

## UPGRADING TERRITORIAL SYSTEMS IN THE INNOVATION PARADIGM OF ECONOMIC GEOGRAPHY

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### Abstract

Upgrading shows that both local and global dimensions matter. Clustering and transnational corporations offer substantial advantages, and participating in global value chains and interacting with foreign buyers and companies may enhance local firms' capabilities to produce goods. However, what matters most markedly is the form of governance of value chains and clusters, which affects the upgrading process of territorial systems. Competitive factors that influence innovative models of regional economic development and lead to successful country and regional scientific and technological policies are investigated. The emergence of new fields, including research into responses to informationization and globalization, financial geography, etc., has brought more vitality and diversity into economic geography. This paper aims to contribute to the understanding of how to make a regional innovation system work and what important aspects should be considered for the successful implementation of innovation policy.

**Keywords:** *upgrading; transnational corporations; innovation; globalization; clusters*

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## 1. INTRODUCTION

Innovation has become a mantra of economic development policies and is what most policy strategies claim to concentrate on. Many governments have attempted to gear their policies towards this in order for their economies to remain competitive. Consequently, providing an environment that is favourable to innovation appears to be the sole feasible and sustainable competitive strategy for businesses and locations alike, especially within advanced and highly competitive countries.

Economic theory has long regarded innovation as an isolated technological invention created through research that is exogenously given. Over the past decade, however, following evolutionary research into innovation and knowledge, it has regained its prime place in explaining reasons for the success or failure of regional and national economies within the economic development paradigm. The innovative development economic model is a notion which is widely used by political elites to define directions, set goals and tasks for future national social and economic development. Innovative development implies the mobilization of intellectual, financial, human, technological and other resources for the attainment or retention of a favourable position in the growing segments of the world market. A country's share extension on so-called dynamic markets enables the acquisition of additional resources for stimulating external growth of the whole economy, allows for the modernization of economic patterns and the development of infrastructure. Therefore, technological innovations are seen as a solution to problems connected with the growth of state competitiveness and overcoming socioeconomic obsolescence.

In industrialized and some developing countries, the state strongly supports strategies for innovative development. It stimulates the development of the academic field of the country and creates conditions for establishing so-called "innovative clusters" by expanding infrastructure. This implies the existence of regions with a high centralization of high-tech companies, high patent activity (compared to other regions), high level of contributions to R&D, high employment rate in high-tech industries, and a large share of high technology products in the export structure. The majority of these regions are located in industrialized countries. For instance, there are such regions as "Silicon Valley" in the USA, which is named as "a unique ecosystem<sup>1</sup>" by the Professor V. Miller of Stanford University. Other such regions are the Stuttgart agglomeration, Île-de-France region, Greater Tokyo Area, Seoul, Singapore, etc. These regions have become centers of global innovation, and the majority of the world's new technological ideas originate there. In some developing countries great attention is given to the formation of high-tech growth poles (such as innovative regions and regional clusters). In contrast to developed countries the formation of such systems just on the basis of inner resources in the majority of developing countries is impossible. The policy of catch-up development requires contemporary new knowledge which, due to historical events, is concentrated in particular regions of industrialized countries. Cutting-edge world knowledge and the bulk of innovative resources are concentrated in these innovative regions. Huge transnational corporations are the carriers of this knowledge

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<sup>1</sup> «Das verlorene Vertrauen» // Stuttgarter Zeitung. № 5. 8.01.2014

and the globalization of transnational corporations' productive activities has enabled less developed states to obtain access to new knowledge and technologies as well as adapt and directly use them in their regional systems.

Certain regions of developing countries have taken the opportunity to start a new cycle of transformational growth. Global production networks are operating as the channel through which the transfer of new knowledge and technological know-how from innovative regions of the developed countries to the emerging innovative regions of developing countries flows. In addition, in most cases the "global players" stimulate the processes of regional learning, which reflect the functional complexity and the development of socio-territorial systems. The disciplinary boundaries for example between economics, geographical and political sciences have merged and become blurred in the quest for successful regional development and policy. Thus, the economic definition of "upgrading" can be investigated from the angle of economic geography.

