

# ENTREPRENEURIAL UNIVERSITY: NEW INSTITUTIONAL SYNERGY FOR CREATING HI-TECH INNOVATIONS

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**Abstract:** *The paper discusses problem the institutional supporting of activities for creation the innovative Hi-Tech productions, it presents the methodological and analytical generalization of the modern practices in building institutions that ensure organic cooperation between Universities, Industries, and Government in framework of the "Triple Helix" innovation mode. In this case, the probability of reaching commercial success of the R&D activities rises significantly. This has changed the traditional model of the University in toward the "Entrepreneurial Universities", which have become the system centres of the new Hi-Tech innovation clusters. The paper presents the international comparative analysis by indicator of "University/industry research collaboration" as part of the competitiveness index. It gives proposals to improve the Ukrainian innovation policy.*

**Keywords:** INNOVATION POLICY, 'TRIPLE HELIX' MODE, HI-TECH INNOVATIONS, INTREPRENEURAL UNIVERSITY

## 1. Introduction

Management of effective collaboration between the universities, businesses and the state in the process of creating innovation high technologies has become of an extreme importance because many countries are building a knowledge-based economy, which has lately been evolving into a more complex conceptual format – smart economy. In the today's post-industrial world, the crucial resource for ensuring the country's and the company's competitive advantages is the ability to not only generate new knowledge, but also the ability to commercialize those in the form of new high technologies and product innovations. This belief is the methodological core of the knowledge, innovation, and smart economies [1].

In the past decades, there has been a persistent search for effective tools of the state policy, which could be used to create a management conditions for successful generation of the high-tech innovations. This search has led to forming a new methodological view on the organizational conditions and policy tools, which best suit to achieve the goal and continuously provide support for this process in the country. As a result, a model for managing the innovative processes has changed: a linear model of management of innovation cycle was being substituted by the cooperative model, or so-called *Triple-Helix* model. Such methodological and practical transformation has fundamentally changed the role, forms, and meaning of the collaboration between the institutes of science, education and businesses in the innovation process. This has caused the creation of the new type of a university – the entrepreneurial university.

## 2. From Linear to Cooperative Model of the Innovation Cycle

Cooperative model of the innovative cycle generalises the new managerial approaches, which have emerged in the recent decades. In essence, this is caused by the abovementioned shift in theory and practice from the linear model of the innovation cycle management, when institutes of science, design and technology development, production and sales of the innovation goods and services exist and operate separately from each other, – to a matrix cooperative model, when all the institutes organically interact with the help of feedbacks. These processes are different from operational algorithms of the traditional linear mode of technology transfer first of all by the activities of the mutual creation and simultaneous commercialization of the innovative technology and products. An example of such matrix model is *The Triple Helix* model [2]. Development of this trend of innovation management is also caused by the growing complexity of production, technology, business models, which develop new relations in collaboration between the Universities, businesses, and the state both inside the country and globally [3]. This has directly influenced the modern institutional

model of the University, which has changed according to the abovementioned tendencies.

When the innovation cycle was long enough, the intermediary organizations of technology transfer served as a buffer, which softened the contradictions between the stages and more or less ensured the ending of the innovation cycle. Today, the dynamics of all the economical processes has increased significantly and the globalization has caused an unprecedented growth of international competition. In these conditions, the long linear innovative cycle has become an obstacle to the full timely realization, and has shown inability to flexibly react to dramatic changes in the modern consumption demand.

Cooperative model of the innovation cycle management differs in a way that all its stages joint into a system of organic collaboration in order to simultaneously make decisions for the scientific and commerce tasks with the immediate orientation on the conditions and requirements of the implementation stage. In this case, the probability of reaching commercial success of the R&D results rises significantly. Such trend has changed the traditional model of the University in many ways. Universities of a new type have emerged – research or entrepreneurial universities, which are called the 21<sup>st</sup> century Universities [4], and they have become the system centres of the new Hi-Tech innovation clusters (traditional example – The Silicon Valley).

Search for the optimization of the abovementioned relations of the members of the innovation cycle (value added chain) has led to *The Triple Helix* concept, in which innovation should be created in an organic cooperative interaction of the sides of a so-called 'knowledge triangle' of Universities-businesses-state. In the system of the cooperative relations between the actors of this model, new entrepreneurial Universities began to play a central role as institutes, where new knowledge is generated and is then further commercialized [5][6]. In this context for the post-soviet countries like Ukraine, the problem of greater autonomy for Universities, especially financial autonomy, becomes very urgent. Such independence also can help to ensure more diversified sources of funding - through the commercial relations with businesses and government agencies.

