UNIVERSITY MISSION

THE THIRD MISSION OF POLISH UNIVERSITIES: THEORY AND PRACTICE

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ABSTRACT: Polish universities have three missions to fulfill: education, research activities, and building relationships with the environment. This paper addresses issues related to the implementation of the last two, with emphasis on the collaboration between universities and the environment.

The scientific research market is comprised of universities (supply), business enterprises (demand) and the regulatory sector. Hence, the presented study first contains a brief description of the parties active in the research market, complemented by a practical look at the commercialization of research results. The authors conducted interviews with university faculty, who are professionally engaged in the commercialization of research. Internal procedures were analyzed, as well as strategies and regulations in force in this area. As a result of these interviews and analyses a catalog was generated of methods and strategies of commercialization of research and barriers that inhibit this process. The main conclusion of analyses is that Polish science and development policy is tasked with stimulation of activity of all the respective interest groups in the scientific research market, i.e. private entities in the financing of the R&D sector and the motivation of universities as well. Further improvements in legislative, educational, financial and fiscal solutions remain key challenges in Poland.

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Introduction

Institutions of higher learning currently play a significant role in the development of the knowledge-based economy. Hence, in recent years, the expectations from universities have noticeably increased especially in highly developed countries (Luukkonen and Thomas, 2013). The state and society have assigned them the tasks connected with improving competitiveness of the entire economy as well as work on enhancing the ability of the country to produce goods and services according to the

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needs of its citizens. The main factors of economic growth besides investment are technological advancement and the enhancement of human skills. The achievement of thusly stated goals is possible only through the collaboration of the academic community with the economy. Moreover, in Great Britain it has been shown that universities ought to take direct responsibility for the practical implementation of their research accomplishments (Witty, 2013). Following H. Etzkowitz and L. Leydesdorff - one ought to conclude that currently, the building of relationships between universities and the environment (Third Mission) is mainly understood as their contribution to the economy and is the essence of their purpose (Etzkowitz, Leydesdorff, 1999). This is depicted in the *Triple Helix Model* where the interaction between universities, industry and state is pointed out (Leydesdorff, 2012). The institutions mentioned above interpenetrate and even begin to take on roles assigned to other sectors, for example universities acting like corporations do. The triple helix model shows how the interested parties in the process of bringing research results to market, working together, learn from one another. It is exactly in this context that modern universities operate - third generation universities.

Towards the third generation universities

An analysis connected to the completion of the so-called third mission university, or the creation of relationships with the environment would not be accurate without consideration of their second mission, that is scientific research activities. In the case of the commercialization of scientific research results fulfilling one mission is a natural consequence of the other, as it were. Commercialization, however, begins in the moment of achieving scientific research results and ends with their practical implementation and the generation of initial profits. So it is a process which intends to generate profits which may then fund further research. The Italian economist R. Viale writes that one may speak of commercialization when “knowledge generates added value from the point of view of the economy” (Viale, 2010). Commercialization, therefore, is a possibility for universities and the scientists themselves to sell the results of their research and generate profits from them (Glazer, 2004).

In light of the above, the success of a university is not only measured by the number of citations of its employees and their so-termed productivity, but lately, a more practical dimension of scientific research work or the transformation of knowledge into services, technologies and organizational solutions of an applicable nature. They are actions resulting in mutual overlap of scientific research activities of universities and their personnel and the building of relationships with the environment (in other words, it is the interlocking of the two university missions). In the process of commercialization, we have universities on one side and industry (business entities) on the other. The collaboration of these two main actors on the scientific research market is largely based on mutual trust, the building of which necessitates the two communities becoming familiar with each other.

At the foundation of the matter being analyzed is the concept of *innovation* because they are created on the borderline between business and education which implies the necessity for collaboration of people and institutions with differing capabilities and qualifications. At the junction of this cooperation the cognitive and scientific value of research meets their applicability characteristic. Hence, innovative processes are long-term, complex undertakings requiring the engagement of a number of entities (both on the part of the university as well as that of the economy). As mentioned above, an inseparable and indispensable stage of the process of innovation is the commercialization of research results, or bringing them to market and thereby their propagation. In another, more detailed understanding, commercialization is the building of the business model of a technology, shaping the process of sales, or the implementation of the technology on the market and creating added value of the

technology (Kalinowski, Uryszek, 2010). On the Polish market of the commercialization of scientific research results, we can identify three distinct types:

- Granting of license for the results of R&D;
- Sales of the results of R&D;
- Contribution of R&D results into a partnership (Ministry of Science and Higher Education, 2010).