## 2. METHODOLOGY

This paper adopts a qualitative research approach to offer an insight and understanding of the underlying reasons behind the complex dynamics, perceptions and relationships between actors, that would have been difficult to grasp following a quantitative approach. More contemporary approaches of innovation policy-making have advanced from earlier industrial policies and incorporated a more strategic and holistic approach. They widely follow the new, systemic view of innovation, which renounces traditional, linear understandings of the creation of innovation (i.e. stringently evolving from research to invention, innovation, and diffusion) by considering a broader range of influences. This is reflected in the emergence of concepts of innovation systems, which consider the role of interactions within the wider collective institutional framework (Nelson & Rosenberg, 1993, p. 4). An emphasis is placed on cooperation to complement competition as drivers of economic development (Lagendijk, 1997b, pp. 18-19). This in effect means an increasing appreciation of the local environment, in which networked firms are located.

This paper looks into the quest for successful strategies to develop innovative learning regions. While many studies identify certain factors for success and describe successful cases of economic development, less attention has been placed on policy failures and the struggles of less-favoured regions (e.g. with the exceptions of Morgan & Nauwelaers, 1999c; S. A. Rosenfeld, 2002). Accordingly, current theories generally imply what policies should focus on with little to say on how to implement them practically and achieve their objectives. Similarly, there is widespread recognition in certain strands of the literature that 'institutions matter' but without sufficient investigation into why they matter and how they can make a difference. While the difficulties in terms of effective policy-making are noted by some (e.g. Bentley &

Gibney, 2000; Nauwelaers & Morgan, 1999; Shutt, 2000; Stiglitz, 1998), they are believed to be underestimated still by many others.

Overall this paper aims to contribute to the understanding of how to build a regional policy and business support environment conducive to innovation or, in simpler words, what constitutes a regional innovation system, insofar as it is supposed to actively facilitate the clustering of the business dimension of a regional innovation system. Certain conditions are assumed to be needed to constitute the functioning of an innovation system, such as that key actors are generally cooperative and coherent in an overall strategic approach which must be present.

Innovation is seen here as the ‘conversion of new knowledge into economic and social benefits’ – now acknowledged to take place as the result of complex long-term interactions between many players in an innovation system.

It is believed that innovation is nurtured in functioning innovation systems. The regional innovation systems concept represents in this respect an advanced form of a ‘regional learning system’, as Cooke & Morgan (1998, p. 71) imply, and it is defined here ‘in terms of a collective order based on microconstitutional regulation conditioned by trust, reliability exchange and cooperative interaction’ (Cooke, 1998, pp. 24-25; Cooke, Gomez Uranga, & Etxebarria, 1997, p. 490). The array of organizations corresponds to economic, institutional, technological and social subsystems, ‘which interact continuously with each other and operate as a system’ (Cooke, 1997, p. 362).

The governance infrastructure does not just comprise the regional tier (and other multiple levels) of government that influence regional innovation policy and activities, but the wider organisational framework and environment of business associations and networks, and so on. Moreover, innovation policy is also defined here in a wider sense, which not only comprises actual initiatives and programmes, but also the structures and relationships between actors in the governance system.

Upgrading, as an economic and geographic category, is seen through such methods as historical (through evolution of world economy in developed and developing countries) and statistical analyses (examining statistical data of foreign trade, export and import data, high-technology industries and GNP of developing countries).

