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## Growth Pole Theory as a Concept Based on Innovation Activity Development and Knowledge Diffusion

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# GROWTH POLE THEORY AS A CONCEPT BASED ON INNOVATION ACTIVITY DEVELOPMENT AND KNOWLEDGE DIFFUSION

*Elżbieta Wojnicka-Sycz*<sup>1)</sup>

## **Abstract**

Innovation activity and knowledge diffusion are key development factors in territorial growth poles and crucial, but not enough stressed in the original growth pole theory. In the article thoughts of the authors of the original growth pole theory connected with knowledge and innovation are presented. The original theory is than adjusted to the modern requirements of the knowledge based economy by presentation of the model of territorial growth pole as a system of development factors and analysis of the real impact of theoretical development factors on economic growth based on literature review.

**Key words:** growth pole theory, development factors, innovation, knowledge diffusion

## **1. Introduction**

The growth pole theory may be considered as one of the earliest regional development theories referring to knowledge and innovation. This theory stresses the role of propulsive branches and their impact on the development of their milieu. However in the original theory, although it stressed the role of innovations, as propulsive branches were considered not the most innovative branches but such as steel or petrochemical industries. Thus in the article the original growth pole theory is presented with the emphasise on the aspect of innovation mentioned by the authors of the theory and the new approach to the theory from the today's perspective that is the model of territorial growth pole as a system of development factors. This model shows the key importance of innovative branches for formation of territorial growth poles but also the meaning of the required presence of other development factors in a given territory. Moreover analysis of the real impact on economic growth of different development factors, based on empirical literature review is presented.

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## 2. The evolution of the growth pole theory

“The bitter truth is this: growth does not appear everywhere at the same time: it becomes manifest at points or poles of growth, with variable intensity; it spreads through different channels, with variable terminal effects on the whole of the economy” (Perroux 1955).

A growth pole is a regional and industrial planning model for a “set of expanding industries located in an urban area and inducing further development of economic activity throughout its zone of influence.” It is the product of agglomeration economies in a leading, dynamic industry or sector that serves as an “engine” for development, creating forward and backward linkages and promoting diversified production and consumption for a growing local urban population and also for other growth points throughout the pole’s area of influence. In this manner, an emerging dynamic center diffuses technological innovation and socio-economic growth throughout the periphery, and urban hierarchy it stimulated (Hite 2004, 54).

The original concept of the growth pole derived from Perroux integrates Schumpeter’s theories on the role of innovations and big business with a theory of industrial inter-dependence based on inter-industry linkages. The concentration of economic activities was characterized by a dominant firm which was growing rapidly, innovating and exerting substantial effects on other firms through strong inter-industry linkages. This view of the growth process leads naturally to another key idea in growth pole literature of an industrial complex in which the expansion of a dominant industry sets in motion a process of development sustained by a very high super-multiplier. Firms operating in such a complex grow quickly because of alleged advantages such as economies in investment expenditure – relative to what would be required for scattered development – proximity to markets and supplies, larger and more diversified labour markets, rapid diffusion of technological innovation and the benefits of specialization and the organization of common managerial and infrastructure facilities (Moore 1974, 1019–1020).

The genesis of the growth pole idea was mainly in economic space, rather than geographic space, although geographical agglomeration was not excluded (Perroux 1950). A shift in emphasis from economic to geographic space soon came, however. Hirschman in 1958 noted that “an economy to lift itself to higher income levels should first develop within itself one or several regional centers of economic strength.” He referred to growth poles as centers. Boudeville defined a growth pole as a town or city with a complex of propulsive industries. From the beginning, growth pole theorists have held that economic growth originated in interindustry, multiplier and accelerator linkages. In particular cost reductions due to productivity gains, innovations and other types of knowledge, and scale economies are viewed as providing the opportunities for propulsive industries to initiate growth and to pass growth impulses through the linkage chains. A second growth path is the local mul-

multiplier effect derived from local income expansion. However the linkage aspect has received the most attention (Campbell 1974, 43).

