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## **BASIC DETERMINANTS OF THE CREATION OF ACADEMIC SPIN-OFF COMPANIES**

### **Key words**

Academic spin-off companies, academic entrepreneurship, determinants of business creation.

### **Abstract**

Companies referred to as academic spin-offs appeared in the Polish economy along with the economic transformations at the beginning of the 1990's. Despite the great interest on the part of economic policy, very few such companies have been created in Poland for over twenty years. The paper identifies five areas that constitute obstacles to the creation of academic spin-offs in the conditions of the Polish economy.

### **Introduction**

Companies referred to as academic spin-offs appeared in the Polish economy along with the economic transformations at the beginning of the 1990's. Since then there has been no boom in their creation for twenty years. However, the interest of academic circles in this subject has grown. Academic spin-offs have also found their place as part of the economic policy in the broad sense of the word. Their creation, for example, can be promoted and supported to a certain extent by the Human Capital Operational Programme, in the framework of Measure 8.2.1 Support to cooperation of scientific environment and enterprises.

The 2005 Higher Education Act [17] incorporated academic entrepreneurship into the basic scope of activities of higher education institutions in Poland. Apart from conducting research and teaching students, they are obligated to cooperate with their environment, particularly through the sale or free-of-charge provision of results of research and development works to enterprises. They are also required to disseminate the idea of entrepreneurship in the academic environment in the form of an organisationally and financially separate business activity, which *de facto* can be directly related to the involvement of universities in the creation of spin-off companies. It should be noted that, although the actual activity of academic centres is still minimal in relation to the spin-off creation, spin-offs have become such a popular topic of discussion that universities at least no longer attempt to actively counteract their creation.

This paper aims to group and analyse the determinants concerning the creation of academic spin-off companies in the conditions of the economy and education system in Poland. This defined objective was realised on the basis of a review of literature and the author's experience derived from the implementation of the project entitled "The Effective Environment of Business Innovation" carried out by the Polish Agency for Enterprise Development.

### **1. Spin-off and academic spin-off as an economic phenomenon**

The term of *spin-off* is widely used in scientific literature as well as in business and other aspects of life. It comes from English and its basic meaning is "a by-product," or "additional advantage/extra profit" [10]. In other words, the term defines certain additional benefits created in the course of the realisation of the mainstream of the given work or the main project. This definition leaves room for wide interpretations as well as applications in different areas.

Spin-off companies, particularly academic spin-offs, have become well-known due to the development of Silicon Valley and Route 128 in the environment of such prestigious universities as Stanford or Massachusetts Institute of Technology. They have been an important part of American entrepreneurial activity in the academic environment for a number of years [12]. It is a more recent phenomenon in the European context. Since the year 2000, however, a significant number of studies and important publications have been devoted to the subject.

It should be emphasised, however, that academic spin-offs are not a unique economic phenomenon that is not encountered in other spheres. Enterprises also use the form of spin-off in their activity. This type of spin-off is defined as an entity created by separating/splitting from the parent organisation in order to start an activity that would be difficult or impossible to realise in the framework of the existing enterprise [15].

In the business sector (as well as in academic institutions), these difficulties are usually connected with requirements of the new venture management system and the lack of adaptation to the existing system. In other words, the system of the management of structures and processes essential for everyday business operations is different from the one that is needed to implement new (innovative) projects. The combination of corporate long-term planning and the financial audit focused on short-term control (e.g. the necessity to maintain in the continuous system of sales ratios controlled by the Board), usually creates the corporate environment that favours the steady growth planned in detail and based on incremental processes and product innovations. Radical innovations are usually incompatible with this type of structure. The main problems connected with them are as follow [16]:

1. The corporate financial system favours short-term returns – corresponding mainly to incremental innovations.
2. Production activities favour efficiency over innovation.
3. Sales and marketing are oriented toward and rewarded mainly based on the existing products and services.

The use of a new company of the spin-off type enables the enterprise to break free from the existing structures and to create new ones adapted to the requirements of the particular project.

Another area of difficulty that can be solved by means of a spin-off company is the introduction of some types of innovation onto the market by such companies. Particularly, the types of innovation that are not related to the existing range of products or markets of the parent organisation. It creates the situation in which the existing entity is forced by the introduction of a new solution to create new markets and production competencies [2]. Thus, there is little possibility of supporting the venture, apart from the capital support, and the integration of the new activity with the current areas of operation will not bring the synergy effect.