## **2.1. The emerging innovation paradigm and its importance**

In order to understand the importance of innovation and its implications for businesses and their territorial systems, which emanate from it, one should not only look at current trends and academic thinking on how the economy works, but also at past practice. Among the array of papers on paradigm changes, Capello’s (1996) extended review essay based upon Conti, Malecki & Oinas (1995), for example, elaborates upon three distinct economic paradigms of industrial organization, which by no means are exhaustive but, nevertheless, highlight the most prominent changes in understanding

corporate strategy and regional development in the second half of the last century: division of labour ('Taylorism'), the industrial district paradigm with a shift to a 'flexible regime of accumulation' (Albrechts & Swyngedouw, 1989) with a cluster of specialised small firms realising economies of scope, and the network paradigm (Cooke & Morgan, 1993) highlighting the need for cooperation, networking between businesses in order to use economies of association and to take account of the transition from an industrial to a complex knowledge-based society and economy (Schätzl, 2001, pp. 224-225).

Indeed, businesses need to become efficient 'learning organisations' (M. Armstrong, 1996, p. 521) in order to fully exploit their quality potential and to satisfy and adapt quickly to fast-changing customer demands (Missethon, 1993, p. 10) through continuous improvement.

In order to promote the process of innovation in a region, an environment has to be created in which innovation activities are enhanced and ideas, new technologies and best practice can be disseminated.

## **2.2. The link between innovation and economic growth**

The link between innovation and economic growth has long been studied, both theoretically and empirically. Undoubtedly, there is a clear general consensus that innovation drives productivity and, in logical consequence, economic development. As an example, the UK government (Department of Trade and Industry, 2003a, pp. iv and 8) has recognized innovation as 'the most important influence on productivity growth alongside changes in skills and capital intensity', and uses it as one of five drivers for their framework analysis of how to increase productivity.

Even though it may be hard to establish a clear direct link between innovation and GDP at the national level for instance because 'innovation is only one factor among other structural ones', such as employment, education, skills and lifelong learning, regulation, taxation, and macroeconomic variables such as inflation, exchange rates etc., to name a few – all in all, there is sufficient empirical evidence in the literature (Mairesse & Mohnen, 1995) to suggest a strong link between innovation performance - whether measured in R&D expenditure or patents - and productivity, which again is seen as key to economic growth.

## **3. TRANSNATIONAL CORPORATIONS AS A FACTOR OF TERRITORIAL INNOVATIVE DEVELOPMENT**

Globalization of the world economy goes hand-in-hand with the economic activities of large transnational corporations. Liberalization of the world trade, the introduction of new technologies and relatively cheap fuel resources allow transnational corporations to take advantage of the location of certain territories, which are sometimes distant from their home country. Putting the stages of the production chain in the most convenient places, companies save a lot by reducing factor costs. At the same time new models of cargo transportation and modern logistics make the production of goods profitable in a

geographically fragmented production chain. Thus, global production networks are formed, accounting for 80% of current world trade (World Investment Report, 2013, p.10). They cover the whole cycle of value creation of a product from raw material extraction and production, to sales and disposal (Paul L., Knox P., Sallie. A., 2011).

The development of production networks occurs in two ways. First, increasing international competition forces companies to specialize only in those areas that can provide them with a competitive advantage. By concentrating resources on strategic operations (management, R & D, control), companies turn down what they consider to be less important functions, allowing other companies with which they cooperate to undertake them, commonly known as “outsourcing”.

As a result, the share of parent companies in the value of the final product is reduced. The second way is the partial transfer of production or service functions to other regions of the world, or “offshoring”. Using spatial differences (natural, economic and social) of the world’s regions, international companies are able to achieve increased efficiency in terms of revenue growth and cost reduction. Furthermore, access to the regional market and technological know-how (knowledge) plays an equally important role as a reducing factor costs does.