The simplest way for commercialization of R&D is simply their sale; however, this is the method that yields the lowest income to the holders of industrial property¹rights. A decidedly more advanced, and hence more profitable, is the method whereby a license is granted for the results of scientific research. This method forces long-term collaboration between the grantor of the license (university) and the grantee, however, it simultaneously ensures that the owner of the industrial property rights retains control of the license substance. The most advanced and requiring a considerable effort from both sides of the commercialization process methods is the contribution of the research results as an investment in a partnership (an existing partnership may be used or a new one set up for the purpose - a so-called *spin-off*).

From the description given above, emerges a very complex picture of the process of commercialization of scientific research results. For this process to exist, a well-planned collaboration between all participants in the research market is necessary, grounded in a framework of long-term strategies and based on a well-constructed system of laws which protects first and foremost the owners of industrial property rights as well as the authors of the invention themselves (Perkmann et al., 2013).

The deliberations up to this point allow for the delineation of the main sides (areas) of the research market as follows:

- Supply side - that is the creation of a supply of knowledge by the universities (researchers);
- Demand side - that is the demand for knowledge (innovation) generated by the economy (entrepreneur, investor);
- Transference mechanism - that is commercialization of scientific research results (association the demand for knowledge with the supply of knowledge - knowledge broker);
- Market regulatory policy - that is national legislation, acts of internal law (Orłowski, 2013).

The scope of interest of this study focuses primarily on the supply side which is made up of: researchers (inventors) and universities.

The market economy is in need of new solutions (technologies, ideas), thus alongside the universities themselves, it can be the catalyst for new research projects. Whereas the scientific and academic community is looking for opportunities to empirically confirm whether the theoretical solutions and ideas actually work in the real world. Therefore, a broad collaboration of both communities is indispensable and moreover - beneficial for all the entities operating on the scientific research market which we will endeavor to show in another section of this study.

Commercialization of research results - A legal framework

¹ Industrial property, a form of exclusive rights resultant from national, international or regional legislation. Examples of exclusive rights are: patent, industrial designs and trademark laws

The foundations of the mechanism for commercialization of research results were initially formulated in Polish legislation alongside the socioeconomic transformation (beginning of the 90's in the 20th century). At that time, a number of entrepreneurship incubators and science-technology parks were set up at universities. However, clear and concise frameworks describing the realization of the process of bringing research results to market were lacking (both on the side of the universities as on that of business enterprises)

Polish universities presently operate under the *Higher Education Act* dated July 27th, 2005 (Journal of Acts 2012, pos. 572 c.t.) which permits the operation of a commercial entity separate in organization and finances from the core commercial entity which is an extraordinarily important regulation as it pertains to the process of bringing the results of scientific research to market. A university may, therefore, in accordance with presently applicable law, achieve income resulting from the use of technology created in the R&D process (art. 98 par. 1). Articles 86a and 86b of the *Higher Education Act* state that a university for the purpose of commercialization of scientific research and development results may create a limited liability partnership or corporation referred to as a *special investment vehicle*. A special investment vehicle may be formed by one university or a number of public or non-public universities. Before October 1st, 2014 a public university would purchase intellectual property rights (in a narrower scope - industrial property rights) from its employee and would engage in the commercialization of scientific research results on its own. Usually, the university would transfer the entire commercialization process to a special investment vehicle. The latest amendment to the *Higher Education Act* dated July 11th, 2014 (*act amendment - Higher Education Act and selected other acts* - Journal of Acts 2014 pos. 1198), is in force as of October 2014 and allows both universities and researchers more freedom as to the procedure of bringing to market the results of research. In the academic community, it is even mentioned that the July act "enfranchised the scientists". These are not laws which in a precise manner regulate all areas of activity pertaining to industrial property rights (as confirmed by our study's results), but rather set up a certain framework within which the researcher and the university may operate and pertain to public universities and PAN institutes (Polish Academy of Sciences). The remaining institutions or the non-public universities and research institutes are to create internal regulations delineating the rules for management of property rights and related rights as well as industrial property rights and rules for commercialization of scientific research and development results.

