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THE ANALYSIS OF SCIENTIFIC ACTIVITY IN UKRAINE AS A COMPONENT OF NATIONAL ECONOMY'S INTELLECTUALIZATION

The development processes of scientific activity in Ukraine are investigated; the actual condition and the trends of indicators changes, which characterize the intensity and efficiency of scientific activity, extent of its use for the intellectualization of the national economy are defined. The results evaluation of preconditions, scopes and effectiveness of scientific activities in Ukraine are generalized.

Key words: *scientific activity, intellectualization, the national economy, the economy, analysis.*

The statement of the problem. The level of intensification and efficiency of economy's intellectualization, as any other macroeconomic process, depends on the appropriateness of its planning and henceforth on the implementation of reasonable decision-making. Therefore, it is necessary to incorporate not only the effectiveness of scientific and intellectual activities, its commercialization and competitiveness enhancement of individual economic agents or national economies but as well as favourable prerequisites for development of scientific and innovative activity, necessary and available resources provision for population and economic agents, efficient management and motivation, especially in basic economic activities, appropriateness of control and state regulation of the mentioned processes in the theoretical and methodological basis of economy's intellectualization analysis. In view of this it is expedient to carry out the investigation.

The analysis of research and publications. The issue of scientific activity and innovation has been extensively studied in the papers of such scientists as T. Bogolib, V. Geyets, I. Galytsia, A. Halchynskyi, T. Smovzhenko L. Ligonenko. However, taking into account these investigations, there is a necessity of analytical calculations of scientific activity in Ukraine for the corresponding findings concerning the development of economy's intellectualization.

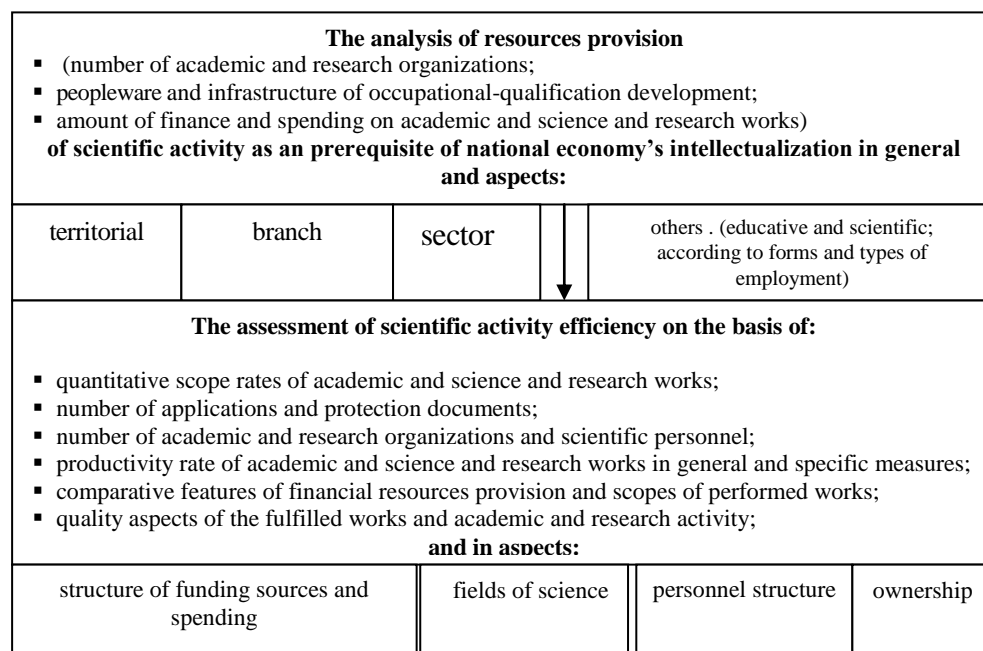
The purpose of the article is to carry out an analysis of scientific activity in Ukraine as an important component of economy's intellectualization.

