

[DOI: 10.20472/IAC.2016.025.007](https://doi.org/10.20472/IAC.2016.025.007)

NICOLETTA BASKIEWICZ

Politechnika Częstochowska, Poland

MAŁGORZATA ŁĘGOWIK-MAŁOLEPSZA

Politechnika Częstochowska, Poland

MICHAŁ DZIADKIEWICZ

Politechnika Częstochowska, Poland

ANETA PACHURA

Politechnika Częstochowska, Poland

NETWORK STRUCTURES AS A FACTOR STIMULATING INNOVATIVE CHANGES IN ENTERPRISES

Abstract:

Network functioning covers all kinds of formal and informal relationships between individuals and organizations. Network structure allows enterprises to reach knowledge quickly, while saving time and money which becomes the determining factor in the changes made in enterprises. In order to define a network one can assume that it includes customers, competitors, suppliers, research organizations, schools, institutions, non - profit organizations that are linked one to another and create innovation. The nature of the network lies in the innovation process, which means creating new technical and organizational solutions as well as their transfer and application in the economy. This is possible thanks to the knowledge generated in the network, which is the result of a process of interaction and cooperation between the participants in the network. The objectives of this paper are to determine the following: what forms of cooperation are taken in business practice that entrepreneurs take together in the network and to what extent this network affects its participants.

Keywords:

network structures, factors stimulating innovative changes, innovative changes

JEL Classification: M21

Introduction

Dynamic relationship that one creates with one's environment, which means that all components of the system are closely linked to each other and are in constant mutual interaction. As a result, it is difficult to make any changes in the structure or strategy of the organization (Czander, 1993).

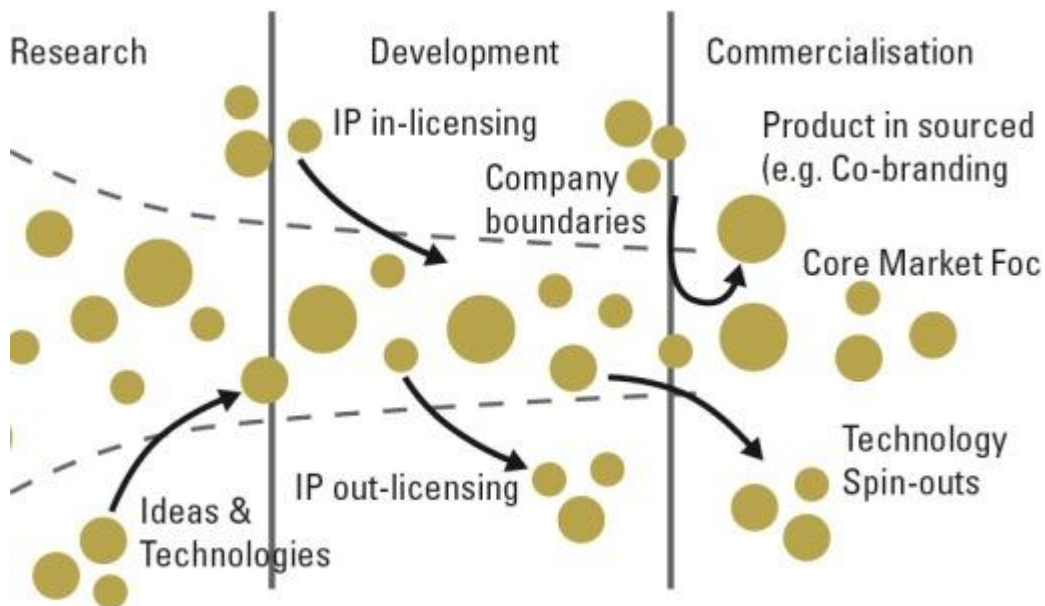
Our research potential and organization of companies that run innovative activity is usually not sufficient for autonomic implementation of innovative projects. This situation determines the need for cooperation between individual entities, in order to develop new solutions both in terms of organization and products. Cooperation can take various forms and comply with the rules of Open Innovation.

1. Creating network structures as a factor stimulating innovation of enterprises

Research on literature and economic practice shows that innovative activity requires a new approach based on cooperation and the creation of networks. There are theories covering the whole innovation process - from development through performance, to implementation which include the principles of Open Innovation approach (Chesbrough, 2003).