The process of the spin-off creation has, as a rule, the characteristics of the process of new company creation. However, it is not building from scratch in all cases. It is possible to create a new business based on the separated assets of the existing entity or even on the separate, organised part of the company. Thus, the important role of the parent organisation is clearly visible, because the institution from which the knowledge originates or from which come the staff largely creates the competitive position of the new entity. The multitude of options used cause certain problems in the precise terminology for individual phenomena.

In this context, academic spin-offs can be treated as part of a wider phenomenon – spin-off companies. Largely, they are characterised by features typical of most spin-of companies and are subject to economic determinants typical of most enterprises after their creation. At the same time, their

specificity resulting from the unique characteristics of their parent organisations (academic institutions) and their staff should also be stressed. These institutions function in a different legal and organisational environment than enterprises, and they have different structures and their own unique organisational culture.

## 2. Trends in defining academic spin-off

Academic spin-offs are called “university spin-offs” in English publications, whereas Polish literature frequently uses the Polish equivalent “firmy odpryskowe.” These are companies created based on the solutions connected with scientific research conducted. Since academic institutions are often established to conduct scientific research in high-tech areas, it can be expected that this knowledge will be transferred into practice. These expectations are not met to the extent that could be seen as satisfactory by the wider economic sphere and governments of many countries. There is an English phrase “ivory tower” coined to describe academic institutions. It reflects the criticism of the elitism of these institutions and their distance from normal, everyday reality. In other words, it reflects the view that scientists are a separate, elite group that deals mainly with the problems created by themselves and for their own needs. Consequently, they are not interested in using their achievements and concepts in economic life or wider practice.

It can be said that university spin-offs are a visible example that contradicts the opinions presented above. Scientists involved in practical activities are their inherent component and business activity results in both patents and scientific studies and in actual products sold on the market that generate tangible benefits.

Publications indicate that there is the lack of cohesive systematics in the spin-off processes accepted by all institutions and researchers. This situation is highlighted by Callan who, in the OECD report, indicates a number of differences in the approaches presented by individual members of this organisation [3]. Pirnay, Surlmont, and Nlemvo make similar conclusions concerning the analyses of spin-off definitions [11].

At least three trends exist among the definitions used to describe academic spin-offs:

- The trend oriented toward the business founders and the process of their transfer from the parent organisation to the new entity,
- The trend oriented toward knowledge transfer from the parent institution and its implementation in the new company, and
- The trend combining both the aforementioned elements.

In terms of the first group, the personal relationship between the parent company and the spin-off company is emphasised. Thus, spin-off is understood mostly as an entrepreneurial action connected with the creation of a new business by a person associated with an academic/research institution.

Weatherston [18] in his definition indicates that “... academic spin-off can be described as a business venture that was initiated, or became commercially active, with the academic entrepreneur playing a key role in any or all of the indicated areas, i.e. planning, initial establishment or subsequent management phases.” This approach is often used in reference to the description and analysis of academic entrepreneurship.

In terms of the second group, knowledge transfer from the parent organisation to the new entity forms the basis for spin-off separation. This knowledge is then applied in business practice. O’Gorman and Jones-Evans [9] indicate that the spin-off process is “...establishment of a new company or organisation in order to exploit the results of research developed at universities”[7]. Clarysse, Webster and Degroof [2000], in their approach, emphasise the involvement of the institution in the process of the creation of research-based spin-offs understood as “...new ventures created by the parent organisation (university, technical university, public/private R&D sector) in order to carry out the transfer and commercialisation of the invention resulting from the R&D activity of these entities.”

The third definition group, in which both knowledge transfer and personal connections between the parent institution and the spin-off are the reason for the separation, will constitute the basis for further considerations of the concept components and typology.

### **3. The components of academic spin-off definitions**

Analysing the definitions of academic spin-off companies used in literature, three elements that determine whether the given entity can be classified as such are identified. These include (i) new business creation, (ii) knowledge transfer from the parent institution, (iii) personal relationships with the parent institution – the university. In the author’s opinion, only when all three conditions are met at the same time, can the given entity be classified as an academic spin-off. For the purpose of this paper, the fourth factor was added – the capital or contractual relationship existing in the area of knowledge transfer between the university and the new company. This factor often constitutes the element that distinguishes spin-offs created without the knowledge and the influence of the university (often in the so-called “grey zone”) from ventures that form an element of the university strategy of knowledge commercialisation<sup>1</sup>.

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<sup>1</sup> In this context, the terms spin off or spin out can often be used, further discussion of this issue is presented in: Głodek P., Spin-off – wybrane uwarunkowania i klasyfikacja, [in:] Niedzielski P., Guliński J., Matusiak K.B. (ed.) „Nauka – Innowacje – Gospodarka”, Research Bulletin no. 579, „Ekonomiczne Problemy Usług” no. 47, University of Szczecin, Szczecin, 2010, pp. 45–56.

