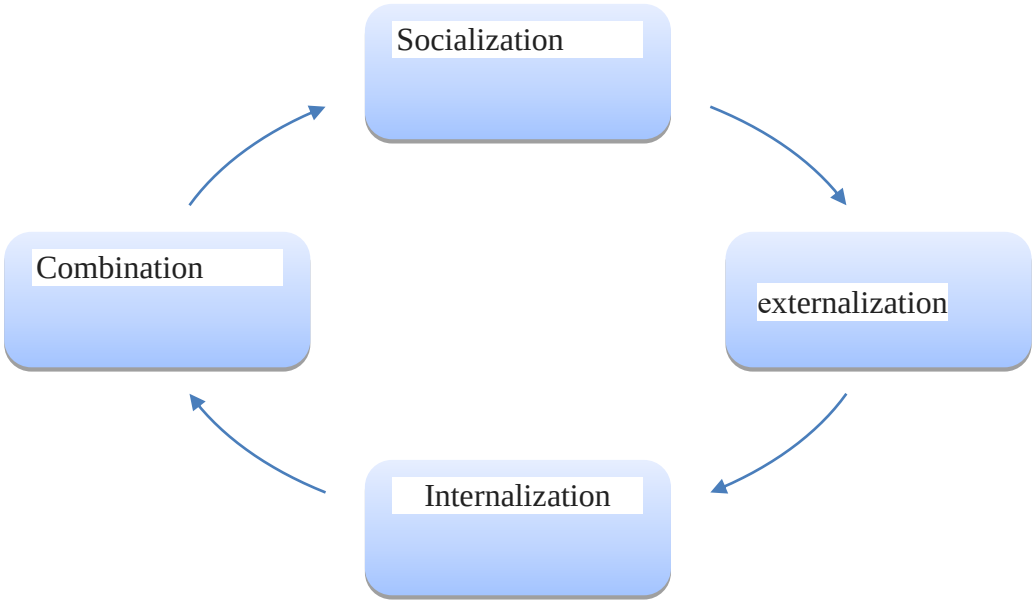

Figure 4. SECI model

Externalization is a process, during which implicit knowledge transforms into obvious. Implicit knowledge, which is possessed by the employees of the company, buyers or suppliers, becomes accessible for all other participants in the form of obvious knowledge, which hereinafter turns into new knowledge. The combination is a process, in which exchange, unification and reconfiguration of obvious knowledge to more difficult and systematic blocks of obvious knowledge takes place. At this stage, the creation of the database and knowledge storage facilities takes place. Internalization is process, in which obvious knowledge is acquired and transformed into implicit knowledge under internalization process.

Four processes of the SECI model include the main components for optimal creation of knowledge, which is created by the individuals and are further used by the company due to the

system of knowledge. There is a possibility to divide knowledge's features into two groups: First group is codification. It strengthens the opportunity of the organization to codify knowledge into obvious one. It allows companies storing, using and disseminating knowledge faster. The second group is a network. It stimulates spread of knowledge through personal contacts and increases amount of implicit knowledge.

Codification is most suitable for such processes as externalization and combination, as it allows to acquire obvious knowledge, while network suits for processes such as socialization and internalization most, because it possibly involves creation and transfer of implicit knowledge. The important role is given to the teaching organization, which aims to system educational process training for effective utilization of intelligent resources.

3. Results and Discussion

One of the ratings of scientific potential development of the country is inside expenditures to research and development (further R&D). In the Republic of Kazakhstan, according to the data of Committee of Statistics Ministry of National Economy of the Republic Kazakhstan, 386 organizations were engaged in researches. This figure increased by 3 units compared to the previous year (in 2016 there were 383 organizations). On analyzing positive tendencies of development of science in the country, it is necessary to note outlined dynamics that indicate the prevalence of the growth rates of the quantity of scientific personnel engaged in R&D above the growth rates of the amount of scientific organizations (Figures 5, 6). 22985 persons were engaged in scientific researches and development, including 17421 specialists-researchers were operational. The given tendency has resulted in positive reproduction of research specialists. This is illustrated by the increase of human resource inflow to the research personnel, as well as to the R&D.