As described, the amendment of the *Higher Education Act* pertains to all scientific research (basic and applied) conducted by employees engaged by universities on a regular contract basis. Excluded are only commissioned research and research conducted under authority of the department of national defense and security. There are three scopes of employee enfranchisement we can point to:

1. Timely notification - the employee is obliged to inform the university of the effects of his or her scientific research at the moment they appear (not at the end of the research project);
2. Entities - any employee engaged on a regular contract basis are entities (scientists, scientist-educators, administrators);
3. Subject - the subject are the results of scientific research (such as: invention, design patent, industrial design, new plant species, development, know-how and topography of an integrated circuit), and development (that is creating projects, prototypes, artworks, etc.).

The Act contains a differentiation of commercialization of scientific research results into *direct commercialization* (the sale of intellectual property rights of scientific research results under a license agreement, lease or rental agreement) and *indirect*

commercialization (taking over or purchasing shares or stock in partnerships in order to implement research results). This second type of commercialization may only be concluded by a special investment vehicle. New legislative solutions are intended to stimulate both universities and commercial entities to operate in the scientific research market. In addition to that, they are expected to motivate the scientists themselves to participate in research since the changes implemented are enfranchising in nature to the scientists and strongly accentuate the practical implementation of scientific research results.

Expectations in the academic community regarding the new regulations were and continue to be quite high. At the present time, universities are designing internal statutes which will regulate the entire process of commercialization of scientific research results within the framework envisioned by the last amendment to the *Higher Education Act*.

The status of implementation by universities of the new legal regulations regarding commercialization of scientific research results will be presented in another part of this study.

Experiences of Polish universities with “third mission” execution

In the process of specifying the empirical research assumptions we endeavored to shed some light on the question related to the new area of activity for Polish universities that is the commercialization of scientific research results. The main objective of the planned research was to describe the state of preparedness at universities for conducting processes of bringing research results to market. An additional task that we set for ourselves was to attempt to specify areas which still need refining both by the universities themselves as well as the legislators. For the realization of thusly-defined aims, the best area for research are the centers of technology transfer which are appointed for institutional support of bringing scientific research results to market. They organize the collaboration with the business environment and have a significant role in the development of the research base at their respective *Alma Mater*. Furthermore, the activities of the centers include identification and evaluation of the commercialization potential of the university, choosing the best commercialization procedure, valuation of the intellectual property rights as well as the development of optimal solutions in this area. Tasks formulated in such a way require from the employees of these organizational units a wide scope of competences and thorough practical and theoretical knowledge and thusly, it was decided that they will be the most appropriate entities for analysis.

The study utilized the research survey method. In the collection of data, an especially constructed tool - questionnaire was used which was comprised of 14 questions (open and closed-ended). In the case of closed-ended questions, the respondents had the possibility of selecting one or a number of answers. All efforts were made so that the proposed answer categories were exhaustive.

The established sample was comprised of 25 public technical universities (that is all functioning institutions of this type in Poland). The survey forms were sent to the respondents in February and March of this year via email, to the addresses of technology transfer centers. To maximize the *response rate*, reminders were sent to the respondents, however, this was not effective in all cases and thus the *response rate* was 40%.

The research conducted were to allow a diagnosis of the state of preparedness at technical universities for the realization of the process of bringing scientific results to market and provide a description of the experiences of the technical universities in this area. For the study, only public technical universities were selected as this is the first stage of exploring this question. The presented research results are preliminary in

nature and collection of data from all technical universities is planned as well as the broadening of the category of institutions tested to public universities¹.

Presentation of initial study results

When asked: “How would you evaluate the last amendment to the regulations pertaining to the commercialization of scientific research results (regarding amendments in force as of October 1st, 2014)” - half of the universities admitted that they accept the direction of legislative changes but at the same time indicated a further need for definiteness, 30% of respondents indicate that the introduced regulations are unclear and require necessary amendments. For 20% of the respondents the amendments introduced completely do not reflect the real-life legal environment. It is worth noting that the latest amendment in the area of commercialization of scientific research results did not create a comprehensive and fully correct legal framework of this new area of activity for any university (Table 1).