Area 1: new business creation.

A spin-off should encompass the process of the establishment of a new venture in the form of a new, separate legal entity, which is a legally independent business. This factor raises no fundamental objections in reference to academic spin-offs. In this case, business activity should be in principle separate from the main activity of academic institutions.

Area 2: knowledge transfer from the parent institution.

One of the key elements that define spin-off is the use of various forms of knowledge developed in the parent institution to create a new venture. The area of discussion is the form of transfer and the form of its application. It should be assumed that this knowledge ought to play an important, even a key, role in achieving a competitive advantage by the new entity. Otherwise, the classification of the company as a spin-off company is questionable; although, such companies can be considered as independent ventures.

Area 3: personal relationships with the university.

The people who have worked in the parent institution (generally defined as an academic institution, although it is still a subject for discussion) play an important role in academic spin-off. Frequently, it is these people who play a key role in knowledge transfer to the new entity, particularly in the area of know-how and specific knowledge relating to detailed solutions. This knowledge is very difficult to transfer in the official form – documentation, drawings, etc.; therefore, as a rule, their involvement in the technical side of the venture reduces the risk and the costs of this undertaking.

Area 4: a capital or contractual relationship existing between the university and the new venture.

When the university, as the parent institution, has shares (stocks) in the new venture or there is an agreement between the two entities as to the possibilities of the lawful use of the knowledge generated in the academic institution, this indicates regulated legal relations. Thus, it can be assumed that the new entity was created with the knowledge and consent of the parent institution.

#### **4. Spin off creation – determinants related to the university and its employees**

Commercialisation of knowledge generated at universities in the form of spin-offs is a particularly difficult task. This fact is reflected, among others, in a small number of created spin-off companies. Even at the top world universities, only a few companies are created each year. The Massachusetts Institute of Technology is the exception [13].

Five areas constitute the basic areas of determinants in the creation of academic spin-off companies:

- Generating new knowledge, including technical knowledge,
- Business competencies and entrepreneurial attitude of academic staff,
- Organisational structure and the system of the management of intellectual property created by the university,
- Legal environment, and
- Psychological and cultural factors.

In terms of generating new knowledge, the prerequisite is conducting scientific research within the university. It should be emphasised that the possibility of the practical application of the solution resulting from a research project is one of the determinants of its quality; therefore, the high quality of research and the high quality of their results is necessary.

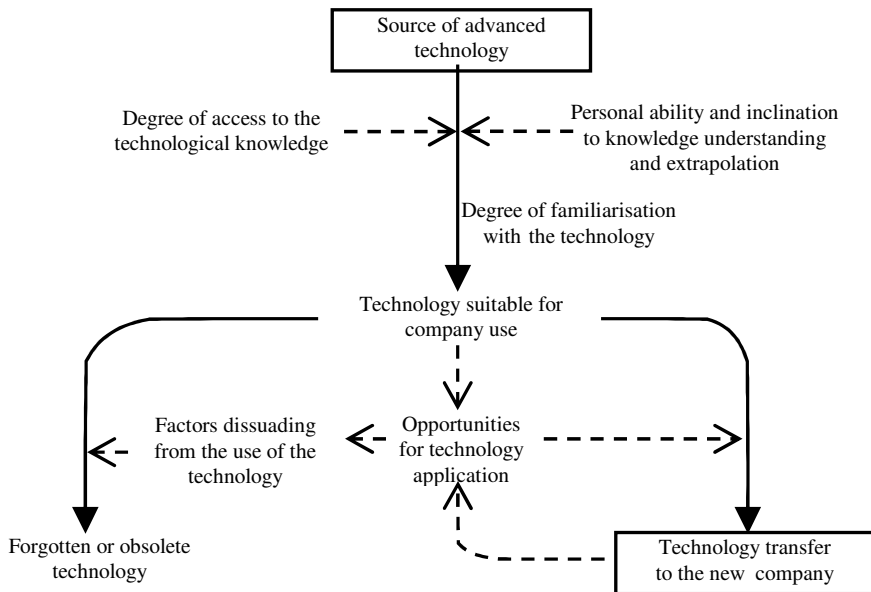


Fig. 1. Diagram for technology transfer to a new company

Source: Roberts E.B. (1991): *Entrepreneurs in High-technology*, Oxford University Press, Oxford, p. 101.

