

# CHAPTER 12. ECONOMIC SCIENCES

## INNOVATION SYSTEM OF UKRAINE: STATE AND PROBLEMS OF DEVELOPMENT

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**Abstract.** The materials of the research contain the analysis of development state of the Ukrainian innovation system. The concept of alignment, which was replaced by the concept of “designing of profit and profit making nodes”, was investigated. This trend was encouraged by the development of globalization processes, in particular competition. The views of domestic scientists on innovation are researched. In one case, innovation is interpreted as the result of the scientific creative process in the form of new technologies, knowledge, methods, etc., and in the other – as a process of introducing new products, principles, elements instead of existing. It has been found that inattention to technical professions is formed in society and transits into family education (parent guidance, negative public experience and media neglect) and schools. We have detected the main problems, restrictive factors, tasks to be solved during the process of stabilization and renewal of national economy. The national innovation system is considered in the context of compliance with the international measurements and the concept of transition to the formation of knowledge society. *The aim* of this article is to identify the main disproportions of the development management of the national innovation system. In our study we have used the *method* of comparison, confrontation, system analysis as well as survey. *Research results.* It is proved, that the main restrictive factor while forming of comprehensive whole and developing of its breakthroughs is inconsistent, and sometimes destructive management, insufficient activity of public administration and residual financing of needs. For almost 20 years in

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Ukraine, there were two peaks of innovative financing: both due to external factors. We have identified the differences between the needs of the national innovation system, business expectations and the requirements of international regulators. In general, this can be diagnosed as a consequence of an institutional destructive policy at the state level. *Recommendations.* Forming of an effective and competitive national innovation system requires the legislative and tool consolidation of innovative development of the country, creation and structuring of the innovation market under national control.

### 1. Introduction

The world market community has begun to focus on the convergence of the public and business interest since the 90's. At first the society had such tasks and motivations as: creation of favourable climate for the entire business; soft investments in the infrastructure (personnel training, improvement of regulations); development of partnership between the state and private sector; private sector invests in the common weal; priority of target domestic investments, strengthening of competitive advantages in the corporate sector (priority of public sector). According to the tasks the state used the following tools: global strategy of competitive development and stimulation of increase in local firms; support of inter-community network consolidation and cooperation; promotion of economic interdependence of corporate groups; improvement of quality of labor resources; efforts to improve the quality of life of the society.

At this stage an approach was developed. As a result the creation of "autonomous mechanisms" in the problem areas as well as promotion of private entrepreneurship are of higher importance than direct state regulation of regional development. The concept of equilization has been replaced by the concept of "designing of profit centers and ensuring of efficiency". This development of globalization process, in particular competition, was the main cause. The cost leadership remained to be the basic means of competitive advantage. The use of innovations as a source of higher productivity became very important.

**The purpose of the study** consists in identification of problems of creation and implementation of scientific knowledge, technologies, provision of innovation process and functioning of national innovation system.

The above-mentioned conditioned consideration and critical analysis of the following tasks: efficiency of state regulation of innovations;

problems of implementation of innovations in the national education; the quality of knowledge generation and their direction; research of innovation infrastructure; as well as the level of innovation of national production.

**Object of the study.** The components of the national innovation system.

The **methodology** of the study included statistical analysis, grouping, systematization, sociological surveys, questionnaires and special tools for processing personal data. The logic of presentation of the material follows the structure of the national innovation system. The logic of the study is subordinated to the task of analyzing the constituent parts of the national innovation system.

**Analysis of recent publications.** The following scientists are engaged now in the study of the problems of development: Buchanan M., de Bresson K., Feldman V., Trenado J., as well as national researchers: Amosha O.I., Andrushkiv B.M., Varnalii Z.S., Heyets M.V., Hovorukha J.A., Dryha S.G., Ilchenko O.O., Zianko V.V., Fedulova I.V. and others.

## 2. The state of the national innovation system

With this purpose the concept of national innovation productivity (NIP) was implemented. As a result, the world rating agencies and the economic agencies were able to evaluate the ability of the country – its political and economic management – to develop and commercialize the flow of innovative technologies under the long term conditions.

