

FORMS OF COOPERATION WITH THE BUSINESS ENVIRONMENT IN THE PROCESS OF TECHNOLOGY ENTREPRENEURSHIP DEVELOPMENT

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Abstract Technology entrepreneurship is becoming one of the solutions resulting in increased innovativeness and competitiveness of enterprises in the conditions of the so called *new economy*. It is the process of transformation of an idea into innovation, and it covers the conversion of scientific knowledge into products and services aimed directly at the commercial market. At its basis lies the effective cooperation between the research centres, capital market institutions and business support institutions as well as enterprises. Hence an essential challenge faced by the business entities is the development of appropriate relationships and forms of cooperation with the elements of the business environment, allowing for the efforts of the commercial as well as science and technology spheres to be directed at the creation of innovation with the use of market opportunities and the potential of the dynamic business environment. Therefore the aim of this paper has been set to draw attention to the importance of shaping of appropriate forms of cooperation with the business environment in the process of technology entrepreneurship development. In order to achieve this aim, a case study of MakoLab S.A., enterprise operating in the IT industry has been conducted.

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1. INTRODUCTION

Technology entrepreneurship is one of the solutions resulting in increased innovativeness and competitiveness of enterprises in the conditions of the so called *new economy*. It is the process of transformation of an idea into innovation, and it covers the conversion of scientific knowledge into products and services aimed directly at the commercial market. What becomes its aim is ensuring greater practical and commercial usefulness of scientific research, achieved through effective cooperation between research centres, capital market institutions and business support institutions, as well as enterprises. Hence an essential challenge faced by those entities is the development of appropriate forms of cooperation with the business environment, allowing for the efforts of the commercial as well as science world to be directed at the creation of innovation. Taking the above considerations into account, the aim of the paper has been set to draw attention to the importance of shaping of the appropriate forms of cooperation with the environment in the process of technology entrepreneurship development, and to assess how such relations are implemented in the economic practice of a given enterprise.

In order to achieve this aim, a case study of MakoLab S.A. has been conducted, an enterprise operating in the services sector of the IT industry. This business entity creates innovation thanks to the use of the technology entrepreneurship concept, developed through close cooperation between the world of science and technology and the sphere of commercial organisations. As a part of detailed research a questionnaire interview has been conducted with the Director for Software Development of the analysed business, who actively participates in the activities related to the development of technology entrepreneurship (Kozłowski & Matejun, 2011, p. 42).

2. RELATIONS WITH THE BUSINESS ENVIRONMENT IN THE PROCESS OF TECHNOLOGY ENTREPRENEURSHIP DEVELOPMENT

What increasingly gains importance in the modern economy, which is evolving towards the so called *new economy* (for further information see e.g.: Jentzsch, 2001); (Balcerzak, 2009), is the various mechanisms increasing the innovativeness and as a result enhancing the competitive position of enterprises. Technology entrepreneurship can be one of those mechanisms, its nature being the transformation of an idea with promising market viability into a specific business plan that

attracts investors, which in turn enables the implementation of the innovation into the market and its further commercial success (Auerswald, 2007, p. 19). Hence it is a certain business leadership model, based on the identification and making the most of the potential of a dynamic business environment related to the opportunities in the area of advanced technologies. What becomes a crucial challenge here is the gathering and coordination of knowledge resources, talents and financial resources as well as managing projects with high growth potential based on high competencies in the area of managerial decision-making (Byers, 2010, p. 1). The condition that guarantees the effectiveness and efficiency of such a system is the cooperation between research centers, capital market institutions and business support organisations, as well as enterprises, which are primarily focused on manufacturing and sales of technologically advanced products and services.

The concept of technology entrepreneurship lies close to such terms as technology transfer, intellectual or academic entrepreneurship and can be perceived as a tool for transformation of research and the potential of scientific institutions into specific products and services of innovative character. Among the theoretical foundations of this concept, one should include e.g. (Noga 2009, pp. 143-155, 205-207):

- the assumptions of the entrepreneurial organisation theory initiated by F. Knight and further developed by N.J. Foss and P.G. Klein,
- the views of J. Schumpeter, J. Schmookler and later on P. Drucker and other authors analysing the enterprise primarily from the viewpoint of its research and development activities focusing on creating innovation,
- assumptions of the theory of an enterprise determined by its intellectual capital.

