Journal of Siberian Federal University. Humanities & Social Sciences 1 (2009 2) 94-103
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УДК 001.89:378.33

Russian and Foreign Experience of Distributive Relations in the Sphere of Science and Education Integration

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Received 24.02.2009, received in revised form 03.03.2009, accepted 10.03.2009

In the given article we consider peculiarities of distributive relations in the sphere of science and higher education in developed foreign countries. We raise the problems of development of distributive relations, which appear in the process of becoming of scientific and educational components integration in the sphere of the Russian higher education.

Keywords: integration, distributive relations, higher education, science, researches, financing sources, state budget, institution of higher education (IHE).

Introduction

In the conditions of modern market, a steady development of the economical system greatly depends on technological innovations creation and expansion, innovations which being a result of scientific researches, carried out by different universities. Development of market relations radically changes economical conditions of the higher education sphere functioning, which, being a source of new knowledge, transforms the knowledge into a competitive product. Thereat, innovative pattern of the country economy development changes the role of the higher school, and now it consists in the native industry innovative way of development, i.e. in active participation of IHEs in innovative projects realization in the science-technical sphere. Market economy demands to move the institutions of higher education out into the rank of the main organizations of knowledge-intensive production development, which take part in scientific knowledge transformation into a source of economical growth; and in the result of this process, innovations and their practical appliance become a source of profit in the scientific-educational cognition in the modern world.

Thus, training of specialists, being able to meet the requirements of the innovative economy, becomes the main target of the higher education sphere in the world scientific-educational process, i.e. they must be not only its active participants, but innovation subjects in all the spheres of the social life. Being based on scientific knowledge, education becomes a vitally important condition, which contributes to the salaried employee's competitive ability, becomes a personal demand and a significant factor of the market competition.

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And, in present time, only an educated specialist, being able to apply the newest research and development implementations in practice, can count for him being demanded in the labour market, feels reassured concerning his material support and well adapts to the conditions of the modern informative society. Naturally, training of such specialists is done in higher professional institutions, which fulfill the following main functions: reproduction and growth of the intellectual, scientific-technical, and cultural potential of the nation (Gendler and others. 2005, P.64) for all the branches of the national economy.

Innovative form of the market economy development determines the necessity to involve the higher education sphere into the market relations and to form its innovative sources of financing in dependence on scientific-educational services demand and supply. Consequently, distributive relations in the sphere of science and higher education integration must acquire a qualitatively new form, which brings these two components development to an adequate level.

That is why salvation of the problem of influence of distributive relations mechanism on the science-and-higher-education integration is very important for development of any country economy.

Opinion 1: Foreign institutions of higher education pay special attention to fundamental researches and developments. Fundamental sciences development requires forming a common creative environment for students, aspirants, tutors in the so-called scientific-educational centers, precisely the kind the institution of higher education becomes under the conditions of innovative market economy. It is possible to organize IHEs' scientific activity only if there is a developed university infrastructure. Both educational and scientific components of the IHE require significant investments.

In western countries, IHEs' scientific research financing is done at the expense of universities' budgets, grants, subsidies, and donations. Abroad, freedom in creation and usage of innovations greatly contributes to the development of innovative activity. State support of universities is concluded in creation of funds, centers, innovation development agencies; in other words, the state fulfills the functions of an investor.

The main source of education sphere financing is the state budget. The share of country's budget, distributed for IHEs' scientific-educational activity, has a tendency to cutting in most European countries. It is connected with the fact, that now a huge mass of people has a possibility of higher education and for the state financing it has become simply back-breaking to provide it on an adequate level.

Cutting of the budget financing has not at all any negative influence on the IHEs' science development and educational process of universities in foreign countries. Besides budget funds, governments of developed countries also include means of biggest branches of industrial construction, agriculture, service industry, big, middle and small businesses in to the system of distributive relations, and thus they have created maximally profitable conditions for IHE and business collaboration. They have worked out a policy, setting priorities of collaboration of universities and industry, as one of the most important conditions of innovative economy and social development. This policy realization support has been performed by means of creation of real financial mechanisms (for example, venture capital funds). They have improved the current legislation in order to give universities more possibilities and fillips in their activity of scientific research results commercialization. And in the result of that, the sphere of higher education has begun to receive means from

non-governmental sources – industry, private companies and so on. But, at the same time, governments of developed world powers do not permit any risk of IHEs' scientific research activity suspension in case of financial crises at the subsidizing enterprises, and that is why the main share of expenses for IHEs' fundamental researches still lies on the state budget.

