

THE INNOVATIVE CITY: THE IMPACT OF INNOVATION ON CITY DEVELOPMENT

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Abstract: The process of the innovative development is shaped by cities as the centres of innovative businesses as the elements of urban space. The urban space is a recipient of innovative impulses and, at the same time, it itself creates such impulses. Cities spark the development of innovations since they accumulate different needs and innovations responding to problems in a completely new way. Agglomerations attract innovative subjects, including innovative industrial businesses. They constitute a very friendly environment for a process of creating as well as for accumulating and applying knowledge. On the other hand, the diffusion of ideas has an impact on further changes of the environment, which are manifested in the growth of the dynamics of innovative processes and products, which, in turn, fuel the possibilities of innovative development of businesses. This process depends on the absorption of innovations and abilities of businesses to generate them, which results in the increased level of city innovativeness.

Thus, the idea of innovativeness and animation of innovative development is one of the main interests of both business and a city because an innovative, endogenous development of the elements of the urban space will contribute to the local growth of a city and its urban region. The progress in science, in various kinds of high standard services and innovative industries, especially the industries involved in advanced technologies, is crucial for this process. Their activity requires constant economic and social verification as well as a sequence of creative alterations.

Keywords: innovation, city development, innovative firms, clusters, technology parks

CHANGES IN A CITY'S IMAGE

The contemporary globalizing world is creating many new and exciting possibilities for city development almost everywhere in the world. At the same time, cities have to face numerous barriers and constraints in their development. The cities that will cope best with the emerging problems of growth by finding their own ways to overcome these difficulties will be the winners and gain a privileged position in regional or worldwide urban systems.

Images of cities differ from each other substantially. Cities try to influence the development of their images so as to evolve in such a way that they are adjusted to the quickly changing expectations of urban dwellers and other spatial users. These changes accompany a new paradigm of socioeconomic development expressed in the increasing impact of globalization; the acceleration in scientific and technological progress which is reflected in the growing importance

of knowledge, research and innovation; the increasing role of the environment in companies' activities and the dynamic development of services, particularly those of higher quality (Pietrzyk 1995).

The forces changing a city's spatial and functional environment are very dynamic. Cities are searching for adequate factors of growth in order to gain a kind of comparative advantage. T. Hall (2006) expressed the idea that the former inclination of cities to present themselves as being at the center of something (a region, country or continent) has been superseded by their drive to be perceived as having cultural centrality. In today's economy the exchange of information is more important than the exchange of goods and for this reason geographical centrality has less importance than in the past. However, he argues that cities are desperate to create the impression that they lie at the centre of some kind of important activity. It is important for cities to have a positive image so that the people living in them have a perception that they have all their needs fulfilled. For people, information flow is very important (in their jobs and in their private lives) and the direct implication of this situation is that cultural activities are highly important. Geographical centrality is thus replaced by attempts to create a sense of cultural centrality¹. The development of cultural activities in a city leads to the development of cultural and creative industries which are used nowadays very successfully in city regeneration. The modern image of a contemporary city is also very strictly connected with the idea of an innovative city.

THE NOTION OF INNOVATION

The growing role of innovation in the economy is treated as a key factor for economic growth. This makes innovative orientation for cities growth both economically useful and desirable (OECD Innovation Strategy 2009). However, the idea of an innovative city has many different connotations because the notion of innovation is not precisely defined or interpreted. As a result, the idea of innovation captures both broad definitions referring to the process of knowledge accumulation as well as narrow interpretations based on technology and product changes. Characteristic of the first approach is Lundvall's definition of innovation based on the idea of the learning economy. In such an understanding an innovation is an interactive learning process which is socially and territorially embedded and culturally and institutionally contextualized (Lundvall 1992). Cooke et al. (2003) present a similar approach, describing innovation as the transformation of knowledge into novel wealth creating technologies, products

¹It is interpreted that a city is in the centre of *the action* when it has an abundance of cultural activities (music, night-clubs, theatre, restaurants, museums, ballet, first class sports teams, bars, and cinemas).

and services through processes of learning and searching. Contrary to this understanding of an innovation and innovative processes, some definitions underline the necessity of analysis in terms of a high-tech-focused knowledge-based economy. It is worth emphasizing that Joseph Schumpeter, who introduced this notion of innovation², created a classification of innovation referring to technological and product changes in the spirit of the impact of scientific progress but he accepted also such types of innovation as the opening of a new market, gaining a new source of supply or the introduction of a new organization of production (Schumpeter 1960). This still serves as a basis for the definition of innovations used for practical purposes (i.e. the Oslo Manual definition).