Perroux emphasized that a leading industry induces the phenomena of growth on affected industries through interindustry linkages. If interindustry linkages are deemphasized in growth pole theory other processes must be stressed like impacts of rising employment and improving wage levels generated by an expanding industry which may serve as stimuli for growth in other industries. Service sectors may be dependent upon such intraregional income growth to support their expansion. Moreover monetary and non monetary external economies may be attractive to new industries which are not necessarily linked technologically with the initially expanding industry (Campbell 1974, 44). Propulsive industries contribute to the prosperity of all the surrounding firms through increased flows between suppliers and customers and contribute also to an increase of activity in the tertiary sectors because of the new income they generate. They also attract new enterprises to take advantage of new marketing and production facilities (Campbell 1974, 44).

According to McCann and van Oort (2009), the growth pole theory of Perroux, subsequently embedded in geographical space by Boudeville (1966), is based on an assumption that economic growth, manifested in the form of innovations, is spread throughout a growth centre's periphery to lower-order cities and localities nearby. Innovations and knowledge once generated in a certain central location are expected to spread among regions from one locality to its neighbours.

Innovation was perceived as crucial also for Perroux. According to Parr (1973) "in seeking to explain the emergence of the growth pole, Perroux laid particular emphasis on the innovating entrepreneur, the propulsive industry, the subordinate (linked) industries, and the complex of industries." However, tradition, based on Perroux' work, is more about regional poles built around "industrializing industries", sectors such as transportation equipment, that attract upstream manufacturers of parts and components, as well as metal, primary metals, rubber, plastic products and glass manufacturing attracting downstream producers using these materials. Such regional agglomerations do not require supporting institutions like universities or government laboratories. In the postwar period, European governments (particularly in France and Italy) applied this concept of Perroux poles in an effort to develop backward areas. Knowledge externalities, in this tradition, do not play a major role; agglomeration is more an input-output fact, based on demand created by prime contractors (Niosi and Zhegu 2005, 3). However this approach was also used for analysis of high tech firms, as well as the concept of clusters. Clusters are mainly supported due to the fact that cooperative and competitive linkages in clusters cause better productivity of the cluster's firms and hence should enhance the situation of the regions in which they are located (Porter 1990, Möhring 2005, Wojnicka 2003). Clusters may be also engines of regional and/or national growth, hence they may form a kind of sectoral growth poles. In comparison to propulsive industries of the mid-20th c., in today's engines of growth, knowledge spillovers and innovation are important as well as

linkages to universities. Probably stagnation in innovation processes in industries considered as growth poles in the mid-20th c. might be the main reason for many unsuccessful experiments in influencing regional growth using growth pole theory.

With favorable conditions an environment can foster interactive learning capacity by facilitating relations between a firm and the external inputs it requires in order to innovate (Doloreux and Dionne 2008, 262). Hence a growth pole with a type of modernizing linkages with other industries and local territory will stimulate creation of favorable conditions for innovation in the whole region. In today's terms innovative branches – growth poles should be active elements of innovation systems both regional and other (such as domestic or sectoral). The interaction aspect of growth pole theory has been recently developed in systems of innovations and networks theory as has its impact both on innovativeness and competitiveness of firms and territories (Andreosso-O'Callaghan, Lenihan 2008, Wojnicka 2004). As Andreosso-O'Callaghan B., Lenihan H (2008, 561) state “seen as an essential dynamic of the regional growth process, a network benefits from transaction cost minimization and knowledge exchange leading to higher performance.” Hence the growth pole should participate in innovative networks both of regional and domestic or international levels.

Characteristics that should be possessed by an urban center before it can be considered a growth pole include the existence of a propulsive firm or propulsive industry, the possession of an assemblage of linked industries whose growth is induced by the propulsive firm (industry), the potential for technical and administrative innovations, the ability to achieve self-sustaining growth, and the capacity for growth impulses to be diffused over the pole's environment or periphery (Parr 1973, 175–176).

