

INTEGRATION OF EDUCATION, SCIENCE, AND BUSINESS: CURRENT INSTITUTIONAL SOLUTIONS

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Abstract. The article discusses the problem of a lack of a national-level institutional solution to the problem of integration of education, science and business in Russia. For the purposes to develop recommendations, proven forms of integration based on international practices are reviewed and applied to Gubkin University. In developed world economies, integration of science and education is associated with technologization, the transition to knowledge-based industry embodied in the form of advanced structural amalgamations, such as Silicon Valley entities – clusters, technology parks and business incubators. Integration of academic and business communities is effected through the participation of business in the management of universities, both in the sphere of education by establishing close relations between competences highly demanded by the labor market and competences offered by higher education institutions, and in terms of administration of a university as a whole in its capacity as an economic agent. This interaction is implemented using various mechanisms that are discussed in detail in the article.

Keywords: engineering education, employer, competences, proficiency, forms of integration, supervisory board, endowment fund

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The problem of integration of education, science and production being the prerequisite for high quality training of engineering specialists and ensuring competitiveness of domestic economy is as actual today as it was in pre-war time [1]. The problem's relevance is continual.

Out beyond number are politicians' declarations, doctrines, and programs of every level, master treatises and doctoral theses on the subject. However, each subsequent attempt at finally tackling this problem reveals the lack of due consensus of the stakeholders.

In all fairness, it should be noted that a fair number of successful practices was developed, there is indeed considerable progress, there are effective models and striking examples in place (technical and vocational institutes at factories,

the “phys-tech” model (model developed by the Physics and Technology Institute), Pushchino State Institute of Natural Sciences and others). Yet, the crucial aspect is lacking – there is no consistency, the coveted triunity is not supported institutionally.

In the Soviet times, the necessary interaction between the higher education system and the production was ensured at the national level. A model charter of a university would state that Board of a higher education institution could comprise faculty members, as well as representatives of enterprises and agencies that would employ graduates of that education institution. Besides that, compulsory industrial apprenticeship was in place [2, p. 102].

These practices ensured that students gained practical experience required to confer an en-

gineering qualification on graduate. This assurance ensured that the national system of engineering education possessed its fundamental competitive advantage.

Big Science, in other words, academic science, was, however, separated from the learning process. Charters of academic institutions – “the main building blocks of the Russian Academy of Sciences (Academy of Sciences of the USSR)” – did not incorporate participation in educational activities, that is, transfer (as they say nowadays) of current scientific discoveries into classrooms, as part of its objectives and functions [3, p. 207].

During Perestroika, it became possible to alter this situation.

In 1987, thirty years ago, Gubkin University established a precedent of an institutional solution to the problem of integration of academic science and higher professional education. For the first time in our country an academic institution – Oil and Gas Institute (OGI) was formed on the basis of departments and laboratories of a higher education institution – Moscow Oil and Gas Institute named after I.M. Gubkin.

OGI had a dual subordination: both to Academy of Sciences of the USSR and to the Ministry of Higher Education of the USSR.

The new Institute was mainly made up from talented youth who have trained at schools of sciences of Moscow Oil and Gas Institute named after I.M. Gubkin. Ongoing creative contacts with its scientific departments and laboratories were fundamental to OGI’s rapid evolution [4, p. 11].

The model of integration of science and education implemented through the establishment of an academic institute affiliated to Gubkin University in many respects drew on the experience of French polytechnic schools, in particular of the National Polytechnic Institute of Lorraine.

Today’s generation of higher educators lives in the environment of reforms of domestic education system, both second level, higher and postgraduate education, which started in 1987 and since then did not pause for a day. The time for reforms of Russian Academy of Sciences

came somewhat later. Production has much changed as well – it was incorporated, privatized and came to be called “business”. The definition of the problem of integration itself has also changed.

The imminent triumph of the current, the sixth in succession technological mode in developed economies and the victory of the latest industrial revolution is associated by many researchers and analysts with the knowledge industry embodied in the form of advanced structural amalgamations, such as Silicon Valley entities – clusters, technology parks and business incubators.

Such amalgamations are being created in our country, too. However, realization of relevant projects is complicated by natural entropy resistance of the recipient environment.

As an example of this resistance, we would like to quote here an intriguing expert opinion:

“By referring to foreign experience, the idea that the “gravity center” of scientific progress will be carried over to within the walls of higher education institutions is persistently enforced. Is this possible? Saying nothing about the fact that the main objective of higher education institutions is training specialists it is hard to conceive an educational institution be able to maintain and effectively operate potent experimental research facilities and production complexes” [5].