The modern world use the generally accepted methodology to rank the country's place in the international market system by a number of indicators, that characterize the development of the national economy, specialization of the country in the international division of the labor market and the development potential. GDP per capita is the basic index of estimation. According to this criterion, the circumstances are not favorable for Ukraine: in 2016 GDP per capita was only 2,100 US dollars (the lowest in Europe). We have compared it with the previous values, namely: 1990 – 1570 US dollar (according to the world Bank) ; 1999 – 635,9 (40.5% of the level in 1990); 2004 – 1370 US dollar (87,2% of the level in 1990); 2007 – 3069 US dollar (194%); 2010 – 2545,9 (or 82,9% of the level in 2007); 2014 – 3014,6 (or 25% less than in the previous year); 2185,9 (or 54.2% of the level in 2013). There is the highest fall in values during the periods of liberal democratic activation (2005-2010 and 2013-2016.) [1; 2]. The real

gross national product till 1990 was: in 1999 – 43,2%; in 2004 – 61,0% in 2010 – 41,7% in 2013 – 35,4% [3; 4].

According to the index of “Government Effectiveness” Ukraine ranks the 130th place among 144 countries. However, due to the development of human capital Ukraine received the 31st place, that corresponds to the level of development of developed market countries. According to the world Bank Ukraine is a country, where limited investment process may take place only according to the index of human resource development.

Productivity is one of the most effective tools of increase and development. And the best tool of its accumulation is the use of innovative tools for the development of potential.

Meanwhile, the value of innovation indicators and innovation activities has decreased by 8-15 times in comparison with 1990. Analysts believe, that this also prompts the effective workforce to an active migration.

The national innovation system includes the following elements:

1. State regulation (legislative, structural and functional institutions).
2. Education (institutions of higher education and scientific production enterprises).
3. Generation of knowledge (research institutions and organizations).
4. Innovative infrastructure (production, technological, financial, informational, analytical, expert and consulting components, including industrial parks, technopolises, innovation centers, technology transfer centers, etc.).
5. Production.

The national innovation system has to ensure an effective interaction between the components of subsystems in order to ensure the implementation of new knowledge, technologies and inventions through the production and business practice skills of personnel.

The novelty of the topic under consideration is the complex consideration of the problem of innovation in the national economy with an emphasis on the development of the food industry, as well as a critical understanding of the external and state factors of the restoration of systemic innovation development of the country. Together with the urgent current needs of innovation activity, it determines the relevance of the topic.

The current world economic situation is characterized by some features that encourage the improvement of tools for the development of economic agents. Firstly, before the success of the economy and enterprise was

based on control over natural resources and capital and at present the society exists under the conditions of “intellectual economy”. Secondly, the increase in consumption is primarily determined by the use of information products and services rather than by the increase in demand for the traditional mass industrial products. Thirdly, the gap in public welfare between the countries producing intellectual and innovative products and those that focus on the production of industrial goods is increasing. Fourthly, the most significant component of accumulation of common wealth is the development of individual abilities of person, the joint human capital, and the best investment to ensure a high market position is investment in human development.

Science intensive technologies affect the development of society as a whole. The share of technological innovation in GDP of economically developed countries ranges from 70 to 90% [5]. Western researchers consider the innovative behaviour of enterprises to be a combination of the following factors:

- 1) the volume of changes that they cause in the range of products, production processes and organization of activities of the enterprise;
- 2) the number of activity directions of the enterprise, that they change;
- 3) the number of functions, tasks and methods of work that they change;
- 4) the difference between the current products, processes and the previous ones [6].

Domestic researchers have two major points of view concerning innovation. According to the first point of view the innovation is being interpreted as a result of scientific creative process in the form of new technologies, knowledges, methods, etc., according to the second point of view – as the process of introduction of new products, principles, components instead of the existing [7; 8].

In the 90s the United States left Europe and Japan behind due to the concentration of innovations and stimulations of the development of the industries of the 5th wave. The United States reduced costs in the industries providing information technology due to the expansion of specialization in the framework of international labour division and immigration, that helped to keep the low wage rate in subsidiary industries. Moreover the wages in the sector of the 3rd and 4th wave were considerably reduced in order to maintain competitive advantages. It resulted in the advantage in costs compared with Europe.