Perroux most certainly calls attention to the crucial role of innovations and innovators in the process of economic development. Perroux notes that the expansion of output by the propulsive industry induces subsequent expansion in the outputs of affected industries – those which are directly connected to the propulsive industry by technological interdependence or forward and backward input-output linkages. Perroux suggests that constellations of tangible and intangible innovations can stimulate and involve all agents capable of creative expectations and thus create an emotive state which is conducive to growth and progress (Parr 1973, 175–176).

Perroux shared Schumpeter's belief in the role of innovations as “the prime causal factors behind economic progress”. Presumably these innovations are introduced in “large economic units which are able to dominate the environment” (McKee 1987, 168). For Perroux, a growth pole is relatively large in comparison to the whole economy and that is the reason for its strength. Although the source of this strength is the ability to control conditions for buying and selling, the pole influences the economy in other ways. The pole induces changes and growth in the economy. Comparatively, centers are places where changes start and later on are experienced by people in the wider area.

According to Rodell (1975, 524–525) the growth pole is a single enterprise or industry, while an economic center should consist of different types of firms – it is a geographic unit aggregated around different producers.

If we observe that some areas develop quicker than others, then we presume that they are the main points of innovations in production, trade or social and political practices. Innovative processes are crucial conditions for growth. They are the basis for polarized growth theories. Information about innovations diffuses from the place of its origin to peripheral areas. Changes in the peripherals depend on the strength of linkages between the center and peripherals. Growth centers are hence untypical places in comparison to surrounding areas (Kuehn, Bender 1969, 435).

Investments in propulsive industries are based on innovations and perspectives for future profits, that shift the growth to the surroundings. Perroux perceived growth and structural change as happening in an economy, geographical space or society. A growth center reacting to the situation in the growth pole causes investment in the center such as the creation of suitable infrastructure or educational facilities. This center may be a center of attraction – investment in the center lowered the density of population in the region; or a center of diffusion – investment in the center increases the density of population in the region.

According to Higgins (1983, 3–5) many modern propulsive branches are based not on natural resources but on human capital. In such case growth poles consist of science based manufacturing and related services with weak linkages with regional peripherals, apart from treating them as sources of labor. Such branches operate on wider territory. They react to the growth in other cities more than on changes in regional peripheries. Such growth poles are constellations of innovative, propulsive branches as engines of diffusion. Modern growth poles are electronics, scientific instruments, the computer industry and IT.

Currently growth poles, perceived mainly as metropolitan areas, are considered as an instrument simulating development of the whole country f.ex. in Poland, but also in other European countries like Germany, Romania, Greece but also in Cambodia, Thailand and Africa (countries like f.ex. Egypt, Madagascar, Mozambic, South Africa) (see Christofakis et. al, Knapp i Schmitt 2008, EIB 2010, MRR 2010, ERIA 2009, Ganstho 2008). In fact all around the world initiatives to stimulate development with the usage of growth poles are still undertaken, despite of mixed results of growth poles strategies that have been carried out since the 60s.

### **3. The model of territorial growth pole as a system of development factors**

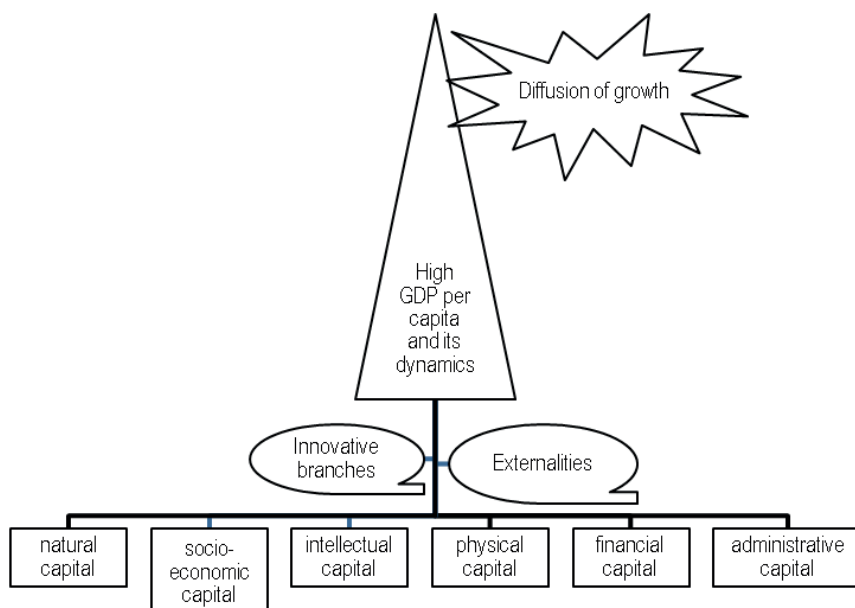
Presented here model of territorial growth pole is the result of the analysis of development factors present in the Polish sub-regions. Development factors indicated in varied theories of economic growth and development relating to the level of countries and regions were grouped in the following types of capital: natural, finan-