TABLE 1. PRESENTATION OF STUDY RESULTS FOR THE QUESTION: HOW WOULD YOU EVALUATE THE LAST AMENDMENT TO THE REGULATIONS PERTAINING TO THE COMMERCIALIZATION OF SCIENTIFIC RESEARCH RESULTS (REGARDING AMENDMENTS IN FORCE AS OF October 1st, 2014)?

Source: Own data interpretation based on survey study conducted.

While evaluating the legal regulations, the respondents also pointed out that in the area of commercialization of research results, there is no need to treat the universities in the public and private sectors separately. Undoubtedly, this opinion may be influenced by the fact that in the present financing structure - both scientific or research activities, the obtaining of research grants (national and foreign) - is only done by public universities. In the survey forms which were sent back, the respondents widely commented on the deficiencies of the legal regulations governing the commercialization of knowledge. Some of the most often reported comments include:

1. Too short a period (3 months) in which the university is to decide whether to commercialize research results.

¹ Regulations of act dated July 11th, 2014 act to amend act - Higher Education Act and selected acts (Journal of Acts 2014, pos. 1198), directed to public universities and PAN (Polish Academy of Sciences) institutes.

2. The necessity of using a complicated, bureaucratic and costly system of verification of the creative process conducted by researchers in the case of preferential acquisition of intellectual property rights by researchers (10% of the lowest remuneration). In addition, the unreliable, incompetent, dishonest claims submitted by researchers informing about the circumstances of creating intellectual property may expose the university to significant financial losses (e.g. breach of prior obligation to transfer industrial and intellectual property rights to the enterprise commissioning the research performed by the university).
3. In the case of transferring intellectual property rights to the researcher, the act does not assign the university any tools or legal recourse for verification of the researcher's income in order to collect receivables arising from the commercialization of research results (25% of gains received by the researcher).
4. The current regulations have practically deprived the universities of the possibility to conduct their own (financed by the university) activities and projects aimed at commercializing research results due to the limited (up to 25% of costs maximum) and sealed cost catalogue decreasing the basis for calculating compensation for the inventor.
5. Lack of a complementary system for financing commercialization and legal requirements in this area.
6. Lack of solutions in the area of time organization for researchers: lowering of the quota of teaching hours or lack of commercialization being connected to requirements regarding professional promotion of scientists and parametric evaluation (dilemma: "commercialize or publish")

The scope of the comments submitted by individual universities indicates just how inconsistent and incomplete are the legislative solutions which create the legal framework for commercialization processes at universities.

The questions contained in the survey form also enabled the evaluation of internal regulations in place at technical universities regarding the transfer of knowledge.

TABLE 2. PRESENTATION OF STUDY RESULTS FOR THE QUESTION: WHAT CHARACTERISTICS, IN YOUR OPINION, SHOULD RESULTS OF RESEARCH RESULTS SUITABLE FOR COMMERCIALIZATION HAVE?

Source: Own data interpretation based on survey study conducted.

A fact that ought to be positively evaluated is that a decided majority of university (75%) performs analyses of the market directed at demand for the results of scientific research they conduct. Only one out of four universities has no experience in this area. Innovativeness and possible competitive advantage over solutions which exist on the market are, in the opinion of the respondents, the crucial characteristics which must be possessed by scientific research results which are to be potentially commercialized. If it is assumed that competitive advantage over other solutions is

characteristic of every innovative solution, then as a rule, the indispensable condition of every scientific/research activity must be its innovativeness so that in the future, commercialization of its results might be considered (Table 2).

In every one of the universities questioned, internal procedures have been implemented for the transfer and collection of information about research conducted and results achieved. However, only in 38% of the cases of the answers submitted by the respondents there are functioning tools for evaluating the effectiveness of research conducted regarding the commercialization of scientific research results. This is probably due to the fact that in the experience of the universities in implementation of research results is still limited and in many cases isolated. Universities readily share experiences with each other in the area of commercialization (87.5% of respondents submitted this response), which undoubtedly is extremely valuable with the many comments and legislative deficiencies. In a situation where they are operating in unknown territory and implementing new solutions universities are *de facto* "sentenced" to mutual collaboration. The universities are also open to collaborating with other organizations engaged in the process of commercialization - networks (clusters), mostly of a regional or industry sector nature (Table 3).