The innovation process aims at the creation of new markets, products, technologies and services and is implemented in close cooperation with the economic environment. Its objectives, pace and dynamics significantly depend on the state of socioeconomic environment in production sector. The base of the innovation process is a harmonious combination of creation and operation of new equipment and technologies with the investment mechanisms that support its implementation. In the market economy industry and business science (with the exception of corporation states) are not able to engage in this studies. Because the industrial innovation are the result of long term fundamental researches. The fundamental science is a priority in the development of innovative processes, because it is a generator of ideas and it opens the way for new areas of exploratory researches. If we consider the costs on basic research to be one hundred percent, the research developments require squared costs, the research and design work requires the fourth power of costs, introduction and release of new product requires the eighth power of costs [9].

The reasonable macroeconomic approach favors the implementation of innovation development if not only innovative-investment policy, but also a number of other areas of government regulation (technological, structural, fiscal, privatization, social and environmental policies) are the basis of optimization. And above all the task of the state, which abandoned the path of self-destruction, is to focus on the mobilization of domestic resources, to eliminate external control, because it is an economic and institutional trap, to bring the control system to conformity with the national needs and to set the rate of use of human capital. It will be the best managerial innovation in Ukraine.

According to the Global innovation index Ukraine ranked the 50th place among 127 countries in 2017 [10]. Human capital is the main part of national competitiveness: the country ranked the 41st place. The main restraining element is the low of R&D expenditures (54th place in the ranking) that cause the migration of existing and potential scientists outside Ukraine.

According to the index of “Institutions” Ukraine received the 101st place, according to the level of development of infrastructure – 90th place, according to the indicators of markets effectiveness– 43.2 or 81st place (trade and competition – 48, credits – 71, investment – 107), according to the “business experience” index – 51st place (according to the number of brain workers – 41st place, according to the innovative knowledge – 72d, according to the

knowledge perception – 63d place). At the same time the country demonstrates a high level of research efficiency – 32nd place and a low-impact of its implementation – 77. Quite high is the index value of “creativity” – 49th place, online creativity – 47th place. According to the global competitiveness index Ukraine has received the 82nd place between Brazil and Bhutan.

According to the Bloomberg (100 point system) South Korea was the leader of the rating 5 years in succession – 89,28. In accordance with the criteria the rating of Ukraine is as follows: the share of expenditures on research activities in GDP – 47; the effectiveness of industry – 48; growth of GDP per capita of the adult population for three years – 50; percentage of local high-tech companies in the business of the country as a whole – 32; the effectiveness of higher education – 21; concentration of scientists – 46; patent activity – 27.

*For reference:* the effectiveness of education is calculated as the proportion of graduates graduating from higher education institutions to the share of graduates with engineering and technical education. In the western market countries university education is considered to be a part of academic one and humanities. And the competitive advantage of the country is mainly obtained by technical and technological advantage. Then the methodical approach becomes clear. There was the period of 1990-95's in the history of market economy of Ukraine, when namely the market transformation caused the situation, when the engineering specialists were not engaged into the non-specialized employment. For 20 years it was impossible to get actual and decent employment in the engineering profession. As a result people are not interested in technical education in the country (in 2017 only 3 applications were submitted to the Faculty of Mechanics at the National University of Food Technologies). This situation reflects the structural changes in the economy and resulted in to the country's de-industrialization. The lack of attention to the technical professions is formed in society and is reflected in family education (parental attitude, negative public experience and media neglect) and schools (lower quality of teaching of exact sciences, especially in towns and villages, lack of out-of-school encouragement through public circles of technical development and lack of material and technical base for their functioning).

This conclusion agrees with the data of sociological research conducted by the leading national agencies. The destruction of social growth through education and ability to use skills in working practice force youth to focus

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on the societies with a defined and formalized program for acquiring a high social status.

Table 1

### Guidelines of social growth, %

Response	Ukraine			EU		
	2009	2012	2016	2009	2012	2016
High intelligence	30.3	31.8	36.6	56.1	60.8	60.1
Ability to circumvent the law	33.1	33.1	29.2	5.3	5.5	4.7
Social status of the family (origin)	37.9	38.6	33.9	24.2	22.5	14.9
Good education	25.8	26.4	20.7	49.0	48.4	52.2
Focus on enrichment, individualism	46	45	42	47	43	42
Possibility of self-realization in own country	66	56	32	83	86	88
Confidence in government	23.3	28.8	10.6	63.1	67.6	55.3
Importance of science in society	35	48	34	67.3	70.2	78.3
Authority take into account the recommendations of national science	33	35	33	58	67	72

*Based on the sources [11]*

Having analyzed the given data, we have noticed, that the scientific and educational guidelines for social growth are available in the European system of development of the individual and society as a whole. In our opinion, this factor significantly influences young people as well as professionally developed members of society when choosing the place and jurisdiction of the implementation.