Opinion 2: Having considered the main peculiarities of distributive relations in the sphere of higher education of developed world countries, let us address the experience of scientific and educational processes integration in the institutions of higher education in Russia.

The modern Russian pattern of distributive relations in the sphere of higher education and science was formed at the beginning of 90-s of the previous century and since that time it has not been practically changed at all. Up till now, there prevails a residual principle of financing of these kinds of activity from the state budget means.

Transition of the Russian economy to the new management conditions was hazardous for higher education by big problems, i.e. in terms of IHE science development. Sharp cutting of the budget financing brought to research activity recession in the educational institutions. Most institutions did not have enough means for realization of educational process at least on an average level, and most of IHEs had to forget about science research activity at all.

One of the reasons of such attention to the question of integration of higher education and science is concluded in the following condition of the Russian economy, when for the present moment, the national economy is not the main consumer of the intellectual product. The matter is that in structural development of the Russian economy there prevails oil-gas and metallurgical export tendency, while manufacturing industry, including those branches, producing means of subsistence, give up their positions in favour of the branches of raw materials. In Russia «since market transformations have begun, production in the sphere of light industry has declined by 90 %, in food industry declined almost by a half, and import of these branches continues to grow. The Russian market is full of imported TV-sets, refrigerators, washing machines, vacuum-cleaners and other major appliances, bringing its native production to the very minimum or to zero» (Medvedev, 2008, P.6-7). As it goes without saying, the necessity of means distribution among higher education institutions for the purpose of scientific researches carriage disappears for these branches by itself. If there is no industry, then it means there is no demand for scientific researches in this sphere. And those branches of industry, which have been the main consumers and orderers of the university scientific researches in electronics, electrotechnics, instrument engineering, machine-tool building, mechanical engineering and others, are collapsing. The government has made a stake at the raw resources, which export to the world market does not demand any science-intensive component. In the result of such actions, predominantly educative activity, being fully or partially rend from scientific work, becomes the main goal of most Russian higher education institutions. IHEs go in for extensive outreach of the educative activity, obtaining licenses for specialists' training in the spheres of jurisprudence and economics, in order to get some kind of possibility of survival.

As it was mentioned earlier, in Russia the principle of means distribution into the sphere of higher education and science is used to be called residual. From all directions one can hear complains of Russian economists concerning revenues, distributed to this economical sector. «Long lasting education under-financing and unwillingness of the state to change radically the given situation is a distinct symptom of its irresponsible attitude towards this most important

and strategically significant sphere. In 2003 in Russia, budget system education expenditures made up 3.5 % GDP, while in developed European countries it amounted to 5-7 % (here, we should also take into consideration the difference between GDP absolute values)» (Avdeeva and others, 2005, P.71).

According to the RF Fiscal Code, financing of educational institutions is carried out from the corresponding state (federal, regional, municipal) budgets. And what concerns the higher school, so then here «most part of the state higher professional education institutions are under the jurisdiction of federal organs of power. That is why their financing is done mainly by means of the federal budget (in 2004, 93.3 % of all the budget expenditures for higher professional education.) (Abankina and others,2006, P.50).

Example 1: the first place in scientific researches financing belongs to the United States of America and it is of no wonder, as far as this country economy is oriented for implementation of innovations. In the United States of America organization of fundamental scientific researches is mainly carried out in scientific-research centers and laboratories of higher education institutions. Results of these researches are included into educational programs, and thus, they attract most talented students to scientific work. «Universities' engineering centers are created on the base of largest universities of USA with financial support from the side of the government in order to stimulate the development of new technologies. They perform two main functions. The first function is aimed for researching of fundamental objective laws, lying at the root of design engineering of principally new systems. Such researches do not provide industry with a product or technology, being ready for implementation, but with a theory within the frames of engineering sphere, which later can be applied for salvation of production problems. The other function is directed to training of a new generation of engineers, possessing a necessary level of qualification and a wide scientific-technical range of vision» (Titova and others, 2007, P.46).

In the United States of America, the biggest share of scientific-research and design-experimental development (R&D) belongs to the military-defense complex. But, while creating a powerful military-defense potential of the USA, the Department of Defense does not leave without attention the sphere of education and supports university scientific programs, for example, in the sphere of mathematics and engineering.

The second branch of R&D in USA is considered to be the public health service. Paying much attention to public health, V.S. Public Health Service finances universitarian researches in the sphere of fundamental and applied medicine.