The Open Innovation rule is (Chesbrough, 2003): „Keep the indispensable; influence the possible” which means keeping under the direct control one's R & D and intellectual property rights (not impeding co-operation and partnership) and a need to invest one's own funds. Influencing means sharing the results of R & D activity without keeping them under the direct control and limited investment of own funds. The main task of the organization is an appropriate and accurate identification of activities and intellectual property rights, which are to be kept and those that need to be influenced. Figure 1 shows the management of R & D in terms of Open Innovation.

Figure 1: Industrial R& D management in terms of Open Innovation approach



Source: H. Chesbrough, *The Logic of Open Innovation: Managing Intellectual Property*, 2003, California Management Review 45(3).

Figure 1 illustrates the possibility of two-way penetration of ideas inside and outside of the organization (the boundaries in this case are represented by the dotted line, symbolizing its more open nature). Ideas being in the process of birth within the organization framework research process (left side of Figure 3), while some of them may "leak" from outside, both during the stage of research and development, and during its "flow" on the market (the right side of Figure 3). The carriers of these "leaks" are often start-ups, often employing workers of the organizations, in which the ideas arose. Other "leaking" mechanisms are based on external licensing and leaving staff. Ideas may be "born" outside laboratories of organization and they may "influence" it (Skowron Grabowska , Szczepanik ,2015).

When using Open Innovation approach, companies should use external and internal ideas equally. This is a priority condition to meet the technological challenges and expectations

Networking covers all kinds of formal and informal relationships between individuals and organizations. The network structure allows enterprises to reach knowledge quickly, saving time and money. Definition of network can help to assume that it includes customers, competitors, suppliers, research organizations, schools, non - profit organizations that are linked together and create innovation (De Jong, 2008).

The nature of network links in the innovation process means creating new technical and organizational solutions as well as their transfer and application in the economy. This is possible thanks to the knowledge generated in the network, which is the result

of a process of interaction and cooperation between the participants in the network (Wiśniewska-Szałek, 2015).

The network affects its participants through two ways of interaction: the first is based on the flow of information in the network and determines the rules of sharing; the second is based on the differences arising from the position of individual market participants that have a specific power of influence and control the level of imbalance. The most important is the position of the organization in the network, because it expresses its strength, which has an impact on the network itself. Sources of power may include economic strength, technological confidence (Surówka-Marszałek, 2008). One of the biggest advantages of being in a network is the possibility of cooperation of many companies and organizations in a project. They may come from different economic sectors, from different countries with different social systems (religious and cultural), so their knowledge bases are different, and the result of the study consists in innovations that might not have occurred in a single company internal team (Rybiński, 2007).

Networking has a large impact on the functioning and growth of companies on their innovativeness, contacts with the environment, willingness to take risks. Networking covers all kinds of formal and informal relationships between individuals and organizations. Running a business in accordance with the concept of Open Innovation increases its production capacity, but also increases its dependence on external sources of R & D at the same time. This situation provides an opportunity for independent research centers, as a result of changes in the policies and research activities of industrial companies, to gain new sources of funding and development opportunities. Obtaining benefits by both parties is possible only if the use of specific knowledge and activities of potential partners in research cooperation including proper organization and functioning of the structures, which will carry out a research task. Communication is particularly important in the context of partnerships, R & D and the concept of Open Innovation. Partnerships between R & D organizations, most industrial sectors and between representatives of the public and private sectors are becoming more common. Between individuals, there are differences in the understanding and application of their research management processes, as well as the low level of understanding of what behaviors promote good cooperation between partners. The realization of these facts is essential in planning the creation and operation of research infrastructures. A new structure creates new demands of quality: excellence in the management of R & D activity. Management of research is of key importance in the process of coordination and control of the research programs implementation. It constitutes an important point in determining the effectiveness of research structure and minimizing the level of risk and uncertainty in R & D management. Excellence in research management is necessary both at the strategic (doing the right things) and at the operational levels (doing things the right way) (Kośmider, 2010).

Relations between a company and its environment according to the ideas like the concept of Open Innovation, include such key factors as cooperation with scientific researchers, membership in a network and communication. As a result, companies can gain the appropriate knowledge and ideas to develop and hence be innovative and, above all, competitive.