Ukraine received the 35th place according to the rating of compulsory education, the 45th place according to the number of researchers, according to the quality of scientific institutions – the 41st place, according to the employment – the 27th, but legal regulation of labor market remains to be the the main problem – the 103rd place.

The position of Ukraine in the “Innovation” rating became worse, except for the index of “Availability of scientists and engineers.” The worst position is in category “Government procurement of high technologies and products” – from the 86th place to the 92nd, as well as in the category of “Relations between university and industry” – from the 57th to the 73rd place. And the only positive trend is in the category “access to the Internet per 100 people”.

In comparison with the place of Ukraine in the innovation index, European innovation scoreboard from 2010 till 2017 has deteriorated its rating by 4.2%.

According to the Global Competitiveness index Ukraine Ranked the 69th place in 2017 among 118 countries, but in 2016 Ukraine received the 66th place.

In general, this is a consequence of an institutional destructive policy at the state level.

Meanwhile, Ukraine has exclusive positive examples that have been implemented counter to the situation: 7 Ukrainians are among the top 100 of the best innovators in Europe in robotics, biosensories and computer literacy, production of power efficient homes, HR technologies, media and Internet tools [12].

### **3. Legal basis of the national innovation system**

Legal basis for an effective operation of the national innovation system is provided by a complex of laws of Ukraine. There are more than 25 international treaties in the field of scientific and technical activities. They create favorable conditions for cooperation and updating of scientific equipment. The Government of Ukraine has defined the main tasks in the sphere of cooperation in the following articles of the Association Agreement between Ukraine and the European Union: 157th, 159th, 372rd, 375th, 376th. The implementation of these articles will contribute to creation of environment for the transfer of technologies and for the simplification of the use of commercial innovative products.

Analysts note the lack of an integral management system of the national innovation system: the functions are allocated between the Ministry of Education and Science of Ukraine and the Ministry of Economic Development and Trade of Ukraine. As a result, there is no coordination between the investment policy and innovation projects. Moreover, a significant number of restrictive measures of the Ministry of Finance of Ukraine hinders the implementation of innovations and hinders the development of scientific and technical capacity.

However, there are positive improvements: in 2016 a separate National Committee for Industrial Development was created, in 2017 the National Council of Ukraine for Science and Technology Development and the Council for Development of Innovation were formed. However, their activ-

ities are not coordinated. As a result, it is not possible to ensure effective impact on the Government's decisions on the development of innovations.

The identified problems become worse at the regional level.

Many elements of the innovation infrastructure don't work, innovation parks and incubators are closed (in 2005 the system of scientific and technological preferences has been suspended in terms of legislation). Legislative proposals on improvement and development of innovation activities have been refined and marked up for many years.

### **4. The state and development of education**

According to the index of Global talent Ukraine has got a high rating. Human resources are always characterized by a high level of qualification. Perhaps, therefore, Ukraine has become one of the largest exporters of labor (more than 2 million citizens work abroad). The number of students and institutions of higher education is decreasing: in 2017 only 1369,4 students studied at 287 institutions of higher education. These indexes are 35% and 17% respectively less than the same indexes in 2010. For many years no more than 10% of the national investments are allocated to the university science (15 million a year).

In 2016 an external audit of the Ukrainian innovation and research system was launched in Brussels. International experts observed an extremely unsatisfactory state of national innovation system. The participation of the private sector at the level of 20% of the total expenditure in the state on science is very low in comparison with its corporate capabilities. Basic machine building has turned from development driver into a deterrent factor, that hinders innovation mechanisms.

Experts underlined, that Ukraine belongs to the countries with the highest level of “superfluous education”: in the final document they wrote, that 80% of young people study at universities. And it is too much for Ukraine. This document was approved by the Ministry of Education and Science of Ukraine. The level of “superfluous education” is the highest in economic and legal sciences. At the same time the entrants are not interested in natural and technical sciences. In addition, the national economy is not able to admit such a large number of highly skilled people, on the contrary, there is lack of semiskilled specialists with technical qualifications. At the same time, the percentage of students, who continue their postgraduate study is too low in accordance with the European standards [13].