Drawing upon foreign practices is a current trend. However, as experience shows, these practices fit ill to our circumstances. The above collocation, “persistently enforced”, illustrates just that – it has a clearly negative connotation.

Nevertheless, there is no way around international experience, it is at the very least counterproductive to turn it down if we are to ensure competitiveness of our economy. Indeed, this international experience evidences that in the course of their thousand-year long history, objectives of higher education institutions, their purpose, surprisingly, changed quite substantially.

Today, leading engineering universities supplement their names with such terms as “national”, “research”, “innovation”, “design” or “busi-



Fig. 1. Experimental and Research Centers and Engineering Complexes

ness”. Universities grow into business enterprises, producers of commercial products, that is, of their intellectual property – know-hows, concepts, new material prototypes, artificial intelligence components, etc.

Experience has proven time and time again that it is vigorous activities beyond the scope of mere training of specialists that ensure accelerated transition to the new economic mode.

It is commonly known that the Innovation Project “Top 5 – 100” is being realized for the purpose to rank no less than five Russian universities to the top 100 universities of the world. The reason why American and British universities dominate international rankings is well-known: these universities commanding multi-billion budgets are the focal point of these countries’ scientific potential. These are mostly universities where Nobel Prize winners work whose scientific schools ensure high publication activity of these universities and respective citation index. These universities take the position of strategic links of science and technology clusters. Silicon Valley is a textbook example of such amalgamations [6, 7].

Today, research and laboratory facilities of Gubkin University include both “powerful ex-

perimental and research centers and engineering complexes” (Fig. 1).

The Gubkin University experience, the experience of joint scientific and educational activities of the University and OGI of the Russian Academy of Sciences has shown that academic science may be quite comfortable within the walls of the university.

For this very reason the Development Program of Gubkin University adopted in June, 2010 by the Ministry of Education and Science of the Russian Federation being the program of its development as an R&D university states its objective as follows: “to form an environment of scientific and educational activities within the University for the purpose to consolidate intellectual, material and informational resources of the University, academic and applied science and business community, to use this environment to perform research of international level, as well as for project and transitional activities in areas crucial for fuel power engineering and on this basis to ensure consistent reinforcement of the national Fuel and Energy Complex with highly qualified specialists able and willing to lead its innovative evolution”.

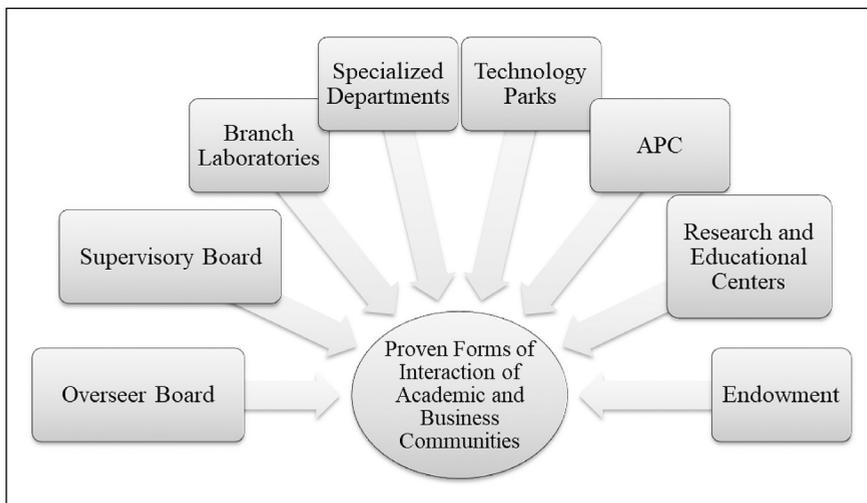


Fig. 2. Proven Forms of Interaction of Academic and Business Communities

Presently, Gubkin University amply utilizes all the capacities, mechanisms or, more accurately, institutions of integration of professional education, academic and applied science, as well as production possibilities validated by national law (Fig. 2).

Overseer Boards should be specifically distinguished from the above list of Fig. 2. One of their vital tasks is to provide and consolidate diversified support of universities by local and national executive agencies, business community, financial structures and public organizations.

Article 26, item 4 of the Federal Law No. 273-FZ dated 29.12.2012 “On Education in the Russian Federation” grants institutions of higher education the right to establish Overseer and Supervisory Boards. Universities included in the “Top 5 – 100” Program were specifically required to establish Supervisory Boards and to change over the category of autonomous educational institutions. The government has effectively defined one of the essential development directions for the higher education institution management system: engagement of representatives of business enterprises being the stakeholders of operation of higher education institutions to the management.