cial, physical, intellectual, socio-economic and administrative. Analysis of co-occurrence of synthetic indicators relating to the above types of capital and growth tendencies in the years 2000–2009 and 1995–2010 in Poland showed that the highest values of synthetic indicators of all types of capital occurred in the sub-regions with the strongest growth tendencies, while the lowest in the sub-regions of weakest growth trends.

A territorial growth pole is an area characterized by a high level and dynamics of development and being the source of spreading growth to the surrounding territories. Growth tendencies distinguishing this area are the result of the presence within its territory of innovative industries and externalities from them as well as the effect of existence of a system of interdependent developmental factors forming the following types of capital: natural, physical, financial, intellectual, socio-economic and administrative. This pole generates spill-over growth effects on neighbouring territories. Innovative industries, especially high technology manufacturing and services, and knowledge-based entrepreneurship require specific conditions of location, based on knowledge, and thus invest primarily where certain development factors are present, such as human capital, knowledge infrastructure, and an innovation-oriented infrastructure. Particularly high values of intellectual capital are not evenly distributed due to the inability to create f.ex. high-quality knowledge infrastructure in any territory. Therefore in the knowledge economy growth will be increasingly driven by territorial and local growth poles. Intellectual capital and innovative industries are key, but not the only condition of strong growth tendencies in the area. In the strongest poles numerous development factors are clustered, which constitute other forms of capital:

- Natural capital – such as natural resources, human resources (life expectancy), favourable geographical location, good environment;
- Physical capital – public and private investment, including foreign and their effects in the form of transport and telecommunications infrastructure and the accumulation of assets in companies;
- Financial capital – the availability of funds resulting from domestic or foreign demand, foreign aid or from financial institutions;
- Socio-economic capital – the presence of both large and small and medium-sized companies, good corporate results that are derived from, among others, good organization and management and the associated buoyant labour market, the presence of the benefits of agglomeration in the form of clusters of companies in various industries and urban agglomerations – growth centres, the presence of other economic infrastructure promoting concentration of economic activities and the occurrence of the benefits of agglomeration as special economic zones, economic and social networks conducive to the exchange of knowledge and informal institutions such as membership organizations and associations;
- Administrative capital – good governance on the local level, public safety.

Many of the development factors included in the above groups of capital will also support the development in the area of innovative industries (Scheme 1).



**Scheme 1.** The model of territorial growth pole as the system of developmental factors

*Source:* Author

For the purpose of checking the impact of the above types of capital, such as natural, physical, financial, intellectual, socio-economic and administrative capital on growth tendencies appropriate variables for each development factor were assigned and synthetic indices were calculated referring to different types of capital. The linear and in some cases (if needed) spatial lag models showed significant positive impact on growth tendencies in the years 2000–2009 and 1995–2010 of all the above kinds of capital. Moreover spatial lag models showed that significant positive impact on growth tendencies in the sub-region (direct effect) and five nearest sub-regions (indirect impact) had changes in intellectual, socio-economic and administrative forms of capital. Also spatial lag and error models showed that one of the key determinants of the average annual GDP growth per capita in Poland was the dynamics of employment in innovative industries. This dynamics translated into an increase in real GDP per capita, not only in the sub-region (direct impact), but also in the five closest sub-regions (indirect impact). The significance of the spatial error model showed that also the error term and values other than the variables included in the model within the 5 neighbouring regions had significant impact on the average annual real GDP growth per capita in Poland (Wojnicka-Sycz 2013).