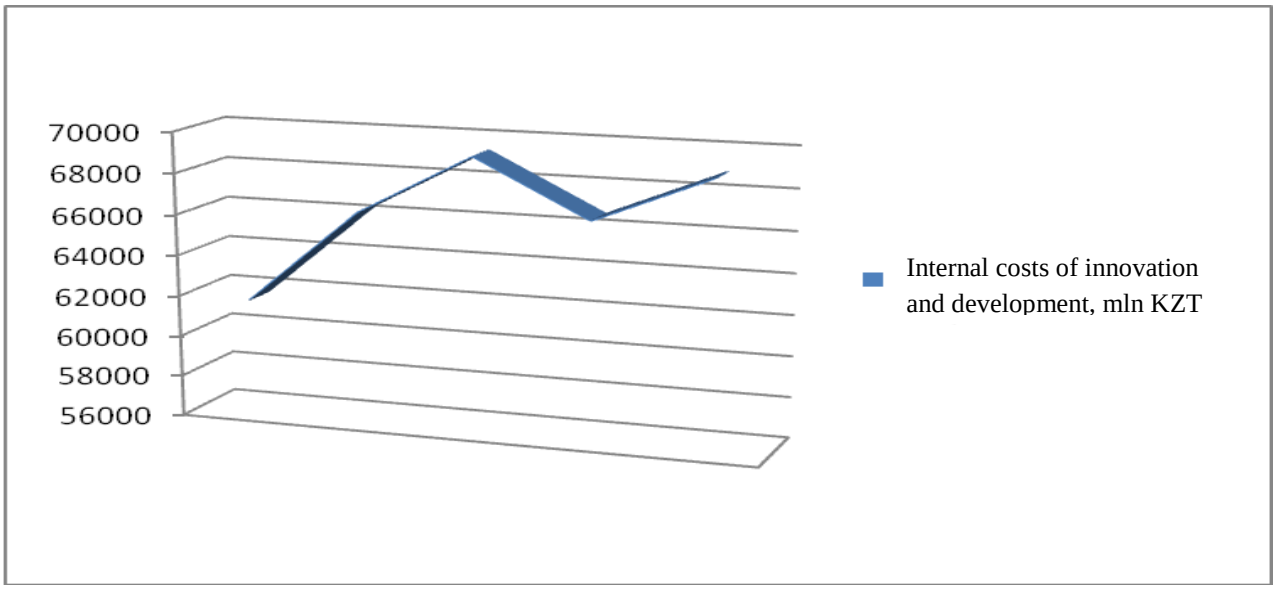

Figure 5. Internal expenditure on R&D

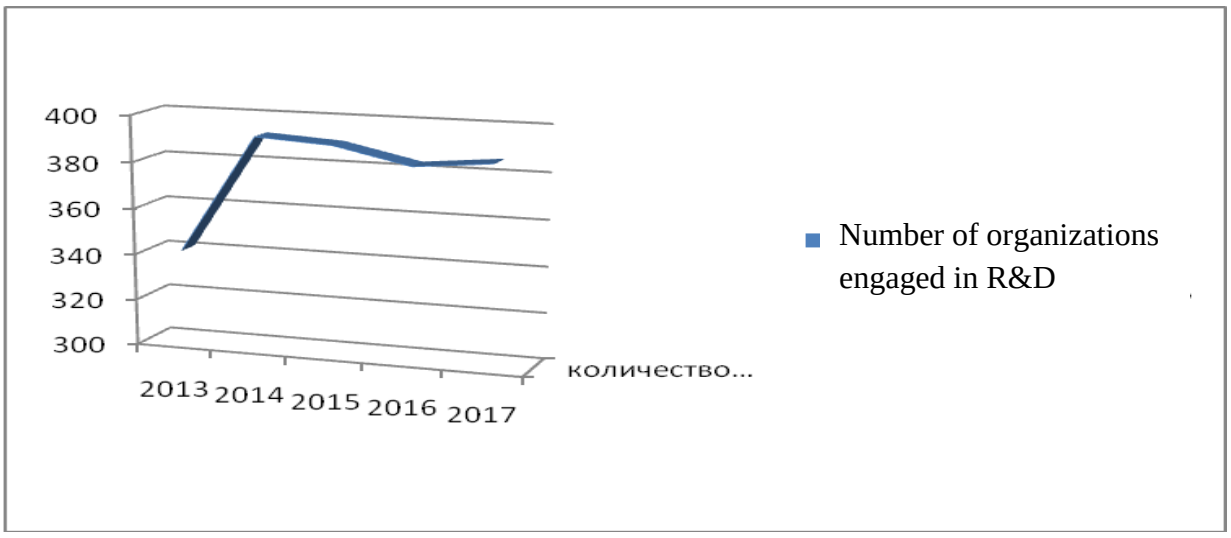

Figure 6. Amount of organizations carrying out R&D

The number of organizations that conducted scientific researches increased in Astana and in 8 other provinces: Atyrau, East Kazakhstan, West Kazakhstan, Karaganda, Kyzylorda, Mangystau, Pavlodar, and North Kazakhstan. In spite of the fact that active development of the network of the scientific organization was observed in Astana, Almaty continues to remain the main center of the science of the Republic Kazakhstan. From the total amount of the organizations, 39% were related to the business sector of economy, including organizations and enterprises, whose primary activity is connected with the manufacture of products or services with a view of sale. The next group of organizations that had close figures was the higher education institutions. Universities, other higher education institutions, despite the source of financing and legal status, associated scientific research institutes, experimental stations and clinics that are under control of the universities.

Public sector includes the organizations of the Ministries and departments that are funded by government and is designed to meet society needs as a whole, as well as profitless organizations that are mainly financed and controlled by the state. The number of the organizations of public sector have ramified network of formations on scientific researches. These organizations are not stable and change each year. It is possible to note a tendency in the field of organizations that perform researches and development. The greater number of higher education institutions are engaged in researches. At the end of analyzed period, 93 universities were engaged in scientific researches. Another significant factor that favors the development of the country ‘s science is the fact that fluctuations of the growth rates of science financing practically do not influence the growth rates of the number of personnel engaged by R&D. This implies that there is a low elasticity of a number of scientific personnel from volumes of science financing. This is caused by the steady and active mechanism of the salary of scientific personnel that does not depend from volumes financing under the project according to Law of Science of Republic of Kazakhstan. As a whole, the decreasing elasticity of the number of scientific personnel to fluctuations in expenditures on R&D shows that science became more appealing for the population.