### **3.1. Study area and data**

More and more companies are increasingly involved in the processes of internationalization of production. It is roughly estimated that at the beginning of 2008 there were 82,000 of transnational corporations in the world (whereas in 1990 there were 7,000), with 810,000 branches situated worldwide (Rodionova I.A., 2009). Communication and logistics networks of these companies cover the whole world, and their configuration is the result of companies' financial investments abroad as well as their management and state performance in the process of marketing of their regions. Networks modify functions and roles of countries in the international division of labor. Recent years have been marked by an increase in the share of developing countries' industrial production. Functionally, developing countries are diversifying their suppliers of raw materials and agricultural products and transforming into industrial and service areas of big international companies. In some companies the processes of forming innovative parts of independent high-tech activities are observed. However, generally speaking, R&D, strategic management, administration and control of logistics chain remain the prerogative of industrialized countries.

The global division of labour in the production network is a strategic factor in improving a company’s competitiveness. Due to the distribution of production and service functions (global sourcing) multinational companies lower their own costs and financial risks, sharing them with other companies. Cheap labor and low factor costs in developing countries help transfer manufacturing and service operations to them. Saved



resources are then directed for the creation and development of new products and realization of marketing strategies by the parent or leading company. Thus, in developing final production costs, the share of R&D, advertising, and logistics located on the territory of the developed countries increases and, simultaneously, the share of direct production, localized in developing countries decreases.

Three main stages can be marked in the history of the postwar internationalization of factory area networks. In the period of 1950-1990 branches with high material and labor costs, included in a group of low-tech branches, were at the centre of global sourcing. Among the first industrial branches exposed to the processes of internationalization were those concerned with the extraction of raw materials, and textiles, clothing and footwear industries. In the German textile sector alone, the number of employees reduced by 8 times between 1991 and 2009 (from 400,000 to 50,000 people). Later medium-tech branches (such as automobile industries, mechanical engineering, electrical engineering), which require a certain level of skills and experience from factory workers, were drawn into global sourcing.

Since the beginning of 2000s trends in increasing internationalization of not only medium-technology industries, but also high-tech industries and a number of intelligent services can be observed. The electronics industry, computer production, and telecommunications have become leading branches in a number of developing countries. At the same time the sphere of service is moving to new places. The term "service offshoring" is understood as the "take-away" of serving functions of enterprises to other countries and regions. They can be transferred to other independent companies (offshore outsourcing), or performed in foreign centers of the parent company (captive offshoring). Services can be provided in the regions situated nearby to the "centre", such as Eastern Europe, Mexico (nearshoring), or in relatively remote regions (India, China, and Latin America).

During the internationalization of production activities, more and more new activities are drawn into offshoring. They are oriented to the humanitarian opportunities. The creation of new manufacturing lines of big transnational corporations situated in the countries of Western Europe (such as "GM", "IBM", "Novartis", etc.) in India and China occurred simultaneously with the creation of numerous research centers and R&D laboratories there. Further, transnational corporations stimulate processes of education and organization of network-wide exchange in the regions of their placement. Firstly, this happens through targeted training, advanced professional training for staff for the benefit of the lead firm, and secondly, during the process of formal cooperation with other companies, regional organizations, mainly via contracting companies or suppliers of products for a lead firm. In this case, the adaption of technologies and forms of labor organization, derived from a lead firm, takes place. Companies also work in close cooperation with regional universities and national research centers; initially the

transfer of knowledge goes from companies to the scientific and educational institutions, while later in the form of skilled professionals, it goes back (Fromhold-Eisbith M., 2008, p. 91). Moreover, it travels with the process of education through imitation. Geographical proximity of companies contributes to the copying of leading forms of labor organization and manufacturing. Imitation of activities encourages increasing chances for regional companies to survive. The experience of Chinese companies connected with imitation of technologies and production of western companies appears to be attractive (Liefner I., 2006).

