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TRANSACTION COSTS IN THE FUNCTIONING OF CLUSTERS

KOSZTY TRANSAKCYJNE FUNKCJONOWANIA KLASTRÓW

Słowa kluczowe: koszty transakcyjne, klastry, efekty współpracy

Key words: transaction costs, clusters, cooperation effects

Abstract. This paper presents the problem of transaction costs, specifically the effects of cluster cooperation. Clustering is a modern platform for interaction between multiple actors of socio-economic development. In these relations, cooperation plays a key role. This issue was discussed on the example of Biotechnology Cluster in Cambridge (UK). Good communication and the ability to cooperate with businesses as well as administrations and institutions consisting of educational units and research and development entities, are important cluster determinants. The strength of the cluster is mainly determined by economic factors, including lower transaction costs resulting from the accumulation of specialized resources, informal relations and information flow.

Introduction

The present stage of development of the global economy has made knowledge the dominant factor, often the most important resource possessed by the organizations. Comparative advantage of market and products or services over competitive offerings is determined by the quality of knowledge used for the conceptual design, manufacturing, promotion and sales.

The classical resources, including capital, technological, and material resources are still important, but not as areas where people can look for opportunities for company development. As a strategic resource, the company acquired the knowledge, which is the basis of modern business. At the core of the knowledge economy, lies innovation and creativity, through which new technologies and new management solutions are created [Wierzyński 2010]. This created a business model called clustering, based on knowledge, which is fully realized in modern networks of cooperation.

Clusters facilitate the flow of information and create innovative channels of communication which is essential for the spread of innovation and knowledge. Therefore, the presented networks increase productivity, efficiency, and consequently the competitiveness of the economy at the local, regional, national and global levels. The experiences of countries with highly developed structures of the clusters show that clustering stabilizes the whole economic system, and are an added incentive for growth [Wierzyński 2010].

Objectives and methods

The paper has a theoretical attempt and aims to obtain three comprehensive goals. First it aims to describe the different approaches to the theory of clusters providing also some examples of clusters functioning in the agribusiness sector. Secondly the functioning of clusters will be examined from the point of view of the theory of transactional costs, using the methodological approach of a New Institutional Economy [Rudolf, 2005 and Rudolf, 2009]. On the basis of the characteristics of cluster and transitional costs theories there will be third goal obtained, namely an attempt to measuring the transactional costs of clusters. The sources of information will come from secondary sources, mostly from in depth literature review, which with a case study will serve as research methods.

Theory and cluster development

Michael Porter defines a cluster as “a geographically proximate group of interconnected companies and associated institutions in a particular field, linked by commonalities and complementarities” [Porter 1999]. They include concentrations of interconnected companies, service providers, suppliers of specialized inputs to the production process, customers, manufacturers of related products and also governmental and other institutions, such as national laboratories, universities, vocational training institutions, trade associations and collaborative research institutes [Wolfe 2001].

M. Porter suggests that clusters can be identified through a four stage process that begins with the identification of a concentration of big companies, and then searches for linkages to other enterprises that feed its activities. The second step is to locate horizontal industries or companies that produce complementary products or services, which usually make use of specialized inputs or technologies or share common supply linkages. The third step contains locating the major organizations that provide network of companies with specialized skills, technology, information, capital or infrastructure. The final step is related to the governmental role and other economic development agencies that support the activities of the cluster. Porter's analysis of the main components that comprise a cluster recognizes the importance of "untraded interdependencies" among companies and supporting organizations which arise from the co-location of specific inputs to the innovation process, such as R&D facilities, training institutions, specialized service providers and suppliers of main elements [Porter 1999].

Clusters are reduced in scale innovation systems. There should be a place of the most creative thinking, a place of formulating and developing new solutions. Clusters are also a platform for innovative ideas, which tested within a narrower group of cooperating companies and institutions can consequently enter into the wider economic activity. Not without significance is the fact that such a structure leads to direct and interpersonal contacts.

Clusters are also an expression of a new way of thinking about economic processes, their organization and efficiency. They show the economy as a system of connected vessels, in which technology, information, marketing, logistics, customer needs are interrelated and largely interdependent. Today knowledge economy forces existing companies to develop intellectual capital, invest in innovation and introduce new technologies, thus clusters facilitate the implementation of these tasks. The essence of clustering is to work closely between the R&D sector and the business sector, use the potential of science in business practices and commercialization of laboratory performance [Wierzyński 2010].

In the world there are many cluster structures. Some of them were created decades ago. The most specialized are [Kozak 2009]: Silicon Valley (USA), Biotechnology Cluster in Cambridge (UK), Telecom City (Sweden), Plastic Valley (France), Uniport in Bilbao (Spain), Nokia (Finland), and Hollywood (USA).

The example of biotechnology cluster in Cambridge (UK)

The British biotechnology industry is the largest in Europe and second in the world after the USA. The companies from the United Kingdom produce over 40 percent of biotechnology products in Europe. In addition, 45 percent of biotechnology drugs that are in the crucial third phase of clinical trials comes from the UK. Among the world's top 100 medicines, 18 were discovered in Britain.