TABLE 3. PRESENTATION OF STUDY RESULTS FOR THE QUESTION: DOES YOUR UNIVERSITY OPERATE WITHIN NETWORKS (CLUSTERS) WHICH HANDLE COMMERCIALIZATION?

Source: Own data interpretation based on survey study conducted.

All universities which have implemented instruments of evaluating the effectiveness of their activities in the area of commercialization of scientific research results operate within networks or external clusters. Therefore, one can conclude that the experience gleaned from other entities is implemented and reflected in interior regulations. In a decided majority universities have come forth on their own with an offer for commercialization of scientific research results (87.5% of respondents tested), whereas for 75% of respondents reported that the effect of such collaboration resulted in implementation and 12.5% of the respondents had no experience in this area. The method of commercialization most often employed is the sale of licensing (70% of respondents) and the sale of the results of research (30% of respondent indications). None of the universities studied indicated the contribution of research results in the form of investment in a partnership as a method of commercialization. The most often used methods for the valuation of scientific research results intended for commercialization are: commissioning of valuation to external entities and direct negotiations with the commercial entity interested in implementing the research results.

In identified commercialization costs the universities include the following types of costs: costs connected with securing and maintaining legal protection (pertaining to patents, design patents or industrial designs), costs of legal services directly connected with commercialization and costs connected to obtaining and maintaining legal protection (pertaining to patents, design patents, industrial patents) (Table 4).

TABLE 4. PRESENTATION OF STUDY RESULTS FOR THE QUESTION: HAS YOUR UNIVERSITY IDENTIFIED THE TYPES OF COSTS OF THE COMMERCIALIZATION OF RESEARCH RESULTS?

Source: Own data interpretation based on survey study conducted.

TABLE 5. PRESENTATION OF STUDY RESULTS FOR THE QUESTION: WHAT MAIN BARRIERS TO THE PROCESS OF COMMERCIALIZATION CAN YOU IDENTIFY?

Source: Own data interpretation based on survey study conducted.

At the conclusion of presenting the survey results, the opinion of the respondents concerning main internal and external barriers existing in the process of commercialization is worth showing. The observations of the academic community in this area are not optimistic. Despite a deleterious evaluation of the quality of legislation in this area, it is the lack of interest on the part of business enterprises in inventions and their low level of awareness are the most frequently mentioned barriers standing in the way of effective commercialization. Alarming is also the fact that very often the universities pointed out the lack of interest on the part of researchers themselves in the implementation of the results of their research.

Meager experience, the need for legislation amendments are also mentioned less frequently as barriers to an effective commercialization process. Worth noting that despite these pessimistic opinions, according to respondents, the universities have in place the appropriate internal procedures for supporting the process of commercialization and the awareness of existing problems among scientists is very acute (Table 5).

Conclusion

The period of conducting the study of technical universities enabled the recognition of the evaluation by the academic community relating to the recently amended regulations of the *Higher Education Act*. The empirical data collected allow for the formulation of a number of basic conclusions regarding the actions of universities connected with the execution of their “third mission” in practice as in:

1. the strongest side of the “triple helix” is formed by universities - it is they that generate the initiative for commercialization of scientific research results;
2. respondents stated almost unanimously that the present legislation does not ensure comprehensive legal solutions in the areas of commercialization and knowledge transfer;
3. limited mutual trust along the axis of university-researcher-entrepreneur significantly precludes the building of collaboration between the parties to the process of scientific research results commercialization;
4. universities are diligently working on their own internal statutes which would ensure transparency in commercialization which is a positive strengthening of the level of trust among all interested parties of this process;
5. universities monitor the needs of the market in the area of new technologies - this is alongside the creation of internal procedures, another positive demonstration of the opening up of universities to cooperation with their environment and increasing the effectiveness of university research activities;
6. universities utilize the simplest methods of valuation of research results and their commercialization - probably due to lack of experience in this area;
7. from the point of view of finance economics of the universities, a definitely important element is information collected regarding costs that arise from the commercialization of scientific research results - proportionally the largest part represent costs related to ensuring legal protection for the holders of industrial property rights.

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