Let us consider the sources of financing of educative and scientific activities of the USA universities. The first one is a study-for-fee form of students' education. «About 30-40 % of financial receipts belong to this form of education in the private higher education institutions, and about one forth – in state institutions (Zamulin and others, 2004, P.27). The second source is means of the federal budget – it is presented in two forms of direct money payments: in the form of grants for scientific-research works on a competitive basis and means for fundamental scientific researches, making up «about a quarter of all the receipts in the universitarian treasury» (Zamulin and others, 2004, P.27). The third source is financing from the part of large enterprises and various business-structures, and also private persons, the share of such receipts is «about a quarter» (Zamulin and others, 2004, P.27) of all the budget of the USA universities.

Being directed to the real economy sector development, Governmental policy of the United States of America, brings considerable results,

for example, «the share of American industry accounts for 36 % of the market of science-intensive production» (Neshitoj, 2008, P.17), keeping the leading positions of the country in the world rating.

Literally till the end of 80-s of the previous century the People's Republic of China applied imported technologies for high-technology production. Using the experience of developed countries, the Chinese considered such a method of production to be the least expensive and hazardous. But, having quickly understood, that borrowed technologies would not make the country be one of the leading world powers, the government took the course for development of native innovations in science and engineering. At present time, the largest share of scientific researches is carried out in the universities of the country, and they create technology parks and business-incubators on their basis. For example, in 2006 13.3 billion dollars were invested into the university science (Hochberg and others, 2008, P.115), what accounted for 35 % (Hochberg and others, 2008, P.115) of all the expenditures for scientific-research works in CPR.

As far as such forms (technology parks and techno-centers) of integration of science and higher education are one of the leading in developed countries, we shall consider them closer. We shall analyze such forms of innovative activity as scientific and technology parks on the federal level. «Scientific Park is a form of collaboration of industrial enterprises with universities. Its main idea is: industrial companies create their scientific-research organizations and enterprises near universities and involve the employees of the universities for working with these organizations orders. In their turn, scientific workers have a possibility to apply the results of their research works in practice» (Titova and others, 2007, P.47). Such peculiar form of interrelation of science and industry takes place in some European countries, for example, « the Manchester city council, the city university and 4 of the local companies have formed a scientific park. There are involved 12 firms, 5 of them have collaborative research programs with the university. And for their realization they use the scientific personnel of the university. It gives the firms consultations concerning not only scientific problems, but also the questions of marketing and management» (Titova and others, 2007, P.47).

Technology Park is a form of functioning of «new technologies engineers with the firms, undertaking the risks. The model of a scientific-industrial center, created on the basis of the Stanford University in California, is taken as a pattern of Technology Park in many countries. This Technology Park consists of about 3 thousand small and medium-size electronic firms with a common number of 190-200 thousand people, working for it. » (Titova and others, 2007, P.47).

Scientific infrastructure development demands considerable financial resources, and for solving of this problem some institutions of higher education have begun to unite into consortiums, in order to merge financial means for collaborative scientific work. Two Flemish intercollegiate centers have consolidated their financial funds in order to perform scientific researches: Micro-Electronic Center (IMEC) and Biotechnological Center (VIB), where scientific infrastructure meets the highest international demands.

The following features are typical for education and science of the Federal Republic of Germany. The first one is concluded in the fact, that one of the main goals of the FRG federal government is the enhancement of cooperation of IHEs with research centers and industrial enterprises in the form of joint researches and fieldworks of firms' employees at the institutions. The second peculiarity is characterized by the international directionality of science and

education integration in terms of exchanging of students and scientists. In Germany, they involve most talented students for studies and scientific-research activity.

In Germany, financing of the higher professional education sphere is characterized by the following: the main part of financial expenditures for IHEs' scientific-educative activity falls on Lands' budgets. At the same time, in FRG they allot «16.5 % of national expenditures for science» for the share of university science financing. (Hochberg and others, 2008, P.115).

Example 2: in Russia, in the course of transfer to the market relations the share of GDP expenditures for science was sharply reduced. In 2001, the internal expenditures for research and development amounted to 1.16 % of GDP, while in USA, Japan, Korea, and Germany – from 2.5 to 3 % (Gvozdeva and others, 2005, P.99). Thereat, government subsidies for science were also quickly reduced: their share in GDP fell by half: from 0.99 to 0.47 % for the period from 1992 to 2000 (Gvozdeva and others, 2005, P.99). «In Russia, the volume of science budget financing is much behind its scales in the majority of the countries of «the Group of Seven»: if in our country it is approximately worth 5.1 billion dollars, then in Italy, Great Britain, France and Japan it is within the frames of 10-20 million dollars. In the USA federal budget for 2002, they allotted 87.2 billion dollars for science.» (Gvozdeva and others, 2005, P.99).