At the same time, it has been shown in practice that organic combination of all the participants of the innovation cycle is to form an extremely efficient creative environment for a mass generation of the innovation ideas, which are strictly oriented to the commercial stage. This has enhanced the institutional growth of the so-called *spin off* or *spillover* organizations that ensure the cooperative model implementation in the Universities, where such effect can be the most productive. Especially high innovation results on this basis were shown by the creative clusters, which have merged on the basis of the University science and they become embedded in the teaching processes, and draw both professors and

students in mutual innovation projects for business and government demands.

### 3. Evaluation of the Business Collaboration of the Universities

Measuring the influence of the effectiveness of the innovative collaboration between the universities and the business structures, and its influence on the economic development of the country, has become a subject of the economic research and a part of the characteristics of the national competitiveness of the countries, as well as measuring the productivity of the national and regional innovation systems. Although the fact that the University is a powerful source of new knowledge, which is commercialized into innovations, has been recognized long ago, there are many issues that are opened for discussion regarding measuring the economic effect of such transfer.

It turns out that it is sufficiently hard to statistically demonstrate the general economic effect of the university research, which was financed by the state [7]. Furthermore, a big part of the empiric evidence is based on certain assumptions, which make the research object more subjective and narrow, or lead to the observations under method of a cases analysis, which reflects only certain context or situation. That complicates the methodological generalizations of the practice, which can be later realized in theory and regulations. Another hard problem is a defining the commercialization object – an innovation, content of which can be different either for different Universities, or for different countries.

The phenomenon of collaboration between Universities and businesses in the innovation process has found its representation in the competitiveness indicators of the country in the annual analytical reports about the global competitiveness being compiled by the research group of the World economic forum in Davos (Switzerland). In section 12 about innovations, there is the special indicator "University-industry collaboration in R&D" (until 2014 this indicator named "University/industry research collaboration"). The value of this indicator (index) is formed as an average of the expert evaluations on the above mentioned in the range 1-7. In Table 1 we have prepared the results of such evaluation for selected countries in 2013 and 2015.

**Table 1:** Value of 'The University-industry collaboration in R&D' indexes for the selected countries in 2013-2015 [8][9].\*Note: Values are average answer to the survey question: In your country, to what extent do business and universities collaborate on R&D? [1 = do not collaborate at all; 7 = collaborate extensively]

Country/Economy	Value			Rank 2015
	2015	2013	$\Delta$ (2015-13)	
<b>Selected successful catching up countries</b>				
Finland	6,0	5,8	+0,2	1
Singapore	5,6	5,6	0	5
Israel	5,5	5,4	+0,1	7
Ireland	5,2	5,2	0	13
Taiwan, China	5,1	5,3	-0,2	14
Korea, Rep.	4,6	4,7	-0,1	26
<b>Central and Eastern Europe</b>				
Lithuania	4,6	4,6	0	27
Estonia	4,4	4,4	0	34
Hungary	4,3	4,3	0	36
Slovenia	4,0	3,8	+0,2	44
Czech Rep.	4,0	4,4	-0,4	42
Latvia	3,7	3,6	+0,1	63
Russia	3,6	3,6	0	67
Romania	3,6	3,3	+0,3	71
Poland	3,5	3,5	0	73
Ukraine	3,5	3,4	+0,1	74
Slovakia	3,4	3,3	+0,1	84
Bulgaria	3,0	3	0	112

In the table we have separated out two groups of countries. The 'catching up' countries, which have succeeded in dynamic development and have entered to the pool of developed countries starting with relatively low positions in the world rankings and have reached the leading positions of competitiveness today. The second group represents the countries of Central and Eastern Europe, which had similar starting conditions when shifting from command-administrative economy to market economy.

As we can see from the table, all the presented dynamic countries are characterized by a high evaluation in terms of Universities and industry collaboration in research projects. The same picture can be seen for all the developed countries in the world. Amongst the Central and Eastern European countries, an interesting case is Ukraine. Ukraine in 1990 was one of the most powerful countries in the region in terms of scientific and educational potential. However, it is amongst the outsiders in terms of the Universities-industry research collaboration index. This indicates low level of the innovation performance of the Ukrainian Universities.

Our research showed that historically in Ukraine a tight connections between the Universities (especially, the technical ones) and the industries always has been. The active such cooperation had been in cases when the University had provided the skilled human resources for concrete big enterprises of region. However, firstly, this collaboration typically follows the linear innovation cycle model, and secondly, the stage of commercial implementation of the elaborated R&D results was (and is) traditionally as the weakest spot of the Ukrainian national innovation system. A lot of a finished research projects usually do not found their commercial use.