The growth of the technological status of a regional system (upgrading) occurs through the integration of local qualified personnel in research processes of the companies. The activities of the American company Intel is a good example. With production offices in Malaysia and Costa Rica, this company actively initiates, through engaging in innovative activities (since 2000 having its own laboratory) regional researchers and engineers as well as programs for R&D funding in the regional universities, the creation of global IT clusters in these countries. In Costa Rica, for example, the diffusion of global know-how, using the method of formal and informal exchange of knowledge by corporate experts with representatives of local companies in the national ICT sector, is stimulated. In addition, knowledge transfer arises due to the creation of new firms by former employees of American companies (spin-off). Because of this the overall competitive position of local firms is growing. Some of them conduct independent research and development, such as that indicating the formation of one of the most progressive protoclusters of Latin America in the ICT industry in Costa Rica (Stamm A., 2003, p. 102).

In Malaysia, "Intel" has conducted pilot tests of new processors, developed at the research center in Austin (USA). Here, on the base of the factory, an R&D center capable of testing, adapting and improving products was organized. This required the involvement of highly qualified local specialists and the establishment of cooperation with competent contracting companies. The resulting spin off of the effects and the influx of new companies in the technology cluster is by far the largest in Malaysia (Penang). A number of suppliers, through collaboration and cooperation with the parent company, became transnational corporations within a short space of time (Altenburg T., 2003). This is reflected in the rising share of high-tech, sophisticated production facilities and services in the export structure of these countries. As indicated in Table 1, in 2010 exports of Malaysia and Costa Rica's leading position was occupied by the products of the so-called "developed" (sophisticated manufacturing), high-tech industries that puts these countries in the list of the world leaders.



**Table 1.** The share of production and services due to the level of complexity in the export structure of certain countries in 2010 (%)

<b>Countries</b>	<b>Raw materials</b>	<b>Low-tech production</b>	<b>Middle-tech production</b>	<b>High-tech production</b>	<b>Intelligent services</b>
Brazil	60	5	15	5	10
China	10	25	20	30	5
Costa Rica	20	5	5	35	15
India	35	15	10	5	25
Malaysia	30	10	15	30	5
Russia	75	5	10	0	5

It is noteworthy that in 1995 the share of raw materials in the export structure of Costa Rica approached 70%, and the share of high-tech production did not exceed 3%. Over the past years, it was able to enter a new stage of technological development, indicating, thereby, to other states on possible solutions to problems of technological and socio-economic backwardness (World Investment Report, 2013, p. 202). Positive changes in the territorial development through technological transfer and knowledge can also be observed in China, India, and Brazil.

Thus, technological regional transformations have become possible via the initiation of interactive learning processes even if only by one large global company. It can be assumed that such processes will be strengthened if dozens, or even hundreds, of global players operate in the regions. An example of this is offered by the Indian city of Bangalore.

#### **4. THE DEVELOPMENT OF INNOVATION SECTOR IN BANGALORE**

Today, Bangalore is a major centre of information technology in India and the strategic location for many foreign companies. In 2010 more than 1,100 transnational corporations had operations there, among which we can highlight "Intel", "IBM", "Dell", "SAP", "Cisco Systems" "Oracle" "HP" "Bosch" and several other major corporations. In addition such large Indian companies in the IT industry as "Infosys", "Wipro" were founded. The ICT sector employs more than 250,000 thousand people in the city - more than Silicon valley in the California). It produces 90% of computer programs exported out of India and a large proportion of the products of the national biotechnological sector.

A number of factors have contributed to the transformation of this national centre for technology in global innovation location. Firstly, the high concentration of specialists in the field of information technology in Bangalore resulted in the city becoming the main place to solve the pressing issues of transitioning computer systems for the new

Millennium for American and British companies. In the 1990s, Indian companies worked intensively on the orders of hundreds of foreign companies, and the success of Indian firms was not only seen in the accumulation of capital, experience and know-how, but also demonstrated by the viability of a new model of international division of labor in high-tech industries. Moreover, it stimulated the further inflow of orders in Bangalore. Not only IT services, but also private sector services (BPO) and call centers have become common here. International companies started to open its subsidiaries in the city, involving the work of local workers.