#### **4. Innovation activity and knowledge diffusion as crucial development factors**

Overview of about 200 articles in national and international literature on the actual impact of the theoretical factors of economic development on countries and regions showed that not all of these factors always have a positive impact on economic growth. (Wojnicka-Sycz 2013) Often effects of respective factors are controversial – studies give different results depending on the country, the time and the analysed variables. This shows that context in which the factors are analysed is important. Studies also show that there is interdependence of different factors – individual not sufficiently explain economic growth and empirical models usually involve several factors simultaneously. Very often there is a nonlinear relationship between development factors and their positive impact. In many cases, the increase in the intensity of a factor such as social networks or institutional thickness, and foreign investment, and the level of education of the society, as well as concentration and agglomeration will have a positive impact on the development to a certain level, but then the excess of a factor will make the returns from it diminish, and eventually it may begin to affect growth adversely, such as congestion due to the concentration of economic activity and population in one place. For some factors, on some level, especially if the area – a region or country is a pioneer in the field, such as ICT infrastructure, it will be the winning factor, that is determining the competitiveness, but as it spreads it will become a prerequisite without which it will be impossible to achieve further development, but it will not assure progress faster than of others. Some developmental factors such as migration and human capital, indicated both in the theories of economic growth of countries and regional development theories, will have a different impact, in the light of empirical research on the country level and other at the regional level. This is due to different types of entities which we refer to – the states are still more separate and distinct, even in integration groups than regions in a country. Moreover, in the case of regions of one country generally the comparability of data will be better than between countries, and therefore the results of analysis may be more accurate.

The most obvious link between regional and national economic growth, in the light of the review of the empirical articles, occurs between innovations and therein, as well as between economic development and the factors related to knowledge, investment and exports (Fleisher et al. 2010, Raspe and van Oort 2011, Strahl 2008, Ganne and Lecler 2009). Externalities from the location close to dynamic areas and the knowledge diffusion effects also definitely positively influence growth (Quigley 2008, van Stel 2006). Important for development, particularly regional and local, is also leadership, initiative, and the presence of leaders who inspire positive change (Stimson et. al. 2009). Among the policies the most clearly associated with development is the policy combatting corruption, since the latter weakens economic growth (Del Monte and Papagni 2001).

Table 1 shows the relationship between the development factors and economic growth in the light of empirical research.

**Table 1.** The relationship between development factors and economic growth in the light of empirical research

<b>Factor</b>	<b>Obvious positive influence</b>	<b>Controversial influence – negative, neutral or positive</b>	<b>Nonlinear relationship with economic development</b>	<b>Remarks</b>
Innovativeness, technological progress	++			It has a positive impact on the profitability of firms, and thus the national income, important are also innovations in sectors outside business. TFP has crucial share in GDP growth in developed countries.
Innovation networks			<b>Reversed U-shape</b>	It is important to participate in them, but in networks not limiting competition or in complementary networks.
Social capital			<b>Reversed U-shape</b>	It depends on the type of social relationships – open networks are pro-growth, closed are anti-growth.
Technopols, socio-economic complexes		+		It is important that they are linked to the local economy and to avoid overinvestment.
Innovative milieu		+		Sometimes more important are traditional advantages of agglomeration, as well as transnational networks than local knowledge and social networks.
Entrepreneurship		+	+	The most obvious is the positive impact of innovative entrepreneurship; some studies suggest a U-shape, as the relation of entrepreneurial activity in the regions and their GDP per capita.
Export	++			Export diversification of regions is also important; at the state level growth is stimulated by high-tech exports.