Let us consider table 1.

The data from table 1 show, that the number of IHEs, carrying out research works, have declined by 36 points for the period of 16 years. And from 1990 to 2000 sixty three higher education institutions ceased to be engaged in scientific activities. We pay our readers' attention to the fact, that in Russia the main part of scientific-research works are performed by scientific-research organizations, and in 2006 their share was more that 56 % , while the scientific activity of IHEs was only 11.5 %. For comparison, let us have a look at the following figures. If «in 1990 more than a half of the personnel, engaged in research and development, was concentrated in independent research institutes and engineering bureaus, then in 2006 it was more than 83 %. The unit weight of science expenditures is also significant – it is approximately 83 % (Hochberg and others, 2008, P.114). Thereat, we should not forget that both IHE and academy science carry out scientific researches for separate economical sectors, but not for the whole national economy, as it is in the developed countries of the world.

And what concerns the question of distributive relations influence on the integration of science and higher education, so here we are to underline that science development does not get its adequate

Table 1. Organizations, Carrying out Scientific Research and Development in Russia (Hochberg and others, 2008, P.114)

Periods	1990	1995	2000	2005	2006
Total	4646	4059	4099	3566	3622
Scientific-research organizations	1762	2284	2686	2115	2049
Developing agencies	937	548	318	489	482
Projecting and planning-and-surveying organizations	593	207	85	61	59
Experimental plants	28	23	33	30	49
Higher education institutions	453	395	390	406	417
Industrial enterprises	449	325	284	231	255
Other organizations	424	277	303	234	312

level within the frames of that one residual means distribution into the sphere of higher professional education from the state budget. «According to the volume of expenditures from all the sources for scientific research and development, Russian IHE science (in 2006 – 1.1 billion dollars at parity of purchasing ability) is approximately on the level of Finland, Norway, Denmark and Israel (1.1- 1.3 billion dollars), noticeably yielding not only to the major powers – the leaders of the world economy, but to such developing countries, as Turkey (2.5 billion dollars), Taiwan (1.7 billion dollars) and Mexico (1.6 billion dollars)». (Hochberg and others, 2008, P.115). So, the state turns out to be not at all interested in the development of the IHE sector of science. And development of applied technologies for manufacturing regional industries, within which structure there are branches, producing means of subsistence, is impossible without development of fundamental researches, which largest part is carried out in the higher education institutions.

Conclusion 1: the world experience of science and higher education integration has shown that science and higher education have a real value in developed countries of the world. Higher education institution becomes an integrator of scientific and educative activities. As a result, on the basis of scientific activity in IHE, there is a process of generation of new knowledge, the beginning of its transformation into innovations and transfer of knowledge in the course of educative process. Carrying out scientific researches for all the spheres of economy, higher school acquires some features of entrepreneurial structure, which is oriented for profit-making.

Creating special conditions for efficient IHE scientific-educative activity, foreign countries understand quite well that the rates of subsistence means production, providing a high level of the nation's welfare and the rates of economical growth of the country on the whole, depend on the level of qualification and training of the employees of all the sectors of the national economy, and also on the scales of science and technology prior branches development. The modern economical model of developed market economy is distinguished by the domineering of branches, which are directly engaged in the subsistence means production. But at the same time, development of means is impossible without the sphere, serving the social reproduction, i.e. the sphere of service. Services of educative and scientific character are vitally important for the whole country economy functioning.

That is why developed countries of the world have concentrated their centers of fundamental science development in the institutions of higher education and, thereat, we can observe a close connection of scientific and educative activities of universities, to which the system of financing, performed from various sources, has been adjusted. Collaboration of the state, business and education in the sphere of scientific research can be explained by the fact that higher school is harmoniously inscribed into the market relations in some foreign countries, and, thereat, distributive relations play the role of a sort of a motivator of science development on the basis of IHE. Thus, in order to attract means for IHE science development, governments of developed countries have created conditions for mutually-profitable collaboration of developed universities and the major production, and also minor and middle businesses. In these countries they have worked out a policy, which sets the priority of universities and industry collaboration, as one of the most important conditions of innovative economy and social development.