Within recent years, the number of personnel engaged in by R&D in this sector increased practically by more than 5 times (535%). Despite the growth of the research personnel, scientists believe that economical potential of the country is not enough supplied by the potential of scientific specialists. The number of scientists per 1 million people in Kazakhstan has level that is comparable to countries such as Malta and Mongolia. According to the method of comparison of a number of scientists per 1 million people with the GDP per capita, deficiency of scientific potential can also be

observed. Against a background of growth of state and own expenditures, the decrease of share of foreign direct investments is taking place. At the expense of the state budget, a share of top vocational training and non-commercial sector is growing. A significant share (42,5%) of the workers who executed scientific researches and development works in the sector of top vocational training. According to data provided by analytical tool Incites, tool processing information from the base of quotation Web of Science Core Collection, if Kazakhstan was 90th on the list based on the number of publications among more than 200 countries in 2013. Then this indicator improved in 2016 and had 80th place. A share of Kazakhstani publications in information resource for under study period grew more than to 2 times - from 0,033 % in 2013 to 0,076 % in 2016 (according to a data Web of Science Core Collection, Clarivate Analytics).

One of the most important ratings of productivity of scientific researches and development is a patent activity reflecting technical and technological achievements in the national economy. Patent activity is a proof of the innovative potential of the country, level and perspectives of scientific and technical development of the country. In Kazakhstan, according to data of state-owned enterprise National institute of intelligent property (NIIP) the amount of proceeded applications to the objects of industrial property increased by 5% and accounted for 6948 units in 2016 as compared with the previous year. Majority of proceeded applications were for trademarks - 4719 applications, from which national applicants sent 3111, and 1608 by foreign ones. 1221 applications were related to inventions, from which 990 were from national applicants, and 31 from foreign ones. 716 applications were related to useful models, from which 654 were from national applicants, and 62 from foreigners. The development of patent activity of Kazakhstan can be generalized as positive (Figure 7).

