

# Knowledge Acquisition as Determinant of Outputs of Innovative Business in Regions of the Czech Republic

P. Hajek, J. Stejskal

**Abstract**—The aim of this paper is to analyze the ability to identify and acquire knowledge from external sources at the regional level in the Czech Republic. The results show that the most important sources of knowledge for innovative activities are sources within the businesses themselves, followed by customers and suppliers. Furthermore, the analysis of relationships between the objective of the innovative activity and the ability to identify and acquire knowledge implies that knowledge obtained from (1) customers aims at replacing outdated products and increasing product quality; (2) suppliers aims at increasing capacity and flexibility of production; and (3) competing businesses aims at growing market share and increasing the flexibility of production and services. Regions should therefore direct their support especially into development and strengthening of networks within the value chain.

**Keywords**—Knowledge, acquisition, innovative business, Czech republic, region.

## I. INTRODUCTION

**I**N most cases today, the competitive advantage of businesses and regions does not depend on available production factors. It is necessary to expand these with knowledge and ability to learn, sometimes with abilities embedded in dyadic networks and relationships [1], [2]. From these relationships, economic entities can gain knowledge for further use [3].

Another extension of the resource-based view concerns knowledge as a source of sustainable competitive advantage, as advocated in the knowledge- and learning-based views of the firm [4]-[6]. Knowledge is particularly important for technology-based firms: generating and exploiting knowledge in high-technology sectors demands that knowledge be continually replenished [2]. Because the acquisition and exploitation of knowledge are predominantly social processes [6], social capital may be critical for the long-term success of technology-based firms.

It has been demonstrated that the acquisition of knowledge is determined by many factors in practice. The most important are (a) social interaction, (b) relationship quality, and (c) customer network ties [3]. Social capital improves access to external sources of knowledge (through social and interpersonal relations). This approach, however, operates on a reciprocal basis, and it is therefore expected that the exchange and further development of knowledge will occur on both sides of the relationship. Acquired knowledge is then logically

used either to create a new product, for its innovation, or to increase technological distinctiveness. Finally, it can be used to gain a competitive advantage by reducing the cost of production. That is the least effective use of knowledge acquisition process however.

The so called external use of knowledge has become a phenomenon of the recent years. More and more companies and other organizations focus on acquiring this knowledge in their corporate strategies. Public sector organizations then focus mainly on supporting the acquisition of knowledge and their subsequent transfer between organizations that apply, and sometimes in the form of diffusion use, such as acquired knowledge to strengthen their own competitiveness. As emphasized by [7], the use and further commercialization of external knowledge is in practice complicated especially by obstacles on the actual “knowledge market” such as lack of measurability of external knowledge and legal obstacles in the process of commercialization.

The concept of external knowledge commercialization goes beyond mere passive transmission of knowledge. It incorporates other processes such as identifying opportunities for the potential use and complete transfer management, or use of knowledge (the accrual transfer of the usually tacit knowledge is the last step). It is these processes that often form barriers and make the use of knowledge, and eventually its further transfer, difficult [8].

In contemporary literature, there is a general consensus over the fact that the absorption capacity of firms affects their innovation performance [9]. The absorption capacity is determined primarily by the ability of firms to identify and acquire knowledge from the external environment. This ability must be accompanied by the ability understand and use that knowledge. Previous studies have focused on the impact of overall absorption capacity on the innovation performance of enterprises. In contrast, this study aims at first and, by the current literature, the most important element of the absorption capacity [10], i.e. the ability to identify and acquire knowledge from external sources at the regional level, because regions often provide support and necessary infrastructure through the so called Regional Innovation Systems (RISs).

## II. THEORETICAL BACKGROUND

Knowledge represents the know-how, the ability to apply and put knowledge and skills to practice [11]. Blackler [12] further states that knowledge is a part of active process of knowing, which, because of its properties of inconsistency and situatedness, is difficult to describe. This complicates its understanding and subsequent transfer and final utilization.

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Practice shows mainly operation with data and information and their transformation into useful factors of production – knowledge. Transfer of some knowledge is however significantly limited, it is the so called tacit knowledge. Its opposite is codified knowledge. It is receivable and interpretable by conventional means of communication. It is especially easy to transfer in form of learning that is inherent to all educational systems. In contrast, tacit knowledge is closely associated with procedures, actions, ideas, routines, emotions and values. It is highly individual and its owner may not even know about having it.