Another differentiation refers to the character of changes, because innovations could be considered as breakthrough changes (fundamental innovations) as well as small, permanent improvements (incremental changes). The broad approach is connected with the fact that innovations capture not only original changes but also imitations which played an important role in the historical process of economic development. The different approaches presented above confirm that, as Carter (2007) states, innovation is a heterogeneous phenomenon and is still loosely defined. She concludes that what all innovations have in common is that they are new.

As a result, the character of change (e.g. soft and hard innovations), scale of innovations and effects of innovative changes can be totally different, as can their impact on socioeconomic growth on a regional and local level.

BIG CITIES AS INNOVATIVE ENVIRONMENTS

Cities as spatial clusters of firms and households, or even more generally as spatial clusters of economic activity (Helsley 2003) generate particularly favorable conditions for the creation of innovation. Geographical concentration helps firms in: sharing, that is broadening the market for input suppliers, a matching process, interpreted as expanding the skills by employees to facilitate better matching a firm's distinctive needs, and learning, understood as accelerating spillovers of knowledge, allowing for mutual learning between workers and entrepreneurs (World Development Report Reshaping Economic Geography, 2009). Localization economies in cities accompany urbanization economies and are treated as citywide processes. They capture the mechanisms of cumulative causation, interpenetration of production and trade across industries, including gains from cross-fertilization of ideas. As cities grow, urbanization economies become more important and the possibilities for innovative development gain new perspectives.

²J. Schumpeter published his work titled (*Theorie der wirtschaftlichen entwicklung*) in 1912.

Big cities are characterized by the complexity of their structure and the differentiation of interactions between their elements. The diversification of a city's economic structure stimulates a more creative and innovative environment and thus a more productive economy. As a result, new economic opportunities are created and new types of economic activities are added. These structural changes are associated with the dynamic development of service activities, as well as financial and information activities. The proximity of firms allows them to share capital inputs, labor and information. New firms often start in diverse cities. Of all new plants in France, 84 were created in cities with above-median diversity (World Development Report Reshaping Economic Geography 2009).

It is acknowledged that the urban diversity which is characteristic of big cities can foster the exchange of ideas and technology to produce greater innovation and growth. Cities participate in exchange of ideas and accelerate their transfer. Co-location enables improvement of human capital through imitation of model behavior and learning by seeing. Agglomerations creating a friendly environment for innovations foster the development of tacit, unpublished knowledge which completes and enriches the interactive local codified knowledge (Antonelli 2008).³ Tacit knowledge is created in a local environment and is fully embodied in persons and organizations. Mutual interactions transmit this knowledge among firms, research institutions and the local environment. This system of interactions has an impact on the generation and usage of technological knowledge. The transition of ideas has an impact on the changes in the environment, resulting in an increase in the dynamics of product innovations and technological innovations.

The direct relation between cities (particularly large cities forming metropolitan areas) and the innovation process is so clear that they are even defined as islands of innovation (Simmie 1998). The comparative advantages of such metropolitan islands of innovations are expressed in resource adjustment: highly qualified staff, access to venture capital as well as appropriate conditions for the use of these resources such as the possibility for simultaneous generation and consumption of innovation in a given area. Metropolitan regions are considered the most innovative European regions in respect to technological and scientific progress together with science parks, university and industrial regions (Longhi, Keeble 2000).

³C. Antonelli describes heterogeneity of knowledge in respect to its tacitness, indivisibility, complementarity and appropriability. However, referring to tacit and formal knowledge he underlines that some levels of tacitness characterize even codified knowledge.