What also gains particular significance in this concept is specific characteristics of entrepreneurial activities, such as:

- attitude towards creating innovation, seen in people who have a multitude of ideas and initiatives, who use the combination of production goods, new economic and institutional solutions (Otoliński, 1996, p. 25),
- including a certain level of risk in the process of creating New solutions and innovations (Hisrich, Peters, & Shepherd, 2005, p. 8),
- engaging in opportunities appearing in the dynamically changing environment, while at the same time not allowing to be restrained by currently controlled assets (Stevenson, Roberts & Grousbeck, 1994, p. 5).

In the various approaches to defining technology and academic entrepreneurship, the key to its development is the interaction between the world of science and technology and the commercial world. This is pointed out by e.g. (Poznańska, 2010), while K.B. Matusiak suggests a model of *specific haven*, which can serve as the environment for the development of entrepreneurial initiatives. It consists of (Matusiak, 2006, pp. 110-111):

- science and education sector, providing research results, qualified workforce, flexible options for professional development, as well as potential entrepreneurs among students and academic staff,

- support system including the programmes and institutions supporting technology transfer and the development of initial stages of company growth,
- local environment, composed of small and medium-sized businesses, specialised business support services, institutions financing risk (including venture capital), as well as potential cooperating entities and buyers.

The nature of technology entrepreneurship is therefore the relationships between the areas of science, capital market institutions, public institutions as well as enterprises. These interactions are about the incubation phase and scientific discoveries, funding for research and marketing analyses and pilot studies, as well as about technology transfer and manufacturing and sales of technologically advanced products (Lachiewicz & Matejun, 2010, p. 189). Such relations should be based on the rules of inter-organisational cooperation, which means these should be mutually agreed and complimentary actions, of positive influence on the completion of reaching a given aim (compare to Kaczmarek, 2000, pp. 21-26).

What gains significant meaning in the process of technology entrepreneurship development are the specific forms of such relations. One can identify among those contract interactions, capital ones, partnerships, outsourcing as well as those specific to the processes of technology transfer and creation of innovation: networks, clusters, or licences.

Undoubtedly the selection of forms and character of the relations with the business environment elements has great significance when it comes to effectiveness and transaction costs of activities undertaken within networks, aimed at creation of technology innovation. For example contract relations take place between legally independent entities and result from the fact of entering into contracts (agreements, deals) for provision of a given type of business activity. Capital relations appear as a result of one entity's possession of other entities' shares or stock (Trocki, 2000, pp. 31-33). Pure contract relations are more characteristic for small and medium-sized businesses, which use the capital relations to a far lesser extent, and those in turn allow for (usually) greater extent of control over implemented projects.

Particular forms of cooperation used in the development of technology entrepreneurship are characterised by specific benefits and drawbacks. For instance, network relations used allow for e.g. (Cygler, 2002, pp. 151-155); (Child & Faulkner, 1998, pp. 114-115); (Lachiewicz, 2008, p. 31):

- use of economies of scale and the possibility to achieve a greater reach of market interactions,
- reduction of uncertainty associated with activities and limitation of risk, while at the same time increasing the flexibility of functioning through quicker re-allocation of resources,
- maximisation of one's potential and the development possibilities of network partners through specialisation and integration of activities,
- possibility of easy and relatively cheaper access to scarce resources and capabilities as well as their fast transfer between entities within a network.

Selected forms of cooperation may have a purely transactional character or evolve towards partner engagement, depending on the position and role of a given partner in the process of technology entrepreneurship development. What gains particular importance here is the cooperation relations of partnership character, which are characterised by the attitude towards sharing resources, integration of activities and synchronisation of partners' positions (de Wit & Meyer, 2007, pp. 221-223).

A very crucial role in the development of cooperation forms discussed above is played by the entrepreneurs and managers in enterprises engaged in the process of technology entrepreneurship development. Their creativity in seeking put partners, openness for cooperation and self-improvement, capability to obtain knowledge and negotiate conditions of cooperation as well as preparation to receive and diffuse technologies become pivotal elements in the process of technology entrepreneurship development.