During the independence years, nobody has created proper conditions for the development of science and for the introduction of innovations. Expenditures of the state budget for research make only 0,22% of GDP. Although the developments of domestic scientists are annually sent to the Cabinet of Ministers of Ukraine and ministries only a few inventions are realized practically. However, world experience shows, that the results of scientific research are not able to be effectively and quickly realized only on the market basis without significant state support.

National science operates within the 6th technological paradigm, and 94% of production consist of the 3rd paradigm with the elements of the 4th and 5th ones. It is impossible to change this situation without active intervention and strategic purposeful work of the state, because business (both large and small) exploit the natural raw material base of the country and is aimed at getting maximum results in a short time.

### **5. Production and innovations**

Innovative activity of enterprises remains extremely low for years. So, from 2010 to 2016 the volume of realized innovation products in the domestic market was decreased by 32% and in export by 21%. In 2016 the share of high-tech products was decreased by 17%, and medium-tech – 43,1% in comparison with indicators in 2002. The main sources of financing remain the company's own funds: 85%. At the same time, the share of low tech industries was increased to 41,3%.

For many years the innovative activity of the national industrial enterprises remains critically low. According to the State Statistics Service of Ukraine only 18.9% of enterprises implemented innovations in 2016: only 723 enterprises implemented innovations, of which 400 applied new technological processes, and 570 – implemented innovative products. However, the volume of fundamentally new sold products in the period of 2009-2016 did not exceed an average 10 % of all sales. According to the global trend the costs of the research, prototyping and production of finished goods for market make up a proportion of 1:10:100.

From 1998 to 2004 the share of enterprises using innovations increased from 10,5% to 14,5%, then decreased again to 8,2% in 2005, increased in 2011 to 12,8%. According to the researchers the share of innovative products was declining in the period of 2005-2010 and 2013-2017 [13; 14]. The share of realized of innovative products often decreased to the level

of 3,8% (2010), whereas this index in developed countries consistently exceeded 20%.

The enterprises producing food products, beverages and tobacco products carried out the most active innovative activities – 21,6%.

These industries are interested in the wide range of products, expansion of markets, improvement of quality, introduction of new technologies, receipts and equipment. The enterprises of these industries focus on private investment opportunities with a rare involvement of international loans from foreign co-owners. The leading industry experts think, that it is necessary to create more scientific and technical centers, provide access to favorable financing in order to activate innovation activity. The food industry as well as other industries mainly use own resources at the level of 75%.

At the same time, only 9,7% of enterprises manufacturing non-metallic mineral products, 9,2% of the enterprises of mechanical engineering and 8,7% of the metallurgy enterprises of were implementing the innovations during 2012-2017. The share of metallurgical products in the global exports of goods made up 2,3 %, engineering products – 40,5 %, and in Ukraine 39,7 % and 13,6 % respectively [15]. Innovative activity of the latter was focused on the direction of the introduction of advanced technological processes. As a result, the number of low-waste and resource-saving processes has increased by 63,3%. Having analyzed the financing, we note, that most funds were allocated for the purchase of machinery and equipment, but not for scientific research (10,6% of total funding) [16].

Analysts note, that a significant share of innovative activities involves marketing and management technologies. The trade and service sector applies marketing and management technologies rather than technological innovation. First of all, it is about the means of product promotion, PR and HR activities, electronic commerce, logistics and motivation of personnel. 5.6% of funds allocated for innovation were spent on financing of this direction.

Over the last 5 years budget financing of strategic priorities of innovative activity was carried out in the following areas: technological innovation and development of agro-industrial complex – 59,4%; the smallest financing was in the direction of the introduction of new technologies and equipment for quality medical service, treatment and pharmaceuticals – 2,6%. At the same time, the total funding budget was fulfilled only by 75,5%. The funding of medium-term priorities was fulfilled by 74,2%. At the same time, the funding was reduced by 40% of the annual volume in 2014.

For the period of 2012-2016 5671 technologies were created at research institutions for budget funds. Only 10.8% of these technologies were transferred to industrial enterprises and 0,8% were sold on the external markets. During this period 36 advanced technologies were purchased for budget funds. 97,5% of these technologies were purchased in 2012. It should be noted a significant deterioration in the relationship between the number of implemented technologies and innovative products. In 2000 this ratio averaged 1:10,92, in 2005 – only 1:1,74, and in 2017 – only 1:1,09 [16].