### 4. Results and discussion

Compared to the traditional Universities, which are often characterised using the Chinese metaphor of "ivory tower", the entrepreneurial University creates significant competitive advantages, related to the following.

- Creates an opportunity to effectively teach students the innovative theories and the appropriate entrepreneurial skills, develop their talents, which constitutes the main asset of the modern smart economy.
- The student not only obtains a new profession for a certain modern area, but can also become a real entrepreneur, found his own firm and, consequently, directly aid the economic growth of the country.
- Entrepreneurial University also directly influences the economic development through creating special programs and organizational forms for continuous entrepreneurial learning and generating new business structures: interdisciplinary short-term programs, scientific parks, incubators, etc. [10].
- Entrepreneurial universities have unique capabilities to generate innovative high-tech, nourish creativity, create new cooperative forms of technology transfer, which are reasoned by the objective business needs, rather than subjective informal connections.

Learning of the international practice of the *Triple Helix* model functioning has shown that institutional providing of the knowledge component in this model can be represented differently. Generally, those are the research departments or special organizational forms inside Universities – scientific parks, techno parks, incubators, but those can also be separate institutes – research and development institutes, laboratories, centres. The abovementioned forms can cooperate tightly between each other and create mixed institutional entities.

The legal status of such organizational structures vastly differs in different countries and regions. They can be in a form of technology transfer centres, business-incubators, techno-parks, etc. All those organizational forms are aimed at achieving of the mutual cooperative goal – provide innovation results in the University. The

University plays a role of the initiator of implementation of its scientific findings to the economy. The University in partnership with the state and business facilitates creation of new firms (start-ups) with the participation of its researchers (professors), students, postgraduates, employees, and alumni. This practice is especially successful when there are no enterprises before elaborating innovation projects, which are ready to implement the innovations. These innovations are to become very successful when they create new enterprises and new sectors of economy.

The real implementation of Triple Helix concept is held back by the misunderstanding of crucial role of innovations and the Hi-Tech development for successive economic growth of not so rich countries as for instance Ukraine. Many economists assume that an active innovative policy requires large funding which are only available when a country will achieve a high level of development. As a result, the problems of the state supporting of innovations remain mainly on the backyard of the current Ukrainian economic policy. Meanwhile, there is a direct connection between the absence of innovative reconstruction and the failures of Ukrainian economy. The key to solve this puzzle is in Schumpeter's theory of economic development, where was given solid evidences that innovations have a distinctive feature, they create a new value added. That is why the building of the effective institutions for innovation creation is crucially important.

## 5. Conclusion

Analysis of the Triple Helix concept as managerial instrument to ensure development of the Hi-Tech innovation shows this model forms a basis for the commercialization of R&D elaborations. Furthermore, the organic collaboration of the entrepreneurial Universities with the industrial enterprises and the organizations of the innovation infrastructure are inevitable, if the purpose is a creating a system of effective commercialization of the Hi-Tech innovations.

The concept of the *Triple Helix* includes creating a system of cooperation of universities with businesses and the state institutes. The world practice has proven that today you can see more and more Universities over the World, which perform certain functions of the business, creating centres for innovations' commercialization or small venture enterprises. In such a way, the third mission of the University – knowledge transfer and commercialization of the research and development – is revealed and developed.

In response to the today's challenges, world's leading Universities have felt the need to transform – they have become powerful academic centres, which produce new research and scientific products, which later enter the market. Such entrepreneurial Universities represent the economic corporation, which produces knowledge, and separate departments and faculties get an opportunity to challenge their competitiveness in the market and gain income to direct it at developing the University. Since such Universities are interested in receiving the maximum added value from the own created high-tech, they aid growth of the project from the idea to a successful enterprise.

An important area of research Universities formation is the state providing them a greater degree of freedom of action in the process of commercializing their own research. This will allow them to use these promising sources of funding the commercialization of intellectual property, such as venture capital. Another source of funding processes aimed at the commercialization of intellectual property rights is a specialized investment funds whose activities are concentrated would invest in potentially profitable innovation projects.

From the analysis of practice world-class universities we can conclude that for starting new companies based on the University research and the licensing own developments created by companies it is necessary to build the innovation ecosystem that promotes open innovations. In the centre of this ecosystem must be special

mediators that will build bridges between different stages of innovation cycle. They ensure an early evaluation of innovation samples, projects, investments. They have to be involved in the formulation and selection of new technological opportunities, a knowledge seeking, establishing connections between sources of knowledge in different organizations, development and implementation of business strategy for innovations.

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