3. RESEARCH METHODOLOGY AND CHARACTERISTICS OF THE ENTITY ANALYSED

In order to achieve the aim set for this paper, a case study of MakoLab S.A. company has been conducted, a company operating in the IT sector and creating innovative solutions based on the idea of technology entrepreneurship. The company has been operational since 1989, focusing its activities on four product areas: IT solutions generated to customer's order, development of management systems based on advanced IT technologies, provision of internet services and creation of software tools.

Company's key products are: Fractus system, CoIDis system and e-Schola system. At present the company employs over 80 people and according to the quantitative parameters can be classified as a medium-sized enterprise. As a stock company the analysed business is listed on the NewConnect market of the Warsaw Stock Exchange stock market.

As a result of the undertaken research, interview has been conducted with the Director for Software Development at MakoLab S.A. His is a middle level management post and he reports directly to the company's Chairman, coordinating work of six product-focused departments. His span of management is 7 people (apart from managers of particular departments it includes one support post), while the scope of management is around 50 people.

The respondent is heavily engaged in the processes of technology entrepreneurship not only at the company level, but also through contact with external partners. In the aspect of new IT technology development his role is primarily about identification of technical details with research institutions as well as clients, assessment of solutions proposed and estimation of the technology's market value. Moreover he takes care of the development of technology and planning for changes in this area, through contact with suppliers and company's strategic alliances. The Director is also

responsible for the input into the preparation of European Union structural funds proposals as well as acquisition and development of dynamic knowledge employees.

4. FORMS OF COOPERATION WITH THE BUSINESS ENVIRONMENT IN THE CASE OF TECHNOLOGY ENTREPRENEURSHIP DEVELOPMENT AT MAKOLAB S.A.

It has been stated by the Director for Software Development, that MakoLab S.A. implements processes of technology entrepreneurship by engaging in the conversion of scientific knowledge into innovation, which is introduced to the market in form of products and services, thanks to close cooperation between the world of science and technology and the commercial world. His duties are closely linked to e.g. ensuring that there are proper relations between the institutions and entities engaged in the creation of technology innovations.

Among the basic projects undertaken through the formula of technology entrepreneurship he included:

- creation of a collection of algorithms, methods and tools allowing for the transactional integration of dispersed databases used by the Fractus system,
- system of optimisation of complex database searches according to selected criteria, completed for one of the company's key clients,
- project the company currently works on, related to the development of Semantic Web, aimed at preparation of the semantic ontology for automotive industry.

The nature of the above projects is the synergic combination of the efforts made by the world of science and technology and the entities within the sphere of commercial organisations in order to create technology innovation. Amongst the fundamental entities MakoLab enters into relations with during the process of technology entrepreneurship, the respondent mentioned:

- in terms of research and development facilities and science institutions: Technical University of Lodz, University of Lodz, Polish-Japanese Institute of Information Technology in Warsaw and the Bundeswehr University of Munich,
- in terms of commercial organizations which serve as strategic allies and consultants engaged in research and development work on new technologies e.g. companies like: Fujitsu FQS Poland LLC, EurotaxGlass's Polska LLC, suppliers of equipment and IT systems, as well as large corporate clients, who report their needs and demand for new products become an inspiration to work on technology innovation. A specific role is also played by the competitors, which provide an essential drive for progress in the IT industry,
- in terms of the financing institutions: entities responsible for managing European Union funding dedicated to research and development work

undertaken by commercial entities, banks and investors present in the New-Connect Market.

Moreover in the course of the technology entrepreneurship process the company engages in cooperation with self-government institutions, e.g. Marshall's Office, which the company cooperates with in the area of European Union funding. On many occasions local governments took patronage over conferences organised by the company. Relations are also developed with the business support centres for the small and medium-sized businesses, e.g. Lodz Regional Development Agency.

Cooperation with the media plays an important role as well, e.g. with TV Lodz or Toya TV, which prepare the coverage of symposia organised by MakoLab. An important element of the analysed company's business environment in the process of technology entrepreneurship development is the local community, represented mainly by young people interested in novelties in the area of technology. The community serves as support and inspiration for the company to undertake innovative action in the area of high technologies.