The main material of the investigation. The analysis of the prerequisites, scopes and efficiency of scientific activity is the first stage in the complex study of the present state of economy's intellectualization. Here the information database forms for the findings concerning the prerequisites of innovation enhancement in the state (as the features of business and scientific activity in the sphere of intellectualization), that directly impacts the scopes and efficiency of intellectual property's commercialization (one of the main indicators of intellectualization in the enhancement system of national economy's competitiveness).

It should be noted that in the scientific papers the appropriateness of decomposition of economic processes into the elements of internal structure is proved. The elements encompass an economic independence (that is based on the past, i.e. resources provision, mature market and institutional infrastructure), stability and rigidity (that is determined by the efficiency of the processes at present, the absence of destabilizing factors, the availability of stimuli and guarantees of rational development of the processes in case), the ability to develop and advance (that depends on mature development prerequisites, potential fulfillment, especially in the enhancement system of national economy's competitiveness) [1, p.14]. In our opinion, these aspects are to be considered while validating the research methodology of level and efficiency of national economy's intellectualization. Thus, it is a good thing to define the analysis of resources provision within scientific activity as the first stage (scheme 1).

Nowadays domestic statistical observation isn't sufficient for information database creation and methodological principles for a deep and comprehensive study of national economy's intellectualization, but some assumptions about the prerequisites and scopes of scientific activity can be made.

Thus, in Ukraine in 2011 there were 1255 organizations that performed science and research works and 134,7 thousand workers were employed, including 4417 doctors of science and 1620 candidates of science; 9591.3 billions of hryvnas were spent on science and research works [5, p.8]. The largest number of the organizations, which carried out science and research works, was concentrated in Kyiv (327), Kharkiv (189), Lviv (76), Dnipropetrovsk (73), Donetsk (63), Odesa (48), Mykolaiv (43), Lugansk (41) regions and Crimea (41). The least number was in Khmelnytsk (6), Zhytomyr (10), Volyn (12), Rivne (13), Ternopil Kirovohrad (14), Zakarpattia (15) regions and Sevastopol (14). Thus, an unequal distribution of academic organizations on the territory of our state is observed, that isn't a positive factor for the balanced prerequisites of national economy's intellectualization.



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The identification of development prerequisites:			
<ul style="list-style-type: none"> ▪ level of implementation of research findings; ▪ development of an institutional infrastructure of scientific personnel training; ▪ financing patterns of science and research works; their shares in GDP; ▪ rates of employment and training of scientific personnel; ▪ rate of incorporation of scientific research into material production, demand increase for them and amount of finance; 			
sources of financing	form of establishment's property	establishment's structure	personnel's categories

Scheme 1. The stages of assessment methodology of scientific activity in the system of national economy's intellectualization (suggested by the author).

It should be mentioned that the number of organizations, which performed science and research works, diminished during 2007-2011 by 149 units and by 10.6% - from 1404 to 1255 units. It's quite understandable that it wasn't caused by a keen competition in this economic activity, therefore it can't be considered as a positive one; moreover, on average about 50 academic and research establishments account for one region in Ukraine, and the proportion of population, employed in academic and research works, is only 0.3%.

Table 1. The data about a scientific activity in Ukraine in 2007-2011
(calculated by the author after [2-5])

Indices	Years				Index deviation 2011 to 2007	
	2007	2009	2010	2011	Absolute (+/-)	Relative (%)
Number of organizations that performed academic and research works	1404,0	1340,0	1303,0	1255,0	-149,0	89,4
Number of employees that carried out academic and research works, thousand	155,5	146,8	141,1	134,7	-20,8	86,6
Number of doctors of science, involved in academic and research works	4390,0	4443,0	4481,0	4417,0	27,0	100,6
Number of candidates of science, involved in academic and research works	16976,0	17135,0	17009,0	16203,0	-773,0	95,5
The percentage of employees with scientific degree, %	13,7	14,7	15,2	15,3	+1,6	x
Spending on academic and science and research works, billions of hryvnas	6149,2	7822,2	8995,0	9591,3	3442,1	155,9
Spending on academic and science and research works per one employee with academic degree, thousands of hryvnas	287,80	362,51	418,57	465,15	177,3	161,6
Spending on academic and science and research works per one employee, thousands of hryvnas	39,54	53,28	63,75	71,20	31,7	180,1