In the UK there are about 435 biotechnology companies, with a turnover of 2.5 billion pounds a year. In total, they employ 20 thousands workers. The United Kingdom is a large "super-cluster" in which research firms were located around academic centers. The most famous ones are Cambridge, Edinburgh, London, Glasgow, corridor between Liverpool and Manchester, Newcastle and Oxford. Around these universities clusters and research infrastructure are being developed, and the private sector is heavily engaged in financing biotechnology research [Żukowski 2010].

In the past few decades, Cambridge has become a prime example of an innovative cluster, oriented on commercialization of new technologies. This cluster is active in the field of health and biological and natural sciences, information and communication technologies, industrial technologies, chemistry and materials, energy, and also services and trade. The presence of a strong research base, financial institutions and infrastructure, and numerous specialized companies have resulted in hundreds of hi-tech companies. Thanks to the involvement of venture capital institutions, companies operating in the cluster are focused on development and innovation. The best-known companies operating in the cluster are companies that specialize in medical and biopharmaceutical categories, e.g. Actinova, Amgen and Hexagen, Chiroscience, Napp and Quadrant and Ciba [Cooke 2002].

Overall, Cambridge has a number of different biotechnology processing and development, together with the services support structure. The infrastructure that supports biotechnology in Cambridge is well known around the world, especially from research university, incubators for biotechnology start-ups and commercialization.

One of the most important features of the biotechnology sector in Cambridge and its region is the existence of formal and informal networks between companies, research units and service organizations. The main Cambridge Network was formed to formalize the relations between science and business organizations, connecting local and global networks. The greatest attention is paid to the activities of the IT sector and the Eastern Region Biotechnology Initiative (ERBI). The first activity mainly focuses on IT services, e.g. telemedicine, while the second activity shows the major network with responsibilities for: networking, organizing conferences, newsletters, creating a database and web industry. In addition,

international cooperation with Germany and the USA was established, followed by planning seminars, the creation of common purchasing, and government relations for companies.

All of these joint activities in the biotechnology sector are confirmation of the existence of networks in the Biotechnology Cluster in Cambridge. Due to the sunk costs regarding the provision of network connections by venture capitalists, specialist patenting, accountancy and insurance services, the main driver of knowledge are universities and biotechnology companies, by which Cambridge can be an example of a cluster operating in the regional, national and global development [Cooke 2002].

The biotechnology cluster is known for its strong enterprise infrastructure that supports the well-developed scientific institutions, associations managing collective affairs, and national and regional public funding. In addition, the existing networks between the cluster participants, and cooperation with finance and services sector made the biotechnology cluster known around the world. The cluster also has the nature of the regional innovation system based on a strong network of relations among participants in both business and academics.

To sum up the Biotechnology Cluster in Cambridge, it can be stated that it is a modern platform of interaction promoting knowledge, innovations, creativity, essentially everything that counts in the current global and competitive economy. Importantly, through networking and interaction, the cost reduction, which encourages companies to form clusters, lead to not only the limitation of the cost of production or transportation, but primarily to reduction of the transaction costs [Gorynia, Jankowska 2008].

Transaction cost theory

the theory of transaction costs can be treated as a development and complementary issue to the neo-classical approach, because it allows the analysis of the company not only in the context of the production function, but also transaction costs. Currently the theory, which belongs to one of three main strands of new institutional economics, is not a denial of the neoclassical approach, but is complementary to its concept.

The growing importance of the concept of transaction costs, as the basis for research and analysis of companies, could have occurred when there has been development of information technology and a new field known as ICT (Information and Communication Technology). According to R.H. Coase's, the presence of transaction costs can be explained as the existence of the company, as the contractual and organizational structure that allows the reduction of transaction costs, but also generating new management costs. The analysis of transaction costs requires a new perspective on the concept of hierarchy and market in the enterprise. Such an innovative approach based on the integration of transaction costs to analysis of the companies, O.E. Williamson suggested in the publication of *Market and Hierarchies: Analysis and Antitrust Implications* [Williamson 1975].

Oliver E. Williamson distinguishes two types of transaction costs: *ex-ante* and *ex-post*. The *ex-ante* category includes the costs of designing, negotiating and securing contracts. These are costs incurred in the preparation and negotiation of contracts. Their size depends on the type of goods and services under the contract, which are to be produced. The *ex-post* costs include the cost of failure, the costs of renegotiation, the cost of establishment and running costs, and the cost of storage securing the performance of obligations. These are the costs associated with the need to create a management structure and operate it regarding its failure and the need for renegotiation, process monitoring, and storage security.