Gubkin University, one of the first engineering institutions of higher education, has estab-

lished its Overseer Board as far back as in 1992. The Board’s members included leaders of various businesses of the Fuel and Energy Complex (including those representing Gazprom and Lukoil Groups), banks and a number of executives of the sectorial Ministry. At the same time Overseer Fund was established similar in its charitable activities to an endowment fund, which made it possible for the University to fully finance industrial apprenticeships of its students, implement total computer automation of academic activities, establish allowances for young teachers to be paid from Overseer Fund, publish text books and cope with various general issues.

As an example, in 2007, Gubkin University being one of the prize winners of Innovative Educational Program Contest held by the Ministry of Education and Science received a government grant for realization of the project related to implementation of a technology of interdisciplinary training of students in their future professions using virtual environment. This subsidy in the amount of almost half a billion rubles was contingent upon guarantees of co-funding of the project by business community to an extent of not less than 20%. These guarantees were granted and met by Overseer Board.

A similar condition was stipulated in 2010 when the University was granted a subsidy to

realize a ten-year program of development of the institution as an R&D university.

Apart from that, Overseer Board lent the University substantial support in developing a network of dedicated departments in institutes within RAS and in research and engineering divisions of oil and gas companies.

The Institute of Dedicated University Departments operating within scientific organizations and at production enterprises is well proven by time and its effectiveness is commonly accepted.

By this time, Russian higher education institutions have established over 1,200 departments and other divisions basing in other organizations including academic agencies. A recent bill submitted to State Duma of the Russian Federation would allow removing the existing administrative barriers in establishing dedicated departments and their research and educational activities on the basis of scientific and production organizations.

Gubkin University has established its first dedicated department in OGI of RAS in 2000. Today, the University boasts a network of 19 dedicated departments. There are four of them within institutions of RAS, five – within Gazprom and Gazprom Neft corporate structures, three – within Lukoil and two were established in Rosneft.

Accordingly, the objective tackled by Gubkin University with the aid of dedicated departments is training of Masters using unique programs that, on the one hand, are related to current trends in the development of geology and engineering processes of hydrocarbons and scientific/technological problems solved within these directions and, on the other hand, provide Masters competence in practical innovation activities.

Quite naturally, the brightest graduates are employed by relevant organizations and companies. In terms of demand level, Gubkin University is at the top of ratings of domestic universities. In no small way, this is the result of effective operation of dedicated departments.

National and sectorial professional skill councils are yet another promising institute of

integration of education, science and production, the institute of cooperation between academic and business communities. It incorporates structures developed as a part of independent proficiency assessment system, which is being established in our country [8, p. 85]. These councils are the venue for liaison agents of various unions and associations of employers, college presidents, ministry and department executives to discuss essential issues of the current state of labor market and trends of its development, changes in the requirements to human resource qualification and national economy, both in general and in terms of its specific segments. These representatives organize and coordinate on a national scale activities to update regulatory framework in the sphere of proficiency including the development of national and sectorial qualification frameworks, professional standards, provisions and regulations related to independent skill evaluation of workers of various categories, professional public accreditation of educational programs and much more.

These activities were developed in compliance with the well-known Decree of the President of the Russian Federation No. 597 dated 05.05.2012. Since 2006, the Russian Union of Industrialists and Entrepreneurs played the role of its main driver by actively promoting professional standards as the essential document defining qualification requirements to workers. Gubkin University advanced the initiative of establishment of a Professional Qualification Council for the Oil and Gas Complex (SPK NGK).

In the following years, on an assignment of Transneft and Gazprom Gubkin University Human Resource Potential Development Institute in the Oil and Gas Complex developed pilot projects of professional standards for specialists.

By the beginning of 2013, these professional standard projects were completed and submitted to the National Oil and Gas Institute (NOGI). As of now, the Ministry of Labor has already approved 24 professional standards whose formal developer is NOGI.

The experience of the most successful universities around the globe evidences that the most

effective mechanism of integration of education, science and business being the prerequisite for quality training of engineering specialists and ensuring a competitive economy is a Supervisory Board and the establishment of an Endowment Fund. The establishment of a Supervisory Board was a statutory requirement to all the participants of the Project 5 – 100.

The establishment of Supervisory Board involves the participation of business community in management of a university both in the sphere of education, by establishing a close relation between the competences demanded at the labor market and those provided by a higher education institution, and in general administration of the university as a business enterprise.