CLUSTERING AS A SPATIAL FORM OF STIMULATION OF INNOVATION IN CITIES

Clustering

Cities as spatial clusters of economic activity tend to attract new firms and institutions looking for an attractive location and favorable conditions for growth. They often form clusters.

Clusters are widely considered to be an innovative collection of firms and institutions (Porter 2001)⁴. Studies by Feldman (2008) acknowledge the positive aspects of clustering in a context of knowledge creation and diffusion. Their local development, based on diverse and complementary knowledge, helps to create economically useful spillovers. Empirical analysis finds that industries using the same science base tend to cluster. Co-location of diverse industries within the same science base stimulates cross-industry innovation, which increases returns leading to increased innovation.

The benefits arising from proximity have been widely commented (World Development Report, 2009). One of the examples discussed covers financial sector activities in the city of London. It turns out that co-located financial firms, insurance companies, and banking groups benefit from being close to one another. Spatial proximity also stimulates the growth of other kinds of firms offering specialist services such as legal, software and data processing, advertising, management and consulting firms. These firms provide a denser market for highly educated workers and benefit from access to a large pool of specialized labour. They also participate in the generation and diffusion of knowledge amongst one another. This exchange of ideas and technology unleashes greater innovation and growth.

Foreign Direct Investments (FDI)

An innovative environment for cities, in an era of increasing globalization, is helped in its creation by Foreign Direct Investments. The effects of the positive interaction between FDI and a city's growth are evident, although spatially differentiated in scale and character. There is some evidence that FDI tends to gravitate more towards urban agglomerations than single industrial firms. The reasons are as follows: market size and prospects of increased sales, proximity

⁴M. Porter, responsible for the concept of the cluster, commenting on the issue of innovations from a cluster's perspective noticed that the potential predominance of clusters relies on the easier diagnosis of the needs and possibilities of introducing innovations.

of a science and research base leading to spillover effects, effect of attracting economic benefits from cooperation by already existing locations.

The location of FDI stimulates the growth of innovations generated by home enterprises, because FDI belongs to the basic channels of technology transfer, organizational solutions and management abilities. This is due to the spillover effect. These positive external effects, which according to Dunning are symptoms of spillover, lead to a demonstration effect via the copying of technologies and methods of management, competition stimulating an increased efficiency of domestic, regional and local companies and learning through employment in domestic firms of individuals that earlier worked in foreign firms.

As a result domestic firms become more innovative. This is expressed by a simplification of organizational procedures, growth of productivity levels as well as learning of modern solutions in organization and management (Kraszewski 2004). The innovative behavior of domestic firms generated by the location of FDI results in greater innovation in the local economy and stimulates local development including the increased employment and raising the quality of local labor resources.

Technology parks

Cities, particularly big cities create more favorable conditions for the development of companies interested in technological progress and product changes enhancing their competitiveness. The development of technology parks helps to satisfy the needs of such innovative activity, undoubtedly becoming an innovative element of modern urban structure. Big cities tend to have particular potential in inducing the growth of high-tech industries by concentrating the scientific potential of a region as represented by the location of research institutes, universities and colleges of technology and easy access to highly specialized personnel. The high costs of R&D activities stimulate the search for local opportunities for cooperation and setting up joint initiatives by local firms and institutions. A location in a technology park is chosen by companies that use advanced technologies and cooperate with laboratories and research institutes. They benefit from tax relief, the opportunity to make use of modern industrial infrastructure and research bases, or access to grants and subsidies. Being located close to dynamic research and educational institutions constitutes one of the most important factors in their location and a condition for their development. Therefore, the parks are usually located in big cities or in their near proximity. Of the total number of 60 parks registered by the British Association of Science Parks, over one third were located in the metropolitan region of London.