As a part of transaction costs, the cost of exploration (search and information costs), costs of contracting (bargaining costs) and the costs of coordination (enforcement and supervision costs) can also be distinguished [Petrick 2008]. Search costs arise as a consequence of actions taken by the company in order to find partners. These include not only the cost associated with finding a suitable partner, but also the cost of verification the reliability of a potential business partner. These costs vary depending on the industry and the number of firms operating in it. In the case of a network these are costs which are incurred mainly in the initial period of operation, in which potential partners are being searched for. The result of this investigation can be a database and information on business partners of the company. The next step is the choice of partner and the conclusion of cooperation agreements. At this stage, the cost of business contracts covering all business expenses incurred in connection with the final agreement are being accompanied. These include legal fees, payments to intermediaries, and the cost of time devoted to the analysis of bids and negotiations as well as the cost of purchasing raw materials. The last group of transaction costs are the costs of coordination, including any costs incurred in relation to cooperation with external companies. These include, supply chain management costs and costs associated with enforcement of the contracts and the fulfillment of the obligations contained in contracts [Łobejko 2010].

Analyzing the phenomenon of clustering, the specific nature of the interaction between the participants can be identified. Recognizing the unusual advantages in relations with others, a new set of standards and principles, a new business culture, which consists of trust and openness, is created. In such environments, predictability increases, which leads to reduction of transaction costs.

Transaction costs arise because of the fact that human decisions are controlled by the rational behavior, and human interactions are controlled by opportunistic behavior. Rational behavior leads to the situation when the costs of collecting and processing information are increasing, and additional opportunistic behavior of the potential business partner increases the costs of negotiation, contracting and monitoring of joint ventures. The desire to generate greater profits is the main reason of the constant search for possibilities to lower the transaction costs. The level of transaction costs depends on the three main criteria: the specificity of assets, uncertainty and frequency of transactions. Because of this fact, one of the first tasks undertaken in the new cluster initiatives should be based on identification of possibilities to reduce the transaction costs [Baron, Palmen 2011].

Methodology of measuring the transaction costs

Transaction costs are often difficult to measure, and this is due to the difficulties associated with their unique understanding and identification in practice. The symptoms often include the inability to separate the transaction costs and production costs, which are dependent on each other and have common origins.

The transaction costs can be expressed in money, in the time required to complete about-transactional tasks, but there are also transaction costs that cannot be expressed in a clearly measurable and universal way, such an effort to initiate a transaction, the stress associated with the risk, or loss of health as a result of the transaction. Moreover, often it is possible to measure transaction costs only in relation to certain transactions in the market.

Another problem is related to the number and variability of factors affecting the level of transaction costs, such as regional circumstances. The difficulty of measuring the transaction costs, makes it impossible to summarize, compare, and determine precisely the rate of changes of the transaction costs [Sobiecki 2011].

Firms in the cluster experience reductions in transaction costs through strong linkages that exist between them. The companies form a network often jointly developing the knowledge and their own language of communication, which is also reflected in the amount of transaction costs that accompany the contracts conducted between companies. Pointing to the benefits in the performance of companies as the reason of the cluster formation, there should be mentioned that the cluster is a network made by companies located in certain area. If they interact with each other, they must bear the costs of travel, transport, which are called spatial interaction costs. The amount of these “geographical” transaction costs may encourage companies to locate close to their partners.

Their level depends on how the product, service performed by a company or activity undertaken by it are sensitive to the distance factor, for example, the activity related to development of new products requires direct contact between supplier and buyer.

However, through networking and interaction reducing costs encourages companies to form clusters which leads not only to reductions in transport costs and the costs of adjusting the workforce, but also contributes to reducing the costs of acquiring information and knowledge. It can be assumed that the transaction costs associated with replacing goods are clearly reduced when there are strong social ties between participants located in close geographic proximity [Gorynia, Jankowska 2008].

Conclusions

The concept of transaction costs has been recognized by the Nobel Committee, as evidenced by the two awards granting – Coase in 1991 and Williamson in 2009 for studies contributing to the development of this idea. It should be noted that transaction costs in the new institutional economics is an ambiguous term and is not a subject to explicit quantification [Kargul 2011].

International experience shows that clustering is one of the most important factors in the development and economic growth. The real key to success should be an effective cooperation, good communication and strategic thinking ability. By doing this, cluster has a chance to develop and improve its competitiveness while reducing the level of transaction costs.

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Streszczenie

W opracowaniu przedstawiono zagadnienie kosztów transakcyjnych, jako efekt współpracy klastrowej. Klastry to nowoczesna platforma interakcji między wieloma podmiotami życia społeczno-gospodarczego. W kontaktach tych kluczową rolę odgrywa współpraca. To zagadnienie zostało omówione na przykładzie Klastra Biotechnologii Cambridge w Wielkiej Brytanii.

Istotnym wyznacznikiem klastra jest dobra komunikacja i zdolność do współpracy przedsiębiorstw, administracji i instytucji otoczenia, w tym jednostek edukacyjnych i badawczo-rozwojowych. O sile klastra decydują przede wszystkim czynniki ekonomiczne, w tym niższe koszty transakcyjne wynikające z nagromadzenia wyspecjalizowanych zasobów, nieformalnych powiązań i przepływu informacji.

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