Conclusion 2: as far as in Russia the main part of the higher education financing is done from the state budget, then there quite reasonably appears a question – why not to solve the problem of increase of means for this sphere development

with the help of a simple increase of this very share, as far as its volume is much bigger in foreign countries, than in Russia? But, at present moment it is impossible. And the reason is again in the problem of development of branches, producing means of subsistence. The matter is, that the most important cost item for the sphere of higher education and science is the expenditure of labor» (Medvedev, 2008). So, functioning of all these activity spheres fully depends on the rate of this component of gross value added. In other words, possibilities of development of these activity spheres depend on the society's revenue position, which presents a mass of consumer goods, produced in the country, per one working person or capita» (Medvedev, 2008, P.8-9).

So, it becomes clear that, in order to increase the share of budget means for higher education and science, they need to increase the state budget itself, but on the account of growth of such of its component as a revenue in the form of wages. In its turn, the size of the wages fund and GDP total value «are mainly defined by the production of substance means» (Medvedev, 2008, P.8).

That is why «whatever distributive mechanism would be in the country, however we would re-distribute the revenues among various branches of national economy and different funds (budget and extra-budget funds), being spent for social needs, the upper limit of all the distributed sums is defined by the frames of that fund of substance means value, which has been created in the country and is subjected to final distribution and consumption» (Medvedev, 2005, P.21).

That is why the first direction of making science and education closer must become the increase of financing of IHE fundamental researches – for preferential development of manufacturing industries, including the branches, producing the means of substance. As far as the largest share of scientific researches for space, aviation and military industries are carried out on the base of scientific-research institutes. While fundamental researches mainly accrue to IHEs, as far as they are predefined by the university sectorial specificity and are the basis for further applied development. In order to take a steady and noble position on the world arena, Russia needs to develop the manufacturing sector of industry, and also to realize its scientific potential. And for these purposes the country needs significant investments, which inflow is possible only in the result of taxation and investment climate improvement in the country, and also due to more proportional means distribution among the branches of economy (at present moment up to 50 % of all the investments in Russia are spent for raw materials sectors).

The next problem of IHE sector science development is a formal separation of science and education in the question of financing. The system of separate financing of science and education in Russia is still working, though, at present time, the current RF legislation «Anent the Higher and Post-Graduate Professional Education» provides scientific-research activity carriage in educational institutions. So, there appears a question: where to get the means for scientific researches?

In 2001, they adopted a resolution, concerning the federal special-purpose program «Integration of Science and Higher Education in Russia for the Period of 2002-2006». It provided financing and conclusion of agreements with the winners of competitive selection for performance of highly qualified personnel training and scientific works carriage. How can one perform a competition, if one knows a winner beforehand? It is clear, that in their number there will be leading and famous universities of Russia (most part of them are situated in Moscow) with a well-developed scientific-educative and material base. Other IHEs (for example, small ones and situated in far regions of Russia) just have no material possibilities for innovative developments of educative and

scientific components. Such competitions can be performed only in case they provide a more or less corresponding material background for carriage of scientific researches and development to all the higher education institutions of Russia. On that score, the point of view of I.B. Fedorov seems to us to be very just: «All the amount of the budget scientific order is supposed to be distributed on the competitive basis and it is hard to argue against it. But, nevertheless, some comparatively small, but steady component (in some form) is advisable to be left for some IHEs – proceeding from the fact, that if we are speaking about the integration of science and education, then every (even enlarged) direction of students' training needs to be science supported, but it can be absent in case the competition is lost. This steady component (basic financing) can be defined as some normative financing of scientific researches, being carried out in the given direction in IHE» (Fedorov, 2005,P. 11).

Thus, IHE has to spend some part of means in the form of basic financing for scientific researches, and the other part should be appropriated according the work results, for example in the form of grants, and on the competitive basis. Besides, the Russian Academy of Science and other state academies have basic financing and, moreover, they take part in competitive programs, projects and grants. The matter is that ideally grant is given as to a scientific-research institute, so to an IHE for realization of some scientific researches. But, in the first case grant is a financial addition to the basic activity, while in the second case it is practically the only possibility to carry out research and development.

That is why it is necessary to hand over the main part of fundamental researches to IHEs and to form their corresponding financing in the sphere of scientific researches. In other words, in higher education institutions there must be financing of the integral educative-scientific process and, as it has been numerously underlined, it will bring not only to development of fundamental scientific researches, but also to a possibility of involvement of the Higher School graduates to scientific, research and practical activities, and in its turn, it will help them to better adjust to their professional surroundings.

Russia has yet to solve a mass of problems, connected to the process of integration of scientific and educative activities in the higher education institutions. And suggested in the given article measures for manufacturing industry branches and science development in order to develop and apply innovations; and also for elimination of the gap between science and higher school from the point of view of their joint financing can become the top-priority directions of these spheres gradual integration.

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