2. Cooperation between research institutes and industry as an example of the application of Open Innovation

Efficient relationship between business and scientific – research institutes determine the effectiveness of an innovation system, which in turn translates into business innovativeness and competitiveness. Some of these links are direct, which means the situation when a research leads to discoveries of application, engineering, research techniques and instruments. Other relationships are indirect, e.g. when educated graduates or published scientific knowledge contributes to the improvement of business operations ¹. So the benefits of academic knowledge can be transferred to the companies in a variety of ways. The most intensive cooperation between science and business includes (Wojnicka, 2004):

- Joint promotion of master's theses and doctoral dissertations by the universities and businesses,
- Representatives of business lectures at universities,
- University staff financed by business,
- Transition of university staff to business,
- Joint projects with university and business,
- Establishing of enterprises by university staff,
- Joint publications of science and business,
- Continuous education offered by universities to business representatives,
- Probations of scientific workers in enterprises.

Economic benefits of scientific research, supporting the innovative potential of enterprises are above all (Wojnicka, 2004):

- New and useful information,
- New instruments and methodologies
- Skilled graduates
- Access to networks of experts and information,
- People capable of solving complex technological problems,

¹ www.ksu.parp.gov.pl/res/pl/pk/pakiety_informacyjne/.../01_14.doc, odczyt 6.03.2016

- The spin-offs - academic entrepreneurship.

Efficient business relationship with the scientific – research sphere stimulates innovation and business competitiveness. That is why it is so important for companies to collaborate with research institutions and not limit oneself to market research on their own.

Relations between a company and its environment according to Open Innovation, mean such key factors as: cooperation with scientific research sphere, membership in a network and communication. As a result, companies can gain the appropriate knowledge and ideas to develop and hence be innovative and, above all, competitive. In Silesia region, there are 460 350 business entities of which 437 subjects (9.5%) works in industrial manufacturing, and similar number of subjects (9%) is engaged in professional scientific and technical activity. This fact allows one to conclude that the operators working on new products do not have major problems with reaching providers of advisory services.

3. Empirical research

In Silesia region there are 460 350 business entities in total, of which only 437 subjects (9.5%) work in manufacturing, whereas a similar number of subjects (9%) is represented by entities engaged in professional scientific and technical activity. Thus, the quantity units are close to each other, which leads us to a conclusion, that companies working on new products do not have major problems with getting to providers of advisory services in this regard. In order to understand the scope of cooperation between enterprises and advisors better, in September 2015 all manufacturers from the Silesian voivodeship received an email survey with following question; “ Do you cooperate with any individual advisory entity in terms of the conceptualization and implementation of innovation in your company?”. For 437 surveys 214 responses were obtained, 184 companies of which replied that they do work with the advisory institutions. In October 2015 the second phase of the study was carried out, aimed at identifying up to three most common areas of cooperation. Correctly completed surveys were returned by 84 of the 100 randomly selected companies.

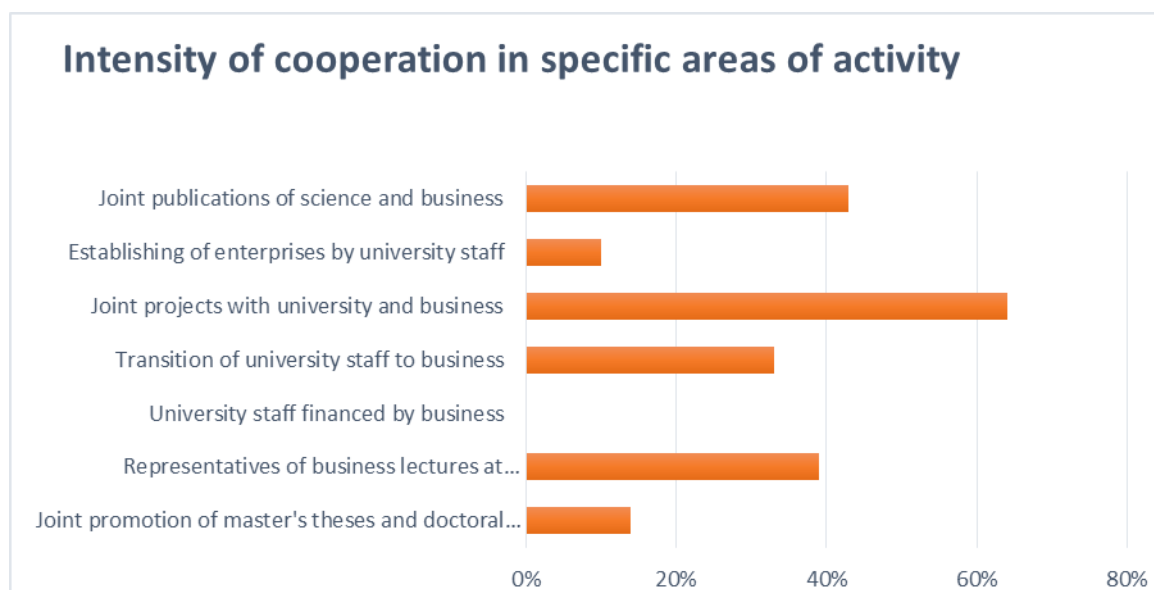
Table 1: Intensity of cooperation in specific areas of activity