continued table 1

<b>Factor</b>	<b>Obvious positive influence</b>	<b>Controversial influence – negative, neutral or positive</b>	<b>Nonlinear relationship with economic development</b>	<b>Remarks</b>
Trade openness		+		In general, greater trade brings benefits due to f.ex. access to technology, but trade barriers may also be beneficial, particularly for developing countries.
Clusters		+		There are positive case studies; however, clusters not always are related to regional development, there are few cross-sectional studies in this regard.
Agglomerations		+		Rather positive effect, although there are different effects of agglomeration (of various types: based on specialization, competition and diversity). There are also disadvantages of excessive agglomeration, even of innovative companies in one place, because they have to cope with increased competition.
External benefits from the location nearby dynamic areas, spread effects of knowledge	+			Most studies indicate benefits of the location close to areas with higher technology activities, knowledge abundance, diffusion of ICT infrastructure as a result of its dissemination in the adjoining territory, higher productivity as a result of better infrastructure in the neighbouring region, although these effects are often very limited in space; as in the case of agglomeration spread effects of knowledge may be varied for different entities and in the case of its different sources.

continued table 1

Factor	Obvious positive influence	Controversial influence – negative, neutral or positive	Nonlinear relationship with economic development	Remarks
Transportation infrastructure		+		There are different effects of different types of facilities and for different regions depending on their level of development.
ICT infrastructure	+			Rather positive impact, but it is more a prerequisite for competitiveness, but not the factor allowing winning with competitors.
Private investment	++			The positive effect is observed already within a short period of time.
Public investment		+		Rather positive impact, although they may displace private investment.
Foreign direct investment		+		Rather positive impact especially in developing countries, important are proper relations of national companies with foreign; in mature markets, they may displace too much local competition, at the level of states, equipment in other resources, particularly human capital is important to achieve the effects of FDI; their effects are different in countries with different income.
Institutions			<b>Reversed U-shape</b>	Too small institutional thickness reduces growth, too large also, important are not only formal institutions but also informal. Public institutions should not crowd out private activity.
Leadership, initiative	+			It is a prerequisite for positive change.

continued table 1

Factor	Obvious positive influence	Controversial influence – negative, neutral or positive	Nonlinear relationship with economic development	Remarks
Growth poles, as centres of growth and economic complexes		+		Different effects depending on the way of the implementation of the theory.
Urbanisation		+		Urbanization itself is not sufficient for development, it is important to have hierarchy of cities as well as cities equipped in suitable facilities.
Human capital, education	++	+		Various is the impact of different levels of education in different contexts (e.g., depending on the level of development of a region or country). Human capital is crucial in the development of less developed regions and countries, although the results are varied in relation to the rate of growth, particularly at the level of states.
Income and educational inequalities,			<b>Reversed U-shape</b>	If they are moderate they may stimulate economic development.
Interregional migrations		+		Migration in the listed studies rather did not lead to convergence at regional level and mainly skilled workers moved between regions, however, it contributed to the economic development at the level of countries (China, Canada).
Economic freedom		+		Rather positive impact, although the authorities' intervention and protectionism contributed to the development of some Asian countries.

continued table 1

<b>Factor</b>	<b>Obvious positive influence</b>	<b>Controversial influence – negative, neutral or positive</b>	<b>Nonlinear relationship with economic development</b>	<b>Remarks</b>
Foreign aid		+		It may result in Dutch disease, although it is advantageous especially in post-conflict and high debt countries.
Natural resources		+		Currently, many countries rich in natural resources have weaker results in terms of rate of development.
Green investments		+		May lower growth due to the shifting of resources from other investments, especially in poor countries.
Fiscal policy, public spending		+		Various effects of different types of spending and spending of various levels of government.
Monetary policy stabilizing of prices		+		The positive impact of the stabilization of inflation in developed countries, in developing lack of significant relation between inflation and growth.
Policy combating corruption	+			The negative impact of corruption on economic growth.
Financial sector		+		Different results depending on the analysed variables, the level of development of countries and regions, different types of regions and different time perspective.