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That caused a drop in the number of employees that carried out academic and research works,- from 155.5 thousand persons in 2007 to 134.7 thousand persons in 2011 – by 20.8 thousand persons or 13.4%, that is worth being considered as a negative trend, which is accompanied with brisk rates. In spite of this, the number of doctors of science, involved in scientific and technical works, in 2011 to 2007 increased (by 0.6%), that positively influences the quality of the works since they are performed by the specialists of high qualification. Moreover, the percentage of employees with scientific degree increased during the analyzed period by 1.6 per cent points (p.p.), whereas the number of candidates of science decreased by 4.5% (773 persons).

A trend that reflects an increase in the spending on academic and science and research works should be considered as a positive prerequisite of economy's intellectualization in Ukraine. Moreover, the rates of the spending increases during 2007-2011 were 155.9% (over 3.4 billions of hryvnas). The improvement of financing (along with the drop in the number of the organizations in case) positively correlates with an increase in the scopes and quality improvement of academic and science and research works. It leads to a revival in the sphere of intellectual property commercialization. To wit, the prospects of such prerequisites of economy's intellectualization are outlined by the spending on academic and science and research works per one employee (the index increased from 287.8 thousands of hryvnas to 465.2 thousands of hryvnas in 2011; the rates of the spending increases were 161.6%) and per one employee with academic degree (this index increased during 2007-2011 by 80.1% and was 71.2 thousands of hryvnas (2011) per one employee – a candidate or doctor).

In Ukraine a considerable dependency between the lines of scientific and research establishments and economy's intellectualization is observed, since in 2011 45.4% of academic and science and research works were performed by the organizations which belong to business sector, 40.5% - to state, 14% - to higher education and less than 1% to private non-profit sector (table 2).

During 2005-2011 the percentage of state scientific and research organizations increased from 33.2% to 40.5% (by 7.3%) and it keeps rising (by 1.03% last year). It indicates that the role of the state in this sphere becomes stronger. However, the percentage of the organizations in business sector decreases – by 10.01% in 2011 and by 1.4% last year. It indicates that the role of scientific and research organizations in intellectualization and competitiveness of Ukraine's economy diminish.

Table 2. The total count and structure of the organizations that perform science and research works according the sectors in Ukraine, 2005-2011 (calculated by the author [5, p. 10]).

Sectors	Years							Absolute index deviation 2011 to	
	2005	2006	2007	2008	2009	2010	2011	2005 p.	2010 p.
Total count	1510	1452	1404	1378	1340	1303	1255	-255,00	-48,00
State, %	33,2	35,2	35,3	35,9	37,2	39,5	40,5	7,30	1,03

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Business, %	55,4	52,8	51,9	50,7	49,1	46,8	45,4	-10,01	-1,40
Higher education, %	11,4	11,9	12,7	13,2	13,5	13,7	14,0	2,63	0,36
Private non-profit, %	-	0,07	0,07	0,15	0,15	0,08	0,08	0,08	-

It is positive that the total body of the organizations that perform academic and science and research works in our state is structured. Thus, the largest number of the organizations is subordinated to the National Academy of Sciences (15.5%), Agricultural Academy of Ukraine (8.6%), Academy of Medicine (2.8%), and Academy of Pedagogical Sciences (1.3%).

In Ukraine there is a rapid expansion of the establishments which train scientific personnel. The number of postgraduate courses increased by 25% (from 418 to 524 units), doctoral studies did by 27% (from 209 to 266 units) during 2000 to 2011. Thereafter, the number of post-graduate students increased by 47% (from 23 to 34 thousand), doctoral candidates did by 44% (from 1.1 to 1.6 thousand).