Table 1 Forms of relations with the business environment elements taking place in the analysed business in the process of technology entrepreneurship development; Own study

Elements of the direct business environment engaging in the process of technology entrepreneurship	Forms of relations							Character of relations		
	Types of relations							partner	transactio nal	exchange of benefits
	contract	capital	network	cluster	partnership	licence	outsourcing			
Customers	x						x	x		
Competitors				x						
Suppliers	x						x	x		
State and it's institutions	x							x	x	
Self-government and its institutions			x					x	x	
Strategic allies and consultants	x		x		x	x	x		x	
Banks and financial institutions	x							x		
Higher education institutions and research and development centres	x		x			x	x		x	
Centres for entrepreneurship support	x						x	x		
Media and press			x	x						
Industry organisations	x		x						x	

„x” mark denotes that the analysed company engages in a given form of relations.

A crucial part of the interview was the identification and assessment of various forms of cooperation between the analysed company and the abovementioned elements of the direct environment. The considerations were being related primarily to the project currently delivered, the Semantic Web. Respondent's answers are presented in Table 1.

Respondent's answers and remarks indicate, that the foundation for the development of technology entrepreneurship in the researched business are contract relations of a partner character with higher education institutions and strategic allies and consultants in terms of commercial institutions. Those relations are entered through contracts, cooperation agreements and letters of intent, signed on behalf of the company by the Board. The respondent's role in such cases is limited to seeking out partners, negotiating and agreeing on the terms of cooperation and presentation of conclusions and recommendations to the final decision-makers. Complimentary to the contract relations are licences related to the specific character of undertaken projects.

Contract relations are also developed with other groups of stakeholders (e.g. company's customers and suppliers, financial institutions as well as organisations in the business environment of small and medium-sized businesses). The character of these relations varies, yet according to the respondent, what is dominant is the transactional links. These primarily refer to the banks and other commercial financial institutions, small and medium-sized business segment customers not focusing on implementation of technologically advanced solutions, as well as suppliers of lesser importance in terms of implementation of technology innovation.

An important area of connections related to the development of technology entrepreneurship in the analysed business are network relations, which are developed alongside the networks of strategic partners, higher education institutions, self-government, media as well as industry organisations. Their aim is not only the diversification of risk and uncertainty, enhanced access to knowledge and other resources or increased flexibility, but also the synergy in joining the partners' efforts in order to increase each other's competitiveness and acquire financial resources allowing for creation of technology innovation.

The outsourcing formula is used to a lesser extent. The company uses a permanent financial and accounting services provided through contract outsourcing by a specialised accounting office. On the other hand, the researched entity itself provides its services in the form of outsourcing for institutional customers. A good example may be the cooperation with BRE Bank.

Cluster relations are used at the smallest scale. MakoLab company is a part of the Lodz Media Cluster (Media Klaster Łódź), which company's competitors are engaged in too, yet those relations have been rated by the respondent as of rather small significance in the context of discussed technology entrepreneurship. The respondent drew attention to the specific character of relations developed with some of the stakeholders, based on mutual exchange of benefits, especially in the area of mutual promotion. This is the case of cooperation with higher education institutions and strategic allies in the aspect of promotion of activities undertaken

in the area of advanced technologies. Such relations are also developed with the industry organisations. In this case they focus on propagating the activities undertaken. Specific promotional activities are related to the state and European Union institutions. These are embarked upon due to the use of European funding in the process of financing projects realised with the use of technology entrepreneurship formula.

The respondent has pointed out, that the analysed enterprise does not currently develop, as a part of technology entrepreneurship development, any capital relations. However one of the options of such connections may be entering into partnership-consortium arrangements with other entities, present at a small scale. Ma-koLab S.A. is at present engaged in two projects of such character. The first one is related to the e-learning platform for higher education institutions, another one covers the research on usefulness and ergonomics of used interface in IT software. The respondent noted however, that perhaps in the nearest future capital connections to venture capital institutions may be used.

5. CONCLUSION

In the process of technology entrepreneurship development, key are the interactions between the sphere of science and technology and that of commercial organisations. Successful course of such process is determined by the use of appropriate forms of inter-organisational cooperation. This article presents the fundamental relations taking place between enterprises and the elements in their direct business environment, aimed at creation of technology innovation.