It is logical that knowledge is dynamic and constantly changing both with the development of knowledge and with overcoming it (when an important piece of knowledge becomes trivial). According to [13], the process of transformation is divided into several stages: socialization, externalization, internalization and combination. Each type of transformation requires different (regional) environment in which the effective transfer of knowledge takes place. For individual types, it is:

- socialization – a group with tacit knowledge (tacit knowledge remains within the group)
- externalization – normal environment with entities that have an interest in the tacit knowledge (school, retraining, businesses, cooperating entities, industrial clusters, innovation centers, etc.)
- combination – research institutions, common innovation-friendly business environment
- internalization – favorable environment for transfer of codified knowledge into tacit.

The environment therefore needs an entity with knowledge and a subject that wants it. If there are more such subjects in a favorable environment, a knowledge network emerges. It represents subjects with common interest – the transfer of knowledge required to enhance their own competitiveness on market. Since the knowledge transfer is very “fragile”, the environment of the network needs to include these elements (shared by individual subjects of the network):

- common values,
- confidence,
- common goals and a sense of mutual benefit in cooperation,
- assisting ICT

These elements are most often found in spatially and culturally close subjects within regions. The aim of these regional knowledge networks is transfer of knowledge that, in commercialized form, would lead to innovation, which in turn would enable their creators or transformers to increase their competitiveness.

### III. RESEARCH METHODOLOGY AND DATA

The harmonized questionnaire of the EU Member States for CIS (Community Innovation Survey) has been used for the data collection. The survey was conducted for period 2006-2008 by combining sampling (stratified random sampling) and surface survey reflecting the NUTS3 regional dimension. The

selection included firms with at least 10 employees in selected areas of production and services (both financial and non-financial), particularly the crucial and complementary NACE sectors: B, C, D, E, F, G45-47, H, I, J57, J61-63, K, L, M69-74 and N.

The most important sources of knowledge for innovation activities were in almost all regions sources within firms (Fig. 1). The only exceptions were regions Pardubice and Plzen, where the highest proportion of sources is knowledge received from customers.

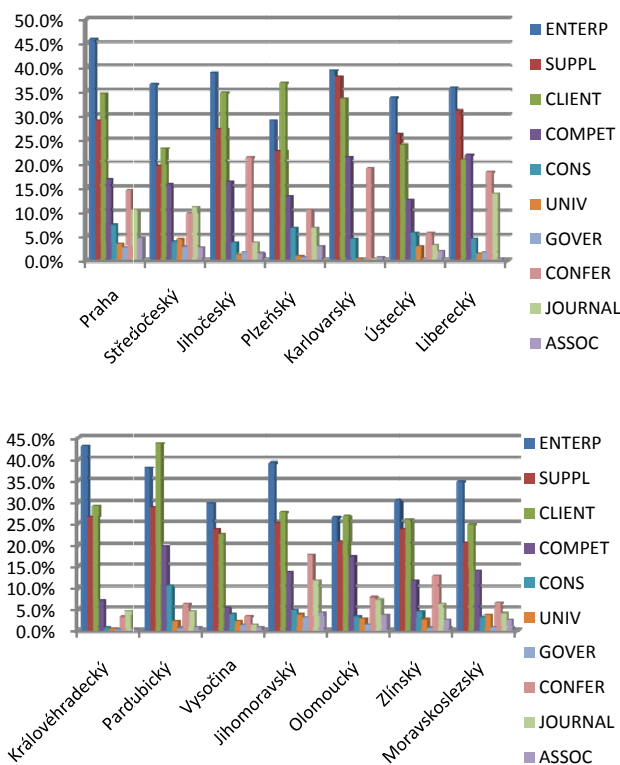


Fig. 1 Importance of information sources for innovation in enterprises with technological innovation – High – during 2006–2008

Also, suppliers have been an important source of knowledge in the Karlovy Vary region. Consultants have been used as a source of knowledge particularly in the Pardubice and Prague regions. Prague, Central Bohemia and South Moravia have also received knowledge from universities and government organizations.

An important source of knowledge has also been conferences and exhibitions, especially for firms in South Moravia. Scientific analytical (particularly explicit) knowledge has been obtained from scientific journals and other technical publications, especially by firms in the Liberec and South Moravian regions.

### IV. RESULTS

Acquisition and generation of knowledge is an essential

determinant for the development of any transferable knowledge. It actually constitutes an input into the whole process, output of which is the transfer of commercialized knowledge. As a result, this knowledge is then applied in the form of (often patented) innovation. The research is therefore focused on sources of knowledge acquisition and objectives of innovation activities (including the results in form of patented applications).

Analytical knowledge obtained from universities and scientific research highly correlated with the number of patent applications (Table I). On the contrary, other synthetic knowledge, usually obtained from face-to-face collaboration, demonstrated negative correlation with this type of innovation activity output. This is probably due to the fact that only a fraction of knowledge transfer output utilizes patent protection (within universities and research institutions, the protected knowledge arises outside the firm and the originators have to commercialize their knowledge in order to obtain funds for further research, which is their main activity).