Interest in the development of such innovative spaces is characteristic of many cities of different size and importance, including global cities such as

New York. Seeking new possibilities for growth, the municipalities of New York found them in the project to develop an innovative cluster of high-tech industry. The city's authorities are planning to repeat the success of Silicon Valley, which is treated as a model in the field of innovative synergies. This challenge is to be met by a huge concentration of scientific potential based in biotechnology, which is the major strength of the metropolitan area. A biotechnology cluster is to be created utilising the scientific foundation of six already existing prestigious medical schools and four universities.

Weber (2008) stresses that the role of the innovative development of a contemporary urban economy should contribute to the reorientation of development of a city's regions towards a more practical implementation of the idea of university-led economic growth in many European cities, not only British cities.

EFFECTS OF SPATIAL CLUSTERING (THE CASE OF TECHNOLOGY PARKS)

An innovative city has to attract new firms relocating from other regions, as well as to become an incubator for the creation of new firms. Among the numerous effects of spatial clustering for a city's development, the impact of technology parks is an important way of finding a competitive edge in the race for economic growth.

There are many advantages of technology parks for a city's growth. They change a city's economic structure by attracting new manufacturing and service companies as well as firms from the business environment. They create particularly favorable conditions for the development of high-tech companies, representing a particularly high level of innovation creation and productivity. In terms of marketing, a technology park's activity contributes significantly to the growth of investment in the district of the city where it is located and improves the image of the whole city. The development of technology parks can also be regarded in the context of their impact on the spatial structure of cities. Technology parks affect the spatial development of cities through investment reshaping the open spaces of a city, as well as contributing to the regeneration and revitalization of cities.

MEASUREMENT OF AN INNOVATIVE CITY'S GROWTH

Technology parks, through the development of advanced technologies, help to increase the level of innovations in a city's economy. Some authors treat this type of change as the main factor influencing the creation of innovations in cities. The main advantage of such an approach is the ability to aggregate the level of innovations, especially if we consider the impact of manufacturing firms on

a city's growth. Such an approach was presented by Domański (2001), analyzing the industrial development of Poznań in the 1980s and 90s. He assumed that creativity and innovation can be regarded as synonymous with the concept of a so-called pure technical and organizational progress. Any such changes occur when output increases without additional inputs of capital and labour, or when output rises more than proportionally to the increase in capital and labour. An increase in production in such circumstances, i.e. an increase with no input, or one that is more than proportional to the input can only occur, according to the author, as a result of creativity and innovation. They favour the generation of creative ideas, the diffusion of knowledge, and its creative application in the form of radical changes such as new technologies, but also in the course of numerous improvements.

Many contemporary studies, however, refer to a wider approach towards innovation potential in a city combining the processes of innovation and creativity. They go beyond a pure technical progress and refer to a very diverse set of indicators that affect both economic and social life. It is the background to an analysis by Matusiak, who assessed the innovativeness of cities on the basis of a comparison of different innovative indicators, for eight European cities. The formula used by him took into account the economic, innovative and creative potential of cities and the degree of involvement of local authorities, measured in terms of the quality of the strategy introduced and the methods leading to its implementation.

CONCLUSIONS

Increasing globalization is strongly influencing the creation of a new paradigm of socioeconomic development which in turn is changing the conditions for local and regional development. To be competitive, cities have to change their past image and look for new opportunities for development by referring to a knowledge-based economy. An innovative city image is without a doubt a modern vision of development, cohesive with general trends in the development of the global economy which views an innovation as a key factor for growth (Rutkowska-Gurak 2010).

Innovative development is interpreted in different ways because the notion of innovation is still loosely defined. It captures both a broad approach referring to the process of accumulation of knowledge and a narrow interpretation based on the effects of technology and product changes. The only possible common characteristic of innovations is that they are new, but this process refers also to fundamental changes and incremental changes including imitation. That is why innovative development can be defined regarding different aspects of socioeconomic life and different changes in its spatial structure.

