Title: Implications of the institutional theories of regional development for the emergence of the regional innovation systems in the Czech Republic

Author: Pavla Žížalová

Summary

The accelerated intensity of the economic globalization and its implications for all segments of the society during the last couple of days have changed profoundly the workings of contemporary capitalism. Increased pressure is put on national and regional economies to continuously upgrade their competitive advantages and at the same time new learning opportunities occur at a faster rate than ever. As a result, in recent years, almost all have come to a consensus that today's advanced economies are "knowledge-based" economies – economies directly based on the production, distribution and use of knowledge where learning and innovation creation is the most fundamental process for competitiveness not only for firms and organizations, but also for nations and regions.

Parallel to the globalization process there are, however, strong forces of localization. To some extent paradoxically, empirical studies have revealed that knowledge intensive industries – the most potentially footloose of all activities – tend to agglomerate in space, often in proximity to universities and research institutes. Indeed, the most knowledge-intensive of these activities seems to show the highest degree of geographical concentration. For instance, in the case of biotechnology considered as one of the most knowledge-intensive activity in current economy this pattern of spatial concentration appears to be strong and, if anything, becoming stronger rather than weaker over time (Feldman, 2001). As a result, we have faced so called regionalisation in the sphere of the research and innovation policy and several policy initiatives raised in attempts to meet challenges of globalizations are focused on promoting local knowledge spillovers between industry and academia.

The point of departure for these studies is the writings of Marshall and the concepts which to a large extent followed his ideas. These include works on the Italian industrial districts, regional clusters and learning regions. The central idea of these concepts is the emphasis on the beneficial effects of the territorial concentration of various activities and actors that are larger than those each actor could generate in isolation. The spatial concentration brings not only economic effects but also so called "untraded interdependencies" which together promote generation and transfer of skills and knowledge and hence promote innovation creation. Even though numerous studies examining these ideas have brought rather ambiguous results, it is still argued that particularly for industries such as biotechnology or information and communication technologies the co-location is still highly beneficial when numerous new companies emerge as university start-ups.

However, as Simmie (2006) points out, much debate on the contribution of clusters to productivity and competitiveness has been on the basis of presumption or belief rather than founded on empirical evidence. Various authors therefore came with the notion that it is

necessary to attain knowledge by investing in building channels of communication to selected providers located outside the local milieu. Hence, now it is often argued that both local and global linkages offer particular, though different, advantages for firms engaged in innovation and knowledge creation referring to a local buzz-global pipeline model of cluster competitiveness.

Role of these networks depend, inter alia, on characteristics of the specific knowledge which the collaboration involves. A first distinction in knowledge characteristics is the one between tacit and codified knowledge introduced by Polanyi (1967). Another way to approach these questions is the distinction made by Asheim, Gertler (2005) between analytical and synthetic knowledge base. The knowledge bases are suggested to include different mixes of tacit and codified knowledge and also different possibility for codification, hence different sensitivity to geographical distance. Even though the knowledge bases concept attempts to transcend the simple tacit-codified dichotomy referring also to distant knowledge creation, it represents its key dimension. Industries that rely mainly on analytical knowledge base might be characterized as less sensitive to distance benefiting from global knowledge networks as well as local collaboration because both knowledge inputs and outputs are often codified. On the other hand, for synthetic knowledge base industries tacit knowledge seems to be more important as knowledge often results from experience gained in the workplace, and through learning by doing, using, and interacting.

A general framework of this paper is the innovation system concept, particularly the regional variant. After entering the scene in the late 1980s and early 1990s, the innovation system approach has become currently key guiding principle for regional innovation and development as it intended to cover the whole complexity of the innovation process. A narrow definition of a system of innovation includes organizations and institutions involved in searching and exploring, while a broader (and mostly preffered definition) also includes all the aspects of economic and institutional structure and set-up affecting these processes. In more concrete sense, the innovation system is composed of two interacting subsystems of actors systematically engaged in interactive learning:

- The regional production structure or knowledge exploitation subsystem which consists only of firms, especially where these display clustering tendencies.
- The regional supportive infrastructure or knowledge generation subsystem which consists of public and private research laboratories, universities and colleges, technology transfer agencies, vocational training organisations, etc.

The most vital feature, distinguishing the system of innovation concept from previous theories, is the stress put on the systematic interactions and learning between these two structures. An innovation system therefore can not be said to exist if the production structure and the knowledge infrastructure merely exist in a certain location or if they exist in isolation.

This study takes these observations as a point of departure and develops a conceptual framework used to analyze the spatial organization of knowledge and innovation collaboration. By combining system perspective and overall quantitative analysis with in-depth focus on concrete case study region and industry the study examines how and why knowledge interactions between firms and related actors are formed taking into account various factors such as type of knowledge, innovation character or institutional proximity. Empirical focus is put on the Czech Republic in general, with in-depth analysis of the IT industry in the South Moravia region.

Innovations are widely considered as crucial factor enhancing both national and regional competitiveness; however, direct measurement of innovation activity and available innovation indicators lags behind progress in scientific knowledge. Therefore, the study is based mainly on empirical case studies carried out by the author departing from existing available data. First, microdata from the Community Innovation Survey in Czechia are used as a starting point in the analysis. To obtain more detailed information on firms´ collaboration, an e-mail questionnaire survey supplemented by several interviews among private companies and research organizations was carried out. Second, analysis of the nature of collaboration patterns of relevant research institutions and universities in all 3 knowledge bases was conducted through analysis of bibliometric database of scientific publications in ISI Web of Knowledge and patent database of the Czech Industrial Property Office and the European patent Office. Collaboration patterns were analysed through number of collaborating authors and co-applicants. As well these analyses were followed by several in-depth interviews in selected universities and research organizations. Finally, in-depth case study was carried out in the South Moravia region analysing the IT industry collaboration patterns. This case study was based on semi-structured interviews in selected IT companies based in the region.