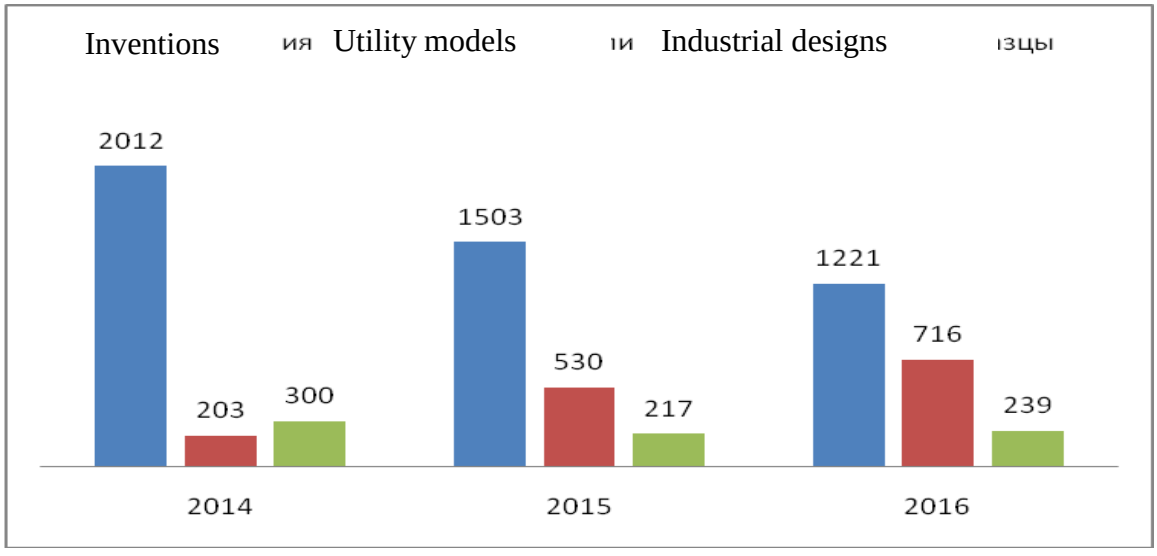

Figure 7. Dynamics of handing of security documents, 2014-2016, unit

As compared with patent activity, commercialization activity appears more inspiring - average annual growth rate accounts for 22, 5% as compared with the growth rate of patent activity (4%) (Figure 12). In such a manner, internal expenditures to researches and development in the absolute expression grew by 2, 5 times for the last decade in Kazakhstan. The striking feature is that capital expenditures have doubled in the structure of internal expenditures. The state budget is the main supplier for the development of the R&D sector and its role has been rising.

The indicator that characterizes the level to which human resources are involved in scientific researches and development, correlation of workers who executed R&D 10 thousand persons

engaged in the economic sector. As a whole, this rating decreased from 28,7 to 26,9 R&D engaged workers by 10 thousands in 2016. The average republican level of this rating was exceeded only in the cities as Almaty and Astana and in East Kazakhstan. This fact testifies of low degree of the involvedness of human resources in the scientific researches and development in these areas. That regional science is related to applied science mainly (Table 1).

	Workers that conducted R&D, total quantity, thousand persons	Number of researcher specialists, total quantity, thousand persons	Engaged in economics, total quantity, thousand persons	Workers that conducted R&D per 10 thousand persons engaged in economics	Number of researcher specialists per 10 thousand persons engaged in economics
Republic of Kazakhstan	22 985	17 421	8553,4	26,9	20,4
Akmola province	652	422	416,4	15,7	10,1
Aktobe province	323	258	408,6	7,9	6,3
Almaty province	983	685	985,3	10,0	7,0
Atyrau province	400	295	296,4	13,5	10,0
East Kazakhstan province	2 205	1 529	684,3	32,2	22,3
Zhambyl province	327	238	501,1	6,5	4,7
West Kazakhstan province	756	595	319,5	23,7	18,6
Karaganda province	1 458	1 067	656,4	22,2	16,3
Kostanay province	556	441	493,5	11,3	8,9
Kyzylorda province	228	142	328,6	6,9	4,3
Mangystau province	700	596	277,8	25,2	21,5