Secondly, the crisis of the high-tech sector in 2001 caused the return migration of redundant workers of Indian origin from the high-tech sectors of industrial countries. Most of them had worked in the 1990s at enterprises in California's Silicon Valley and had advanced knowledge and experience of working in Western companies. An important role was also played by the development of the communication infrastructure of the city. Access to high-speed Internet and phone connections have created conditions for executing orders from other regions in real time and effective participation in various forms of offshoring. This period was noted in Bangalore (as it was in the whole of India) by high-growth in the information technology sector, contrasting with the recession observed in the rest of the (Fromhold-Eisbith M., 2008). Thus, the integration of the Bangalore region into the global production (service) network was carried out in two ways: expensive outsourcing services provided to Western companies, the transfer of some functions of the regional companies or subsidiaries of the parent company to the region, but also in the form of a return (inflow) into the region the Indian programmers and other professionals with experience in foreign high-tech companies and the "baggage" of excellence from other countries.

The state scientific and technological policy aimed at the development and modernization of high-tech industries has also contributed to the development of the innovation sector of Bangalore. Since the late 1980s, the government has given special attention to the development of the information technology sector, seeing it as the basis for further economic growth. For these purposes state agencies have conducted systematic recruitment of large foreign companies to attract them to work in the country. At the same time, the national sector developed rapidly. One of the central mechanisms of this policy was the construction of technological parks with preferential taxation. In Bangalore such large parks as the International Tech Park and the "Electronic City" were built.

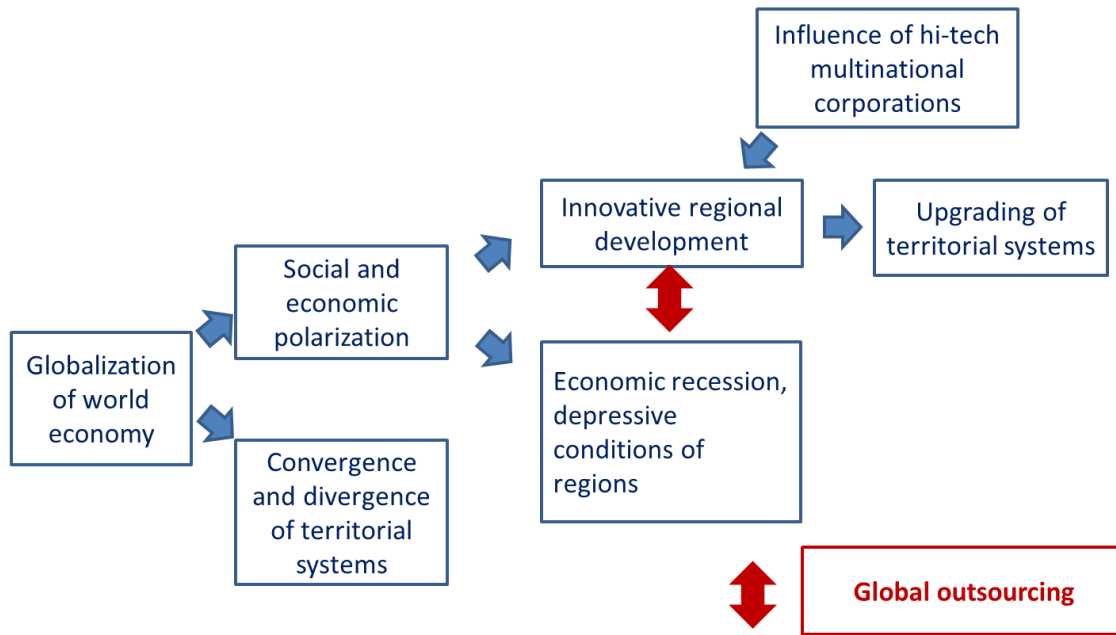
Another mechanism of stimulation of innovative development of the country was the creation of a modern, competitive system of education that could prepare professionals for national and foreign companies. The state purposefully supports educational and scientific activities of elite higher education institutions (e.g., Indian Institute of Technology), encourages the cooperation of universities and companies of the business

sector. In reforming education, foreign companies also play an important role. In regions with large public research centers, good relations between them and transnational corporations have been established, concerning, first of all, training and research activities. In the early 1990s, foreign companies took part in the discussion of the curricula of universities, conducting joint research and development. This contributed to the raising of the level of education in Indian universities. Today, the level of training at the technical faculties of the country is such that their qualifications is in no way inferior to that of industrialized countries (Kämpf T., 2011).