no.	Cooperation area	Number of indications (%)
1	Joint promotion of master's theses and doctoral dissertations by the universities and businesses	12 (14%)
2	Representatives of business lectures at universities	33 (39%)
3	University staff financed by business	-
4	Transition of university staff to business	28 (33%)
5	Joint projects with university and business	54 (64%)
6	Establishing of enterprises by university staff	9 (10%)
7	Joint publications of science and business	36 (43%)
8	Continuous education offered by universities to business representatives	21 (25%)
9	Probations of scientific workers in enterprises	52 (62%)

Source: Own study

The information and data included in tables have also been presented in graphical form (Fig. 2)

Given the intensity of cooperation between the consulting firms and businesses, the greatest intensity should be seen in terms of joint projects of cooperation research entities such as universities and enterprises, where up to 64% of the surveyed companies admitted to have such cooperation. A similar intensity of cooperation can be observed in the area of practices implemented in industrial plants (62%). Scientists' practices in real business conditions are favorable for both sides. These activities are the norm used in German companies, where every researcher is required every year to perform a month internship in an industrial plant.

Figure 2: Intensity of cooperation in specific areas of activity

Source: Own study

An interesting and beneficial solution, especially for the students, are the lectures organized by universities, whose speakers are also entrepreneurs, which has been confirmed by 39%. The consequences of science and business cooperation are joint publications where research literature is supported by empirical verification. The participation in the studies involving such publications was confirmed by 43% of the surveyed companies.

Summary

In the century where information flow is intense due to the expansion of information technology and broader globalization, networking seems to be a norm. A norm, which is also a must. Relationship between scientific entities and business units determines the level of innovation of companies and the level of qualifications of the scientific staff. This situation is commonly observed and all efforts should be intensified, eg. By providing financial support to joint actions, ie. trainings, publications and projects.

References

- CHESBROUGH H., (2003) *The Logic of Open Innovation: Managing Intellectual Property*, California Management Review 45(3).
- CZANDER W.M., (1993) *The Psychodynamics of Work and Organizations*, Guilford Press, New York – London.
- DE JONG J., VANHAWERBEKE W., KALVET T., CHESBROUGH H., (2008) *Policies for Open Innovation. Theory, Framework and Cases*, Vision. Era-Net, Helsinki 2008, p. 16
- KOŚMIDER T., (2010) *Wzrost innowacyjności polskich przedsiębiorstw. W: Innowacyjność 2010*. Red: Paulina Zadura-Lichota, Wyd. PARP, Warszawa , p. 108
- Rybiński K.,(2007) *Globalizacja w trzech odsłonach*, Difin, Warszawa, p. 67-72
- SKOWRON GRABOWSKA B., SZCZEPANIK T. (2015) *An Offer InformationTechnology Companies on the E-commerce Market*, [in:] *Energy,Environmental and Structural Engineering Series nr 38*, Zakynthos, Grecja,
- SURÓWKA-MARSZAŁEK D., (2008) *Rola organizacji sieciowych w kreowaniu technologii innowacyjnych. W: Innowacyjne systemy, procesy i metody zarządzania międzynarodowego*. Red: M. Trocki, Wyd. SGH, Warszawa, p. 52
- WIŚNIEWSKA-SAŁEK A. (2015) *Processes Management in Warehouse Management in a Company of SME Sector – Case Study*, Carpathian Logistics Congress, Jeseník, Czechy,
- Wojnicka, E. (2004) *System Innowacyjny Polski z perspektywy przedsiębiorstw*, Instytut Badań nad Gospodarką Rynkową, Gdańsk, p. 71

www.ksu.parp.gov.pl/res/pl/pk/pakiety_informacyjne/.../01_14.doc, odczyt 6.03.2012