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TUSUR: ENTREPRENEURIAL UNIVERSITY ILLUSTRATING BEST PRACTICES IN INTEGRATING SCIENCE AND BUSINESS

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In the era of knowledge economy, generation of new knowledge and advanced technologies became a key to enhance the competitiveness of a country. In this regard the priority is given to the intellectual potential of society and high-tech science-intensive production and its integration that can be described by Triple Helix model. At the same time, entrepreneurial universities play a special role as an intellectual resource for high-tech production. TUSUR is an illustrative example playing a leading role in Russia in preparing engineers and specialists for high-tech industries. The TUSUR interaction with science intensive business is supported by an educational, science and innovation network.

Keywords: entrepreneurial university, knowledge-based business, innovation ecosystem.

In the era of knowledge economy, generation of new knowledge and advanced technologies became a key to enhance the competitiveness of a country.

A characteristic feature of the knowledge economy is the shift of the center of gravity from material costs and resources towards intellectual capabilities. The basic components of a smart economy are intellectual human potential, innovative and scientific and technological potential, and high-tech production as a priority one.

In this context, the interaction of three key elements of innovation system of a country i.e. University, Industry and Government, can be described by Triple Helix model, developed by Prof. Etzkowitz and Prof. Leydesdorff [1] and widely described in the national and international literature [2, 3].

In this model, a special role is given to universities that are able to create and develop their own technologies and developments, conduct research in collaboration with the international professional community, thus turning into a powerful intellectual resource for high-tech production.

One of these universities in Russia is Tomsk State University of Control Systems and Radioelectronics (TUSUR) – the youngest of Tomsk universities. Despite his age, TUSUR today is a leader in the field of training quali-

fied personnel for high-tech industries, introducing constantly innovative educational and research programs.

TUSUR was the first in Russia to open a Student Business Incubator (SBI) in 2004 [4], and today it hosts the largest Distance Learning Center beyond the Urals, and known as a leader in implementing innovative development programs.

TUSUR is an innovative entrepreneurial university, where the training is closely related to research conducted in the most advanced areas: Information Security, Robotics and Mechatronics, Radio Engineering Information and Telecommunication Systems, Nanoelectronics.

The core element of TUSUR's infrastructure for innovation is the pedagogical approach called "project-based group learning". The projects are mostly implemented at or with the cooperation of industries that provides students with the opportunity to acquire the pre-requisites allowing them to create their own business. Start-ups created in the TUSUR SBI, can benefit from the free of charge equipped facilities and services as well as "innovation lift" that means that after reaching a certain "maturity" they have a possibility to move to TUSUR Technology Business Incubator, and furthermore to a Regional Special Economic Zone, all the way supported either by institutional or state support [6].

According practice the described evolution model from a student project to an independent company located at Special economic zone turned out to be stable and reliable tool to develop a "student project culture" enhancing their professional competencies and hand-on skills.

The years of successful implementing of project-based group learning have allowed to carry out more than a thousand innovative projects and create about 50 innovative enterprises over the past four years. TUSUR student business incubator, which is a methodological center for the development and implementation of new educational technologies, is one of the three best University incubators in Russia [7].

According to the evaluation of the entrepreneurial ecosystem of Russian universities in 2019, TUSUR was recognized as a leader in involving students in entrepreneurship, supporting startups, developing the institutional environment and popularizing entrepreneurial activity [8].

Scientific and innovation activities in TUSUR are based on building effective interaction with its industrial partners. A unique platform has been created in TUSUR – an educational-scientific-innovative complex, which has been successfully used to interact with science-intensive high-tech companies. This "belt" of the university's entrepreneurial environment, numbering more than 210 enterprises, produce about 80% of high-tech

products of the Tomsk region, representing an annual turnover of enterprises about 15.2 billion rubles [6].

One of the brightest examples of successful University – Industry cooperation is a European project called “CEPHEI: Cooperative E-learning Platform for Industrial Innovation” that consists in developing together with European and Asian universities an educational platform to place on-line courses for academic institutions, and especially for partner high-tech companies and individual professional looking for the knowledge in industrial innovation [9]. The platform provides industrial enterprises with access to modern educational resources developed using international experience [10], to develop or enhance their professional competencies in the field of innovation management.

TUSUR is also an active player in implementing of the Russian Government Decree 218 [11], aimed to support University – Industry cooperation, its bigger partners today are Elecard group, Reshetnev Information Satellite Systems JSC, Miland PKK JSC, NIIPP OJSC, Mikran NPF JSC, with which TUSUR has implemented 9 major projects, being a lead contractor in 80% of them. It should be noted, that TUSUR was recognized as one of the leaders among Russian universities for the implementation of projects together with industrial partners.

TUSUR hosts the Regional Centers for Scientific and Technological Initiatives (STI) – the Governmental Program to support the development of promising sectors of the economy – in the areas of "Wireless Communications and Internet of Things", "Sensor Technologies".

Since 2013, the Innovation Cluster “Smart Technologies” has been operating in the Tomsk Region [12]. TUSUR is part of the Cluster playing a role of innovative digital university. Today, Cluster groups six project alliances, which represent organizational tools bringing together innovative business, universities and external partners in order to create new lines of export products [13].

Having a developed infrastructure for innovation, strong scientific potential, and expertise in interacting with industrial partners, TUSUR University is an active participant in the following project alliances: «Arctics», «Robotics», «Technical Vision», «Smart City».

TUSUR case proves that the integration of science and business is an efficient tool to ensure a sustainable development of the innovative ecosystem of the region and its competitiveness. The choice of technologies, tools and forms of integration is done considering the unique features of the regional economy and the dynamics of socio-economic development in the country.

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