Information sources for innovation	Patents
Within the enterprise or enterprise group	-,1724 p=,592
Suppliers of equipment, materials, components or SW	,0394 p=,903
Clients or customers	-,2487 p=,436
Competitors and other enterprises from the same industry	-,1956 p=,542
Consultants, commercial labs or private R&D institutes	-,0604 p=,852
Universities or other higher education institutes	,0763 p=,814
Government or private non-profit research institutes	-,2319 p=,468
Conferences, trade fairs, exhibitions	-,0131 p=,968
Scientific journals and trade/technical publications	,0733 p=,821
Professional and industry associations	-,0119 p=,971

Patents do not emerge from cooperation between the manufacturer and its customers, competitors, and they are most certainly not the result of cooperation between various consultants and consulting firms. However, this does not preclude the emergence of commercialized results and effective cooperation.

According to further research, the most abundant sources of knowledge are suppliers and customers (Tables II and III). These sources of knowledge have positively (although not significantly) correlated with almost all objectives of innovation activities. Conversely, the competitors demonstrated significant correlations, which positively influence the volume of knowledge and often become its source. This may be caused by a number of modern tools of economic development based on cooperation, which have been widely applied in the Czech Republic in the last 5 years.

These are different forms of business cooperation, industrial clusters and various levels of regional innovation systems. They are all inherently based on competition as well as cooperation. The cooperation is often based on creation of new knowledge, its transfer between stakeholders, as well as the use of technology for gaining greater market share, eventually expanding to foreign markets. This is confirmed by our research, as it confirms that knowledge has been used for the growth of market share and increase of the production and services flexibility.

Knowledge gained from consulting organizations has mainly been used for the replacement of outdated products or processes, or the increase of their flexibility. The knowledge provided by the government or obtained at conferences has been collected in order to increase market share.

TABLE II  
THE RELATIONSHIP BETWEEN INNOVATION AND SOURCES OF INFORMATION FOR INNOVATION

	REPL	NEWM	INCRM	QUAL
ENTERP	,3131 p=,322	-,0987 p=,760	,2084 p=,516	,3155 p=,318
SUPPL	,4821 p=,113	,4468 p=,145	,4070 p=,189	,4050 p=,192
CLIENT	,4323 p=,160	,1601 p=,619	,1529 p=,635	,4865 p=,109
COMPET	,3019 p=,340	,3278 p=,298	,6277** p=,029	,2282 p=,476
CONSUL	,6523** p=,022	,3577 p=,254	,4069 p=,189	,3745 p=,230
UNIV	-,0051 p=,988	-,0827 p=,798	,1454 p=,652	-,1031 p=,750
GOVER	,1028 p=,750	-,0657 p=,839	,5345* p=,073	,0489 p=,880
CONFER	,1542 p=,632	,0713 p=,826	,8573*** p=,000	-,1802 p=,575
JOURNAL	-,1338 p=,678	-,2286 p=,475	,4875 p=,108	-,0697 p=,829
ASSOC	-,2944 p=,353	-,3503 p=,264	,3082 p=,330	,0411 p=,899

TABLE III  
THE RELATIONSHIP BETWEEN INNOVATION AND SOURCES OF INFORMATION FOR INNOVATION – CONT

	FLEX	CAPAC	HEALTH	LABOR
ENTERP	,0581 p=,858	,1890 p=,556	-,3242 p=,304	-,2156 p=,501
SUPPL	,4796 p=,115	,4843 p=,111	,3298 p=,295	,2690 p=,398
CLIENT	,3798 p=,223	,2178 p=,496	-,2909 p=,359	-,3060 p=,333
COMPET	,6239** p=,030	,1880 p=,558	,3053 p=,335	,0171 p=,958
CONSUL	,5012* p=,097	,2927 p=,356	-,0082 p=,980	,1129 p=,727
UNIV	-,0734 p=,821	-,1061 p=,743	-,2642 p=,407	,0316 p=,922
GOVER	,0168 p=,959	,3241 p=,304	-,2515 p=,430	,2056 p=,522
CONFER	,0956 p=,767	,2939 p=,354	-,1051 p=,745	,0960 p=,767
JOURNAL	-,0326 p=,920	-,0167 p=,959	,1495 p=,643	-,0651 p=,841
ASSOC	-,1781 p=,580	-,1826 p=,570	-,3925 p=,207	-,2468 p=,439

Closer examination of the table above reveals following conclusions:

- the objectives of innovation activities are particularly influenced by suppliers of equipment, materials, components or software. Almost all objectives recorded high dependence of about 0,5;
- all types of entities focusing on the acquisition and transfer of knowledge do so with the objective of increasing their market share;
- entities from research area have different objectives. Public universities focus exclusively on raising funds to finance their other activities. In contrast, commercial labs or private R&D institutes act as common business entities and focus on standard objectives that can be expected with such entities;
- government institutions and organizations focus on different objectives and in various levels of intensity. This behaviour is probably dependent on the current applied public policy, type of institution and the meaning of its existence.