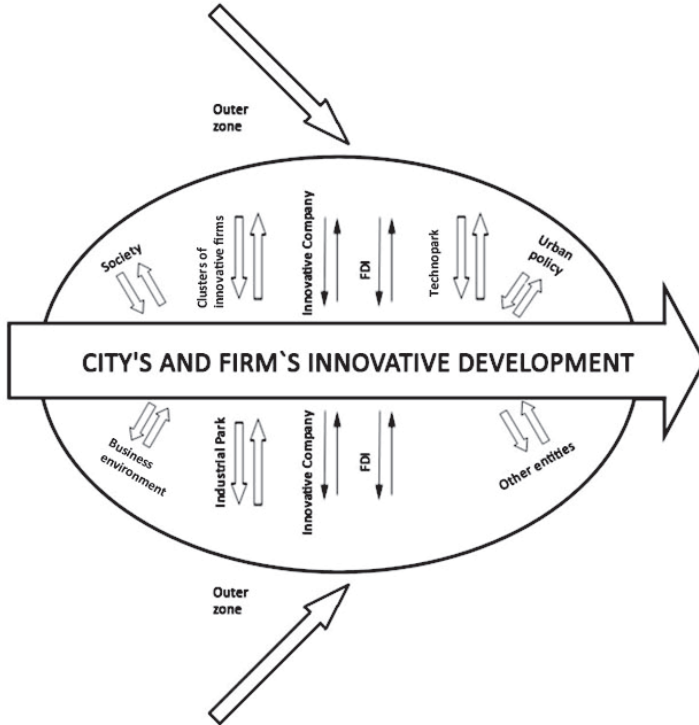


Fig. 1. Innovative development of firms and city growth
 Source: Author's study

Particularly positive conditions for innovative growth are characteristic of big cities, because along with city size the conditions for the creation of innovations increase. The process of innovative development is led by innovative enterprises characterized by a high ability to generate innovations and a permanent inclination to do so. Such constant changes accompany the development of high-tech industry. An innovative environment is created particularly by firms located in spatial clusters and technology parks as spatial forms of concentration of particularly innovative firms.

It can be stated⁵ that the joint innovative activities of enterprises may contribute to the innovativeness of a city, and at the same time the innovativeness of a city may create a synergic effect for all the local social and economic forces.

The generation of the idea of innovative development and its stimulation is therefore in the interest of both industry and the city, because the endogenous innovative development of the elements of the urban space will contribute to the effects of local growth for the city and its urban region.

⁵Similar interpretations of the interactions between firms and regions are presented by I. Ładysz (2009) in the context of competitiveness.

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INNOWACYJNE MIASTO: WPŁYW INNOWACJI NA ROZWÓJ MIAST

Streszczenie

Na proces innowacyjnego rozwoju wpływają miasta jako ośrodki rozwoju oraz przedsięwzięcia innowacyjne jako elementy przestrzeni. Miasta stymulują

innowacje; skupiają potrzeby oraz inicjatywy, dzięki którym powstają nowe sposoby reagowania na problemy. Aglomeracje mają pozytywny wpływ na koncentrację firm, w tym przedsiębiorstwa przemysłowe. Dzięki nim powstają warunki do tworzenia, zbierania i wykorzystywania wiedzy. Rozprzestrzenianie się pomysłów ma wpływ na zmiany w otoczeniu, co prowadzi do wzrostu dynamiki procesu i produktu innowacji, a to oznacza możliwości innowacyjnego rozwoju firm. Proces ten z kolei określa się za pomocą wskaźnika chłonności innowacji oraz możliwość generowania innowacji. To z kolei prowadzi do osiągnięcia wyższego poziomu rozwoju innowacyjnego miasta.

Tworzenie idei innowacji oraz stymulowanie rozwoju innowacji to obszar zainteresowania tak przemysłu jak i miast, gdyż innowacyjny endogeniczny rozwój elementów przestrzeni miejskiej wpłynie na efekt rozwoju lokalnego, związanego z miastem oraz otaczającym go regionem. W tym procesie niezwykle ważną rolę odgrywa rozwój nauki oraz wysokiej jakości usługi, a także innowacyjny przemysł – zwłaszcza rozwój branż opartych na nowoczesnej technologii. Ich działanie wymaga nieustannej weryfikacji gospodarczej i społecznej, a także ciągłych twórczych zmian.