It is positive that the proportion of persons that completed their studies (1995-2011) increased. Thus, a coefficient with post-graduate students increased from 0.19 to 0.25; with doctoral candidates – from 0.2 to 0.3. That positively influenced the proportion of the persons who completed the studies and defended the thesis. The index with post-graduate students increased from 3.2% in 1995 to 6.1% in 2011, with doctoral candidates – from 4.4% to 7.8%. We think that this efficiency index of scientific personnel training in Ukraine remains low, because the proportion of people who graduate postgraduate courses and doctoral studies without thesis's defense exceeds the proportion of those who receive an academic degree. Thus, in 2011 an excess with post-graduate students was 18.9%, with doctoral candidates – 22.2%.

During the analyzed period some changes has occurred in the personnel structure of academic organizations: the percentage of employees in state sector increased (by 5.5 p.p.) and the percentage of employees in business sector decreased (by 5.9 p.p.), that is considered to be a negative trend in the framework of intellectual potential in the economy.

An increase of specialists of higher qualification that work in different sectors of Ukraine's economy is considered to be a positive trend. Thus, on October, 1 of 2011 14.9 thousand of doctors and 85.0 thousand of candidates of science worked in the economy that was more by 3.3% and 1.2% than on October, 1 of 2010.

Besides personnel, the favourable prerequisites of national economy's intellectualization are extensively determined by financial provision. Hence, it is positive that financing of academic and science and research works in Ukraine increases annually (table 3).

Thus, in 2011 they constituted 9.6 billions of hryvnas that was 4.7 times more, than they were in 2000 and more by 6.6% than they were in 2010. But the level of the spending accounts only for 0.73% of Ukraine's GDP (2011) that is extremely small. In the advanced countries a larger share of GDP is assigned for the development of science which provides innovations in the economy. It is necessary to point that spending on academic and science and research works in Ukraine increases annually. Thus, in 2000 it constituted 1.2%, whereas in 2011 it was 0.73%.

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The evidence of the improvement of finance provision for academic and science and research works in Ukraine is an annual increase in financing per one employee. However, it is understandable that larger part of the spending covers payroll (that isn't very high in the economy), welfare and operating costs (rent, connection etc.). With such situation there are no real incentives to spur scientific activity in Ukraine and use its findings for the development of the economy.

Table 3. The data on financing the academic and science and research works in Ukraine in 2000, 2005, 2010-2011 (calculated by the author after [4, p. 79, 80, 92-94])

Indices	Years				Index deviationg (% / p. p.) 2011 p. to	
	2000	2005	2010	2011	2000 p.	2010 p.
Total amount, billions of hryvnas	2046,3	5160,4	8995,9	9591,3	y 4,7 p.	106,6
Amount of finance per one employee of main activity, thousands of hryvnas	10,9	30,2	63,8	71,2	y 6,5 p.	111,6
Share of financing in Ukraine's GDP, %	1,2	1,1	0,9	0,73	-0,47	-0,17
The percentage in total financing:						
- state budget,%	30,0	33,2	41,2	40,2	10,2	-1,0
- local budgets;%	-	0,5	0,3	0,3	0,3	-
- extrabudgetary funds,%	0,9	0,5	0,5	0,2	-0,7	-0,3
- own funds; %	3,0	6,6	9,7	8,8	5,8	-0,9
- customers' funds – Ukraine's enterprises and organizations,%	38,4	32,6	21,8	23,8	-14,6	2,0
- customer's funds – foreign units, %	4,4	24,4	25,7	25,8	21,4	0,1
The percentage in financing according to the sectors						
- state sector %	36,1	30,2	36,3	37,9	1,8	1,6
- business sector, %	58,8	65,1	57,3	55,7	-3,1	-1,6
- higher educationи, %	5,0	4,7	6,3	6,3	1,3	-
- private non profit sector,%	0,1	-	0,1	0,1	-	-

The percentage of spending on academic and science and research works in 2010 against 2011 decreased by 1.0 p.p., but remained a substantial one – 40.2%.