Research results indicate, that in the business practice of the chosen enterprise the cornerstone of technology entrepreneurship development is the contract cooperation of a partner character with the representatives of the world of science, strategic allies in case of commercial organisations and selected customers engaged in the process of creating innovation. In case of other entities, especially financial ones, it was the transactional relations that developed to a greater extent.

Due to company's current situation the capital relations are not utilised, yet it is predicted that in the future an increase in the importance of relations with the venture capital institutions will take place. Results also indicate the presence of important tasks the internal management is responsible for, linked to initiating and coordinating relations with external entities. Major drawback of conducted research is the inability to generalise the results, which inclines one towards further empirical research in this area. The research will be continued as a part of the research project entitled *Factors and methods of technology entrepreneurship development in small and medium-sized enterprises*.

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REFERENCES

- Auerswald P.E. (2007), "The Simple Economics of Technology Entrepreneurship: Market Failure Reconsidered", D.B. Audretsch, I. Grilo & A.R. Thurik (Eds.), *Handbook of Research on Entrepreneurship Policy*, Edward Elgar Publishing.
- Balcerzak A.P. (2009), *Państwo w realiach „nowej gospodarki”*, Wydawnictwo Adam Marszałek, Toruń.
- Byers T. (2010), "Top 10 Elements of Technology Entrepreneurship for High-Growth Innovation", Stanford University, available at: www.stanford.edu/class/e140/e140a/handouts/TopTenEshipLessons_Byers_2010_5322.pdf (accessed 22 September 2011).
- Child J., Faulkner D. (1998), *Strategies of Cooperation: Managing Alliances, Networks, and Joint Ventures*, Oxford University Press, Oxford.
- Cygler J. (2002), "Organizacje sieciowe jako forma współdziałania przedsiębiorstw", M. Romanowska & M. Trocki (Eds.), *Przedsiębiorstwo partnerskie*, Difin, Warszawa.
- de Wit B., Meyer R. (2007), *Synteza strategii*, PWE, Warszawa.
- Hisrich, R. D., Peters, M. P. & Shepherd, D. A. (2005), *Entrepreneurship*, McGraw-Hill/Irwin, New York.
- Jentzsch N., (2001), "The New Economy Debate in the U.S.: A Review of Literature", [in:] John F. Kennedy Institute For North American Studies, Freie Universität Berlin, Working Paper No. 125, April.
- Kaczmarek B., (2000), *Współdziałanie przedsiębiorstw w gospodarce rynkowej*, Wydawnictwo UŁ, Łódź.
- Kozłowski R. & Matejun M., (2011), "Dynamic business environment as a source of technological entrepreneurship – a case study", Grzybowska K. & Wyrwicka M. K. (Eds.), *Publishing House of Poznan University of Technology*, Poznan, pp. 41-63.
- Lachiewicz S. & Matejun M. (2010), "The role of external environment in creating technology entrepreneurship in small and medium-sized enterprises", [in:] *Management*, Vol. 14, No. I.
- Lachiewicz S. (Ed.), (2008), *Komunikacja wewnętrzna w organizacjach sieciowych*, Wydawnictwo Politechniki Łódzkiej, Łódź.
- Matusiak K. B. (2006), *Rozwój systemów wsparcia przedsiębiorczości. Przesłanki, polityka i instytucje*, Instytut Eksploatacji, Radom-Łódź.
- Noga A. (2009), *Teorie przedsiębiorstw*, PWE, Warszawa.
- Otoliński E. (1996), "Istota i kreowanie przedsiębiorczości", [in:] *Przegląd Organizacji*, No. 9.
- Poznańska K., (2010), *Przedsiębiorczość technologiczna*, Szkoła Główna Handlowa w Warszawie, http://ip-hub.pl/m/att/Prof._Krystyna_Pozna%C5%84ska_-_Przedsiębiorczość_techologiczna_.pdf, (accessed 30 April 2010).
- Stevenson H.H., Roberts M.J. & Grousbeck H.I. (1994), *New Business Ventures and the Entrepreneur*, Irwin.

Trocki M. (2000), "Kształtowanie struktur działalności gospodarczej", [in:] Organizacja i Kierowanie, No. 4.

BIOGRAPHICAL NOTES

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