An interesting finding is that in practice, five objectives of innovation activities are almost entirely not reflected by individual entities. It has not been confirmed that the objective of innovation activities is to improve quality of goods or services, nor to improve production or services flexibility. This has mainly been inferred from globalized markets and their characteristics. Businesses today seek a competitive advantage in new products and markets, not in improving existing products and associated services.

Completely out of the limelight are the innovations improving health and safety and reducing labor costs per unit output. This is primarily due to the fact that the Czech Republic still has relatively low labor cost (in basic laborer and finishing job positions).

#### V. CONCLUSIONS

The beginning of the process itself, i.e. the acquisition of knowledge, is absolutely essential for transfer of technologies. Each subject seeking to gain new knowledge that could become a source of competitive advantage needs to have the ability to identify and acquire such knowledge from the external environment. There is a wide range of information sources in external environment of any economic subject. The research has shown that a number of economic subjects focus on gaining knowledge from various sources for a number of different reasons.

Commercial subjects have different business objectives that correspond to their position on the market and their strategic objectives, but the reasons for acquiring new knowledge have been these objectives: replacement of outdated products or processes, entering new markets and increase of market share.

The highest dependency (over 0.86) has been demonstrated with conferences, trade fairs and exhibitions, from which the knowledge is transferred in order to increase market share. The second highest correlation has been observed with competitors that use knowledge to increase market share and

to improve production or services flexibility. A strong influence of consulting and R&D organizations has also been confirmed, which all helped in replacing outdated products or processes.

It is necessary to continue exploring the individual sources of information and their use in practice and find out which factors affect them, how effectively they affect development of new products and what economic benefits they bring to their originators.

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#### REFERENCES

- [1] J. H. Dyer, and H. Singh, "The relational view: cooperative strategy and sources of interorganizational competitive advantage," *Academy of Management Review*, vol. 23, 1998, pp.660-679.
- [2] P. J. Lane, and M. Lubatkin, "Relative absorptive capacity and interorganizational learning," *Strategic Management Journal*, vol. 19, 1998, pp.461-477.
- [3] H. Yli-Renko, E. Autio, and H. J. Sapienza, "Social capital, knowledge acquisition, and knowledge exploitation in young technology-based firms," *Strategic Management Journal*, vol. 22, 2001, pp. 587-613.
- [4] R. M. Grant, "Toward a knowledge-based theory of the firm," *Strategic Management Journal*, vol. 17, 1996, pp. 109-122.
- [5] J. C. Spender, and R. M. Grant, "Knowledge and the firm: overview," *Strategic Management Journal*, vol. 17, 1996, pp. 5-9.
- [6] B. Kogut, and U. Zander, "Knowledge of the firm, combinative capabilities, and the replication of technology," *Organization Science*, vol. 3, 1992, pp. 383-397.
- [7] U. Lichtenthaler, "External commercialization of knowledge: Review and research agenda," *International Journal of Management Reviews*, vol. 7, 2006, pp. 231-255.
- [8] J. J. Elton, B. R. Shah, and J. N. Voyzey, "Intellectual property: partnering for profit," *McKinsey Quarterly*, Special Edition, 2002, pp. 58-67.
- [9] M. Frenz, and G. Ietto-Gillies, "The impact on innovation performance of different sources of knowledge: Evidence from the UK Community Innovation Survey," *Research Policy*, vol. 38, 2009, pp. 1125-1135.
- [10] M. Nieto, and P. Quevedo, "Absorptive capacity, technological opportunity, knowledge spillovers, and innovative effort," *Technovation*, vol. 25, 2005, pp. 1141-1157.
- [11] D. J. Johnson, *Managing Knowledge Networks*, New York: Cambridge University Press, 2009.
- [12] F. Blackler, "Knowledge, knowledge work, and organizations: an overview and interpretation," *Organization Studies*, vol. 16, 1995, pp. 1021-1045.
- [13] C. T. Small, and A. P. Sage, "Knowledge management and knowledge sharing: A review," *Information Knowledge Systems Management*, vol. 5, 2006, pp. 153-169.

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