This thesis has dealt with the geographical organization of knowledge and innovation collaboration patterns in the Czech Republic. The main objective of this analysis was to contribute to the questioning of the often taken-for-granted notion that geographical proximity is a crucial condition in knowledge and innovation collaboration, from a post-communist country perspective. Further, it aimed at searching for possible empirical data and indicators which might be used to assess this issue as currently there is rather lack of data available. Of course, as a rather novel study in the Czech environment, it cannot provide for clear-cut statements and one has to be careful when formulating generalization. Nevertheless, it brings some interesting stimulus and suggestions for further research as well as policy implications.

The thesis presented relatively extensive topic which covers a large number of research debates and arguments. A good way to begin summing up the main conclusions is to say little about the arguments that it does not support. The analysis gives no credibility that geographical space has become irrelevant. Yet at the same time the need for co-located interactions does not seem to be vital. Importance of geographical location has been found especially in case of enterprises' innovation co-operation but the companies' managers and researchers stressed that overall collaboration relies on far more complex set of factors,

including content of co-operation, type of knowledge which is to be exchanged, business strategy and mutual trust and existing informal contacts or recommendation. Partners located in vicinity are preferred, yet if only they meet necessary criteria. To the contrary, universities and research institutes co-operation is much less distance-sensitive and oriented more towards partners from similar knowledge and professional background with potential to communicate new ideas and extra-local knowledge. Thus, even though co-location and intra-regional knowledge and innovation collaboration exist it can not be regarded as a decisive characteristic.

First factor found as influencing the choice of collaborator and geographical structure of innovation co-operation is the type of knowledge exchanged. A different collaboration pattern was found for R&D activities involving higher degree of codified knowledge and for firms innovating activities relying more on closer co-operation with their suppliers, customers or company group. However, the analyses also reveal highly different collaboration pattern for public and private sectors. This might be partly attributed to distant focus of their innovating activities. Czech companies carry out rather experimental development and create incremental innovations, often new only to the company, using learning and tacit knowledge. To the contrary, universities and research institutes are focused more on fundamental research involving particularly scientific, codified knowledge. As the dichotomy tacit-codified knowledge is rather simplified, more complex concept of knowledge bases has been used as analytical tool for part of the analysis. Even though theoretically more advanced concept, our research has shown rather ambiguous results. In addition, it has turned out rather complicated to be applied as an analytical tool. The main reason for it is the complexity of any real activity and the necessity to rely on current, existing classifications. The classification to distinguish properly between the knowledge bases should be done at activity level but in general, only aggregate information are available such as for instance NACE code for firms. In many cases it is not even possible to decide whether an activity relies purely on analytical or synthetic knowledge base. Often, companies tend to use mixed strategies that combine both knowledge bases. Therefore, it seems that the knowledge bases represent rather broad complex of activities and industries which might bring more differences within each knowledge base rather than between them. Thus, in our opinion, the knowledge base concept has contributed to increase awareness about non-R&D innovations but when it comes to explanation of the innovation process, it excessively simplifies the reality as similar classifications which the concept attempts to transcend.

As for the co-operation among the RIS-subsystems, our analysis implies only limited linkages. Czech companies find their collaborators mostly within the corporate sector among their clients, customers, suppliers or even within the company group. On the other hand universities and research institutes engage in knowledge collaboration predominantly with the same type of institutions. Therefore, role of institutional proximity tested in the thesis by simplified distinction public-private seems to play crucial role in knowledge and innovation collaboration formation. This assumption also sustains the geographical dimension among partners with closer institutional proximity. Collaboration within the same RIS-subsystem is

rather internationally distributed while cross-subsystem co-operation is realized mainly within national innovation system.

Partly surprisingly, only limited knowledge and innovation co-operation with local universities was identified in Czech regions. Local universities are indeed important source of qualified labour yet not of exploitable research results as showed other studies from developed countries. This is probably a bottleneck of Czech (regional) innovation system(s) as local universities embedded in a regional economy could provide local companies with regionally specific and hence unique knowledge and information and thus contributing to enhance their (global) competitiveness. Even though this effect cannot be overstressed it has important policy implications for Czech environment. There are already some positive examples where some of Czech universities are starting to establish mechanisms for bringing research results closer to the markets (see e.g. Blažek, Žížalová, 2007), yet, they are rather exceptions. For stronger local co-operation speaks also the fact that Czech companies rely mostly on incremental innovations, or even imitations as their innovations are often new only to the company yet not to the market.

Taken together, the main theoretical lesson that emerges is that the knowledge and innovation collaboration differs along several dimension and that these dimensions matter for the role of geography. The geography of knowledge cannot be analysed without taking into account the specific type of knowledge in question, specific capabilities of those who possess it (e.g. firm-level characteristics) as well as the specific socio-cultural context in which knowledge is created and used.

The analyses have also brought questions about the validation of the RIS concept. While the literature on RIS has provided extensive description of the relationship between innovations, learning and territory, it failed to provide the empirical validity to the delineation of the RIS as well as the conception of innovation as geographical, localized phenomenon. Generally the RIS literature takes as a point of departure an administrative region which they associate with RIS. It is argued that to define a region administratively is necessary as in the field of regional development region is intended to govern policies to assist processes of (regional) economic development. In the Czech Republic, it seems that regional level does not play a crucial role in knowledge and innovation co-operation which leads to ask whether we might talk about the emergence of specific regional innovation systems associated with the existing administrative regions. Therefore, we concluded that research in the sphere of RIS should depart with a bottom-up approach, from the firm-level analysing the emergence of natural RIS. Here, the thesis provided interesting ideas for future research.