It is positive that the proportion of customers' funds, namely of the units from foreign countries, has been increasing lately. It provides intellectualization and as well as foreign investment growth in Ukraine. A decrease in the proportion of business sector is less favourable prerequisite for national economy's intellectualization. Thus, its percentage diminished in 2011 in comparison with 2000 by 3.1 p.p. with an increase in financing a state sector (by 1.8p.p.) and higher education (by 1.3 p.p.).

Summing up the above mentioned analysis, we generalize the definition of the prerequisites of economy's intellectualization in Ukraine (table 4).

Table 4. The assessment findings on the prerequisites, volumes and efficiency of state's academic activity on the post-crisis stage of Ukraine's market economy (2000- 2011) (elaborated by the author)

Assessment features	Positive aspects	Negative aspects
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- of the prerequisites	<ul style="list-style-type: none"> • availability of considerable personnel and institutional potential; increase in the proportion of specialists with higher qualification in personnel structure; • sufficiently rational branch division of the organizations that perform academic and science and research works, deployment of a large part of personnel potential in ministries' staff that supervise the branches of the economy; • refinement on personnel's categories; 	<ul style="list-style-type: none"> • uneven distribution of academic organizations and their personnel in a territorial aspect; • decrease in the number of organizations that perform science and research works and their personnel (in business sector); • small number of science and research organizations that perform orders for individual economic agents with considerable added value (industry, transport, construction); • low proportion of the employees of science and research organizations with academic degrees;
- of scopes	<ul style="list-style-type: none"> • increase in spending on national economy's intellectualization; • improvement of financing scientific personnel and science and research works; • dominance of business sector in financing and fulfillment of the works; 	<ul style="list-style-type: none"> • scanty share (its decrease) of amount of finance for science and research works in macroeconomic indicators; • small proportion of population and economic agents, involved in science and research works; • insufficient rates of state's involvement in financing and incentive creation for efficiency improvements; • decline in business's involvement in research activity and its financing
- of efficiency	<ul style="list-style-type: none"> • ; decline in business's involvement in research activity and its financing; • high efficiency ratio in business sector in comparison with state and science • increase in the share of scientific personnel that complete their studies and defend their academic papers; 	<ul style="list-style-type: none"> • decrease in the number of fulfilled academic and science and research works per one employee of main line and per one organization; • high rates of financing over labour productivity in research and development sphere; • decrease in the scope of fulfilled works in business sector; • domination of the persons that complete their studies but don't present their academic papers to defend; • "gap" between science and production and low implementation of research results • low efficiency of scientific personnel training for budget funds;

Conclusions. Despite the positive trends towards increased and improved financing, domination of business sector in financing, there are some constraining forces: scanty share of financing research and development works in macroeconomic indicators, a small proportion of population and economic agents, involved science and research works; insufficient rates of state's involvement in financing and incentive creation for efficiency improvements; a persistent trend of decline in business's involvement in research activity and its financing. It requires

further research of the development of scientific activity in the framework of the Ukraine's state policy of economy's intellectualization.

Список використаних джерел та літератури:

1. Моделювання економічної безпеки: держава, регіон, підприємство / Геєць В.М., Кизим М.О., Клебанова Т.С., Черняк О.І. та ін.; [За ред. Гейця В.М.]: Монографія.-Х.:ВД «Інжек», 2006.-240 с.
2. Наукова та інноваційна діяльність в Україні. Статистичний збірник. – К.: ДП «Інформаційно-видавничий центр Держкомстату України», 2008. – 361с.
3. Наукова та інноваційна діяльність в Україні. Статистичний збірник. – К.: ДП «Інформаційно-видавничий центр Держкомстату України», 2010. – 347с.
4. Наукова та інноваційна діяльність в Україні. Статистичний збірник. – К.: ДП «Інформаційно-видавничий центр Держкомстату України», 2011. – 382 с.
5. Наукова та інноваційна діяльність в Україні. Статистичний збірник. – К.: ДП «Інформаційно-видавничий центр Держкомстату України», 2012. – 305 с.