Supervisory Board attaches to the business managerial functions in respect of the higher education institution institutionally, in writing, in the form of Supervisory Board Charter, and places relevant responsibilities for the elected strategy of development of the university.

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ИНТЕГРАЦИЯ ОБРАЗОВАНИЯ, НАУКИ И БИЗНЕСА: СОВРЕМЕННЫЕ ИНСТИТУЦИОНАЛЬНЫЕ РЕШЕНИЯ

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Аннотация. Проблема интеграции образования, науки и производства как обязательного условия качественной подготовки инженерных кадров и обеспечения конкурентоспособности отечественной экономики не снимается с повестки дня с довоенных времен. Она носит перманентно актуальный характер, поскольку при каждой очередной попытке полностью и окончательно её решить обнаруживается отсутствие у заинтересованных сторон должного консенсуса.

Следует признать, что в этой области наработан немалый положительный опыт, есть заметные достижения, есть удачные модели и потрясающие примеры («заводы-втузы», физ-

теховская модель, Пуцинский государственный естественнонаучный институт и другие). Нет главного – системности: требуемое триединство не обеспечено институционально.

В советское время взаимодействие высшей школы и производства обеспечивалось на государственном уровне. А что касается академической науки, то она была отделена от образовательного процесса. В годы перестройки эту ситуацию оказалось возможным переломить. В 1987 г. в Губкинском университете был создан прецедент институционального решения проблемы интеграции академической науки и высшего профессионального образования. Впервые в нашей стране был организован академический институт – Институт проблем нефти и газа (ИПНГ) на базе кафедр и лабораторий высшего учебного заведения – Московского института нефти и газа имени И.М. Губкина. ИПНГ имел двойное подчинение – Академии наук СССР и Минвузу СССР. Практика показала высокую эффективность данного альянса. Международный опыт свидетельствует о том, что органичная интеграция образования и науки – необходимое условие для перехода к экономике, в которой доминирующей индустрией становится поточное производство знаний. Эта индустрия реализуется в новых формах организации типа Кремниевой долины – кластерах, технопарках, бизнес-инкубаторах и т.п.

Сегодня Губкинский университет в полной мере использует те возможности и механизмы, правильнее сказать – институты интеграции профессионального образования, академической и отраслевой науки, а также и производства, которым отечественное законодательство дало легитимность. Это попечительский и наблюдательный советы, эндаумент-фонды, базовые кафедры, научно-образовательные центры, отраслевые лаборатории, технопарки, советы по профессиональным квалификациям и т.д.

Попечительские советы следует выделить особо. Одна из их важнейших задач – обеспечение разносторонней поддержки университетов со стороны органов местного и государственного управления, бизнеса, финансовых структур, общественных организаций. Свой попечительский совет Губкинский университет сформировал в марте 1992 г. одним из первых в инженерных вузах России. В состав Совета вошли руководители различных хозяйствующих субъектов ТЭК (в их числе – концерны «Газпром» и «Лукойл»), банков, ряда руководящих работников профильного министерства. Тогда же был учрежден и фонд попечителей, по смыслу и содержанию благотворительной деятельности аналогичный эндаумент-фонду, позволивший университету в полном объеме финансировать производственные практики студентов, провести тотальную компьютеризацию учебного процесса, учредить и выплачивать молодым преподавателям стипендии попечительского фонда, издавать учебники, решать разнообразные хозяйственные задачи.

Институт университетских базовых кафедр, работающих в научных организациях и на производственных предприятиях, давно проверен временем, его эффективность общепризнана.

Национальные и отраслевые советы по профессиональным квалификациям – ещё один весьма перспективный институт интеграции образования, науки и производства, институт взаимодействия академического и бизнес-сообществ.

Опыт наиболее успешных университетов мира свидетельствует, что наиболее эффективным механизмом интеграции образования, науки и бизнеса как обязательного условия качественной подготовки инженерных кадров и обеспечения конкурентоспособности экономики является Наблюдательный совет и учреждение Эндаумент-фонда. Создание наблюдательного совета предполагает участие бизнес-сообщества в управлении университетом как в образовательной сфере, устанавливая тесную взаимосвязь между востребованными компетенциями на рынке труда и формируемыми компетенциями в вузе, так и в управлении университетом в целом как субъектом экономической деятельности.

Ключевые слова: интеграция образования, науки и производства, инженерное образование, компетенции, наблюдательный совет, эндаумент-фонд

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