An additional requirement is the specification of the commercialised solution that enables its actual introduction onto the market by means of a new venture. Most university-generated knowledge is connected with improvements that should be (and are) commercialised with the use of licence agreements. This results from the fact that they streamline parts of processes carried out in large enterprises or modify the existing products. In such cases, the implementation carried out in the existing enterprise results in the adequate level of profitability mostly due to the proper control of implementation costs

resulting from the company knowledge and synergies with the existing processes and products rather than to a high margin per unit. Roberts formulated a theoretical model of technology transfer from the source organisation to the new technological company (Fig. 1).

The second area that determines the creation of spin-off companies comprises business competencies of academic staff. The scientific and academic nature of the previous work experience of the spin-off company potential founders often raises scepticism as to their ability to function in business, which is an environment radically different from the rules observed, for instance, in laboratories. It applies to the knowledge connected with finance management, marketing, or production and their skills concerning comprehensive management of company growth are in particular questioned [6]. Moore suggests that technical enterprises show the inclination to devote too much attention to purely technical issues, often neglecting the other areas of enterprise management. In this context, Stankiewicz [14] presents a rather radical view stating that, in order to appropriately and commercially exploit a technology in a small technological company, in many cases at the initial stage of the company development, management should be passed onto people with greater business experience.

The challenges connected with the organisational structure of the university and its flexibility are the third of the indicated areas. These comments relate in particular to the widely understood system of management of intellectual property created at the university. Its efficiency determines the creation of spin-offs and the overall university activity in terms of technology transfer. Bianchi et al. indicate and characterise the elements of the process in such a system [1]. These comprise the following:

- An active system for the identification of university-generated knowledge (scouting) supported by measures promoting scientists' activity and networking,
- Measures connected with making contacts with resource providers (incl. sources of funding),
- Assistance in finding partners,
- Process monitoring, and
- The use of the flexible stage-gate model to manage the commercialisation process.

In their opinion, fundamental organisational requirements for the university are (i) the need to reduce hierarchical behaviour in favour of teamwork and (ii) a flexible, informal mechanism of teams working to support university technology transfer. Apart from that, a performance-based system of remuneration is an important element. It should be emphasised that, in the environment of a typical academic institution [8], such principles of operation are at odds with the traditional hierarchical structure and principles of operation.



Legal regulations, essentially independent from universities, are a separate category of determinants. They directly influence the possibilities of spin-off creation, e.g. by allowing (or prohibiting) the possibility of owning shares in private entities by universities. Additionally, there are a number of legal determinants that have a negative impact on this process. These include, among others, regulations concerning VAT on in-kind contributions made to companies. They cause a significant increase in the costs of spin-off creation, particularly when combined with regulations stipulating the creation of joint stock companies involved in the commercialisation of university intellectual property. This solution results in a process of transfer of this intellectual property from the university first to the commercialising joint stock company and then to the spin-off company.

Psychological and cultural factors are the last of the presented areas of determinants. They largely relate to the necessity to overcome the anti-entrepreneurial attitudes of academic staff [8]. It is also connected with a relatively low prestige of applied research in academic circles, which correlates to the low prestige of a career in the business sector compared to an academic career. In extreme cases, one can even encounter opinions that cooperation with business and profit-oriented activity is incompatible with the ethos of science.

## Conclusions

The presented analysis confirms the thesis put forward by a number of authors that the creation of spin-off companies is one of the most difficult paths to commercialising technologies created at universities. The complexity of the challenges that academic institutions face explains, to a certain extent, why academic spin-off companies (understood in accordance with the definition used in this paper) are a very rare phenomenon at Polish universities.

The majority of Polish universities still face the problem of overcoming most of the issues connected with all the five areas outlined above. The creation of new spin-off companies requires a great involvement on the part of the university in terms of its own structures and procedures as well as active promotion of changes in attitudes and values of its own academic staff.

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Reviewer:

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## **Podstawowe uwarunkowania tworzenia akademickich firm spin-off**

### **Słowa kluczowe**

Akademickie firmy spin-off, przedsiębiorczość akademicka, uwarunkowania tworzenia przedsiębiorstw.

### **Streszczenie**

Przedsiębiorstwa określane jako akademickie spin-off pojawiły się w gospodarce polskiej wraz z przemianami gospodarczymi na początku lat 90. Pomimo znaczącego zainteresowania ze strony polityki gospodarczej, przez ponad dwadzieścia lat powstało w Polsce niewiele tego typu przedsiębiorstw. W ramach niniejszego opracowania zostało zidentyfikowanych pięć obszarów stanowiących bariery dla tworzenia akademickich spin-offów w realiach gospodarki polskiej.