Table 1. Number of personnel engaged in research and development, by 10 thousand engaged in the economy, for the country and separate provinces of Kazakhstan

The international rating of the best world universities (QS World University Rankings) evaluates the activity and quality of research activity. One of the main criteria of achievements in the area of education and science is personnel internationalization. Therefore, this rating is accepted as one of the most important indicators of scientific activity. 277 foreign scientists, including 240 citizens of CIS and 37 citizens of distant foreign countries worked in the field of science in the end of 2016 in Kazakhstan. The pattern of engagement of foreign scientists is following: their share remained on the former level in the end of 2016. However, this indicator increased to 277 persons, which includes 37 scientists from countries out of CIS.

4. Conclusion

Qualitative formation of mental potential eventually affects the economics ratings of the enterprise activity favorably, and influences the national economy as a whole.

1. Process of monitoring of knowledge's consists of a constant interaction between human resources, which are directed to integration with all various objects, components and organizational activity, and are aimed to planning the process of production, support and increase of the knowledge base in the knowledge management system.

The knowledge management system of the organization is based on the formal organization and formal knowledge. First, the organization contains persons and groups, both formal, and informal, as well as formal power structure. Each person or group is considered as a purposeful independent object, which is in interaction with the other members of the group, with other groups and with the organization as a whole. Therefore, initially it is necessary to create a knowledge base. Then, this base should interact with other group members, other groups and organization as a whole. For creation of the knowledge management system in the organization, it is necessary to take into account the elements of organizational environment as the organization is in constant interaction with other organizations and systems both internally and externally. Knowledge management is an important factor for the development of the system inside the organization environment due to the correct organizational environment, culture and structure knowledge can be bought, used, received and transferred. The organizational knowledge management system consists of the following factors and components:

- The base of the appropriate knowledge;
- Knowledge power structure, organizational culture, etiquette;
- The criterion of checking and the evaluating of knowledge;
- Creation of the knowledge base (knowledge management) including the criteria of examination;
- Internal and external spread of knowledge, community practice;
- The consequences of knowledge spread in the organization,;
- Technical infrastructure for knowledge support, search, display, service, transfer, storage connected with to the knowledge base and integration of knowledge;
- Educated and formed, trained specialists who will use knowledge base;
- Educated and trained specialists who can engage in knowledge management.

Hence, in order to be competitive and successful, organizations should create and to support a balanced portfolio of intelligent capital, to establish the common priorities and to integrate purposes of intelligent capital control and efficient process of knowledge. Human capital is the main in receipt of new knowledge, especially because employees possess the knowledge. Substance of knowledge is in constant updating and change, and it means that knowledge always has innovative character. Thus, the organization should create conditions for advancing knowledge of the employees, pursuant to changes in environment and innovative knowledge control facilities. Companies is seeking to create conditions for effective interaction of the elements of the opportunities model. These elements are important for the development of the organization as a whole.

2. The university is a knowledge establishment and its politics can be considered as the way of improvement of its knowledge management system. The precondition of effective organization of the knowledge management system is the availability of the information. Due to use of modern technologies, the knowledge management system supplies opportunity of creating and controlling the knowledge. However, the information technologies are not the same that knowledge

management. They are important components, which supply knowledge management system so to ensure the efficiency of the system of interaction.

4. The universities should increase their research budgets in order to strengthen their patent portfolios and to transform the results of researches into justified prototype models. University managers, in this sense, should consider stimulation of the faculty activity on technology transfer. Strengthening of a network of universities, industries and government can serve the university managers to attract industrial or state financing and indirect engagement.

5. The human capital of the university is the key for implementing transfer factors of the university technologies. Programs for expansion of human capital should be realized. The universities should concentrate their resources on strengthening of the quality of the faculty in separate branches of the knowledge and technologies and on creating the joint efforts for technology transfer through co-operation.

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