For almost 20 years there were two peaks of innovative financing in Ukraine: in 2007 due to the external borrowings of the owner and in 2011 due to external arrangements, partnerships and external investment. The latter allowed us to double the level of funding of innovation activities in the industry. But in the period of 2006-2016 the share of innovative enterprises in industry was steadily decreasing. Such situation proves, that there are no necessary prerequisites for the functioning of the investment-innovative model of development in Ukraine. The reason for this is the fact, that the realization of competitive advantages created due to the high-tech products in the domestic industry is almost absent. At the same time, this situation leads to a high risk of investment in innovation. As a result the cash flows decrease. Investors choose the less risky traditional industries: today 75% of investments in Ukraine are in the industry of the 3rd paradigm, 20% in the 4th paradigm and 4,5% in the 5th paradigm. The industries of the 3rd technological paradigm have the highest level of re-equipment and modernization – 83%, and the industries of the 4th paradigm – only 10%.

In the period of 2000-2004 the State Statistics Service of Ukraine conducted surveys of managers of industrial enterprises regarding the reasons for low innovation activity. We have carried out own research in the period of 2007-2016. But our sample was significantly smaller.

Having analyzed the results of the survey and the data of scientific observations and statistics, we reached the following conclusion:

1. in the entire period from 2000 to 2016 the matter of financing was not settled. Attraction of venture, loan and other market resources was limited and speculative, and ensured only “skimming”. The received profit was taken out of the country regardless of the source of income (80% of the revenues came from offshore sources for short-term funding of developments that are complete by 80%).

**The main obstacles  
to the innovation activity of enterprises (survey results),%**

Factors of negative influence	According to the IFC		The answers of managers of enterprises	
	2000-2004	2007-2016	2000-2004	2007-2016
The lack of funding	75	23	86	92
Customers don't have enough money	50	12	40	50
Underdevelopment of finance and credit system/high credit rates	42	22	39	50
Imperfect legislation	25	15	32	38
Undeveloped raw materials base	15	15	29	29
High economic risk	30	18	24	28
Low demand	8	10	15	34
Lack of international relations	25	12	11	12
Strict/preferential state regulation	28	10	15	29
Corruption	10	38	12	22
Bad public administration	36	22	12	28
Owner's/investor's reluctance	6	6	15	34

*Based on statistics and own surveys*

2. Legislation and public administration are situational and preferential. The author has investigated this question in many publications.

3. Non-market forms of restraint became barriers: opportunism of the owner, greed effect, resource orientation of the markets in the country.

### 6. Innovation infrastructure

The process of basic adjustment and modernization of the enterprises requires the use of special means of support: government support, tax and procedural benefits, creation of special zones and incubators. All developed countries did everything in the same way. However, the international community has called Ukraine for structural changes, modernization of equipment and production technologies and simultaneously it has strongly demanded abolition of preferences and economic support measures: the World Bank, rating agencies, intergovernmental meetings, the International Monetary Fund have repeatedly emphasized these demands in their documents. The severest demands were in the periods, when Ukraine tried

to join the global funding at the state level (IMF requirements on the eve of the receipt of loans), to enter the international market organizations (2005 WTO and 2014 the Association agreement with the EU). Because of such leverage Ukraine has reorganized the State innovation Fund into the State innovation credit institution (2000); suspended, the adopted in 1999 law of Ukraine “On special regime of innovation activity of technological parks” has been abrogated (2005). Thus Ukraine doesn't have own tools to support the national innovation production. But the industrial parks started to operate. They were based on foreign investment and foreign control of selection of directions of innovations and areas of application of innovative production (2006). At the same time the innovative developments were implemented with help of business incubator (creation of prototype, current engineering model) through financing of venture and private investment funds. The objective “organization of development, production and put science intensive, high-tech products on Ukrainian and foreign markets” [17]. The change of economic orientation of the country made it possible to restart the activities of industrial parks (2012), to create jobs, to development modern production infrastructure. At that time, there were more than 30 industrial parks.