Source: (Wojnicka-Sycz, 2013)

The increasing importance of knowledge and innovation activity for economic development means that development will occur more and more in certain points, because not all locations are able to have universities, research centres, and attractive environment for creative and high technology activities, and it would not be good for the economy if every location had such advantages. To ensure balanced development, assuming that only a moderate level of differentiation of various types stimulates growth, it is important to create appropriate channels for the diffusion of

growth from innovative centres / companies / industries. Promoting the development of productivity must nevertheless be followed everywhere, on the basis of bottom-up local initiatives, supported by relevant activities at the regional and central levels, but strong growth poles may not be built in each place.

The concept of growth poles corresponds to the above scheme of innovative development based on some centres – poles or locomotives and the spreading of growth from them. Particular locations should try to find the right driving forces for themselves, but they must be adapted to certain conditions and possibilities. With regard to the concept of growth poles, it is important to draw on the experience of Japanese, and recent Greek strategy where with the use of growth poles the aims of both economic growth and a certain alignment of development are achieved (Christofakis et al. 2011, Miyoshi 1997). This may be done by directing productive industries not to major metropolitan areas, but to other major cities, with suitable conditions for their development, as was done by the growth pole strategy in Japan in the 60s. In the Greek case growth poles strategy is supplemented by endogenous development. This is also true from the perspective of the necessity of having a hierarchy of cities for the diffusion of growth effects and innovation, which was noticed in both theory and empirical research. At the same time, due to the need for international connections, the location of productive industries in the area often depends on the presence in the vicinity of such facilities like airports and highways, but they would not necessarily want to invest in the city, especially in the case of manufacturing. This corresponds to the location of the industry mainly in metropolitan area and not in metropolis themselves. As a result as innovative growth centres today appear rather metro-regions than the cities-metropolis themselves. The development policy should only support bottom-up location trends of industry but not take the form of excessive and often unfinished investments, like for example in Latin America, where efforts to create “poles in the desert” were undertaken (Hite 2004, Parr 1999). It is also important to complement growth pole strategies with stimulating of endogenous potential of territories.

Studies on growth poles show that this term is used in different contexts. Also the aims of growth pole strategies were changing. Currently such strategies are mainly aimed at national competitiveness in the form of development of metropolitan areas in polycentric systems of cities than at restructuring of weak regions, which was often the case in the 60s and 70s (Parr 1990, Knapp, Schmitt 2008, 1191, EIB 2010). Two major elements of growth poles may be indicated, such as the presence of propulsive industries and the benefits of agglomeration which are achieved mainly in certain urban agglomerations. Instruments supporting poles of growth have evolved and now increasingly involve the formation of pro-innovation infrastructure – like technology parks. (House 1978, Hansen 1990) In some countries, particularly developing ones free trade zones were used as an instrument in growth pole strategy (Chien i Yang 2007). Many researchers currently consider clusters as a modern form of growth poles (Li 2005, Ganne, Lecler 2009, Heijman 2009, MG 2011).

Increasingly, the contemporary growth pole must be the pole of innovation in order to be effective (Niosi and Zhegu 2005). Innovation is stressed not only by the most developed countries but also by developing states, which already have had success in terms of economic growth, such as China (Chien and Yang 2007). The main distinguishing feature used in relation to the term “growth pole” should be outstanding results in terms of the dynamics of development.

## 5. Conclusions

Innovation aspect was indicated by the authors of the original growth pole theory. The analysis of empirical literature showed that in fact knowledge leading to innovations is the least controversial development factor, that is factor that in all the analysed studies have proved its positive impact on economic growth. The model of territorial growth pole verified for Poland also showed the key importance of innovative branches but also of other development factors, among them of intellectual capital for formation of territorial growth poles.

The model of territorial growth pole adjusts the growth pole theory to contemporary conditions of the knowledge economy, especially the importance of innovative industries, indicated in the original theory, but with less emphasis, as the propulsive factors were not necessarily considered the most innovative industries, but such as steel or petrochemical industries. Furthermore, the analysis has shown that propulsive industries and their links are not enough for the area to become a territorial growth pole, and actually the coexistence of many different growth factors is needed. It also shows why many of the growth pole strategies, which consisted in stimulating the development of disadvantaged areas by the location there of propulsive industries, without the development of necessary complementary development factors has failed.

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