In recent years the number of institutions of scientific and technical information has been substantially reduced, the number of regional centers of scientific and technical information has been reduced or their subordination has been changed, the Ukrainian Center for Scientific and Technical Information has been reorganized, its resource support has been weakened, therefore the information resource does not conceptually and organizationally meet the needs of the innovative economy.

The integrity of the development of the National innovation system. The issues of formation and development of national innovation system periodically become the object of consideration at the Parliamentary hearings. In 2007 such hearing was held for the first time. In 2009 the “Strategy of innovation development of Ukraine for the period of 2010-2020 under the conditions of globalization challenges” was discussed and the Concept of development of the national innovation system for 2009-2013 was approved. Even at the level of higher state authorities this period is recognized as the most productive. This period is characterized by a consolidated governmental approach to the needs of innovative development of the economy.

At present, there are two programs documents on innovation development in Ukraine: Sustainable Development Strategy “Ukraine 2020”, the program of activities of the Cabinet of Ministers of Ukraine on implementation of the Association Agreement between Ukraine and the EU. The Plan of measures on the implementation of the Concept of reformation of the state policy in the innovation sector for 2015-2019 is aimed at the realization of these directions. In accordance with the Plan it is necessary to develop strategies for the development of high-tech industries, as well as a number of specified laws. The process of approval of the bills continues for more than two years. The National Academy of Sciences is trying to compensate for sluggishness or inactivity: there was a report “Civilizational Choice of Ukraine: Paradigm of Understanding and Action Strategy”, “Innovative Ukraine 2020«. The program “Foresight” has been developed. It is a program of innovation and investment development of NAAS for 2016-2020. And the Mechanism of implementation of this Program has been also developed. All these data were submitted to the Cabinet of Ministers of Ukraine. These documents are being processed since 2016.

Meanwhile, Ukraine continues to lose its competitive position in the markets of high-tech goods and services. According to the State statistics service of Ukraine 75% of patents of national owners are no longer valid because of non-payment of fees to maintain efficiency, only 7% of patents are used in the economy. The reason is the lack of incentives, long-term and resource consuming method of registration. As a result, there is a process of “patent migration”, which is annually at the rate of 10-12%. This process is particularly characteristic for the direction of development of medicines, IT technologies and for pharmacology [16].

Moreover the imbalances in the training of specialists are increasing: there are three times more lawyers and economists than specialists, that are able to generate new knowledge, specialists in physics, mathematics and advanced technology and specialists, that are able to provide innovative development of economy.

### 7. Conclusions

Having analyzed the state of the national innovation system we have found a number of negative factors that hamper its development. These negative factors include slippery political decisions, reduction of governmental attention. These factors have influenced the type of managerial decisions, pri-

oritization, funding, legislative support. Particularly urgent is the inadequate regulation in the area of intellectual property. There are also problems of commercial implementation of scientific research results. It is caused by disinterest of rental business, poor infrastructure and lack of support in the processes of international registrations of intellectual property rights to the inventions.

The vast majority of innovative solutions are considered without regard for the prospects. Only business aspect and the rate of recoupage of investments are mostly taking into account. Unfortunately, the scientific activity is not included into the list of state priorities: there is a constant reduction of funding both for institutions and scientific research. At the same time, this situation leads to negative shifts in personnel, promotes the outflow out of the country of talented young people and well-known experts. The scientific potential of Ukraine is almost excluded from the economic and management process of the society – the science intensive capacity of industrial production is at the rate of only 0,3%, the knowledge management capacity of commercial structures – 2%, public administration – 5%. This situation creates a steady lag in technical and technological directions of development and establishes the raw material orientation of the national economy for the future.

The revival of scientific and technological power of Ukraine, strengthening of its competitiveness and formation of powerful national innovation system is observed in several directions:

- renewal of the value of science and innovation at the level of state policy, including the formation of the strategy of innovative development, activities, execution of tasks in form of Program with independent funding;
- implementation, legislative and instrumental securing of innovative development of the state on the basis of formation of innovative market under the control and accountability of the executive power of the country, region, industry.

Implementation and realization of these tasks requires not only political will, continuity of governmental policies but also creation of systemic approach based on strategic vision, development prospects and international cooperation, legislative regulation. Fulfillment of tasks requires improvement of the state management of innovation processes in the state, proper economic support, improvement of forecasting system for long-term outlook, target priorities and improvement of education system, preservation and support of scientific personnel of the state.

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