Strengthening the national innovation system occurred in parallel with the growth of interactive learning processes in the region and the constant increase in the level of objectives run by companies. Thus, in early 2000, the majority of companies in the information technology sector were engaged in the creation of computer programs. The next step was to guide the IT managers of the customers and the IT management system of the production network. Additionally, industrial enterprises of the city have undergone phases of Fordist production and test products prior to the period of the organization's own R&D and production of new products. In the region a real innovation boom is being observed, when about 90% of IT companies based there are able to conduct their own R&D (Fromhold-Eisbith M., 2008, p. 91).

The rapid growth in the first decade of the twentieth century was demonstrated by the Indian companies in the region. In "Infosys" the number of employed increased in the period 2001-2007 by more than 7 times (from 9,800 to 70,000 people), Wipro by 6.6 times (from 9,900 to 66,000) (Kämpf T., 2011, p. 53). The Tata Consultancy Service has, within a short period of time, become one of the world's largest companies providing IT services; employing 84,000 people (from 13,000 in 2001) it has offices in 42 countries. The company's subsidiaries in Latin America employed around 5,000 people in 2008 (up from 7,000 in 2001) (Glückler J., 2008, p. 40).

Foreign companies have also seen a considerable growth of employment and capital turnover in the region of Bangalore. In the Indian branches of such large companies SAP, Bosch, Daimler, Cisco, the number of employees has increased tenfold. From Bangalore economic, technological and innovative impulses began to go to the other regions of India. Significant growth of new industries can be observed in Hyderabad, Delhi, and Kolkata. Most TNCs pursue a policy of spatial expansion in India. For example, IBM expected to increase expenditure on R&D in India in 2008-2010 to US\$6 billion and to increase the number of employed up to 14,000; the American firm Accenture had plans to increase the number of people employed in India up to 50,000 people in 2011 (Pilny K., 2006, p. 72). The trends and examples of the evolution of territorial systems in developing countries are shown in Figure 1.



**Figure 1.** Upgrading of territorial systems in the structure of developing countries

## 5. CONCLUSION

Contemporary trends towards greater economic integration, on the one hand, and globalization on the other, are leading towards a reshaping of the territorial systems.

Global off-shoring gives developing countries the chance to overcome their technological inferiority from developed countries and modernize their national economies. Previous studies indicate the process of over-complication of work and value added growth of manufactured products and services.

Most companies are primarily focused on the availability of cheap labour and are interested in the potential for further training of their workers. The quality of output product rises and work process optimization is noted. As time passes the level of performed work in off-shore companies grows increasingly complex. It happens because growing agglomerative costs force companies to switch to the manufacture of products with higher added value. Only in this case will a company's products be competitive. These processes are simultaneously followed by the growing integration of off-shore companies in a regional network or cooperative systems with other companies as well as with universities and scientific research institutes.

The dynamics of these processes are only possible in a regional system which has corresponding structures and stimulates external and internal network-wide processes. Favorable state scientific and technical policy, government investments in education, science, technologies and infrastructure create conditions which are essential for

manufacturing high technology products and services by foreign and national companies. The growth and amplification of off-shore activities in the regions of developing countries are practically impossible without these qualities. Structures of regional systems should support and stimulate processes of interactive training and gaining new knowledge in the region.

As labour with its technical and scientific characteristics becomes more sophisticated, the level of regional scientific and technical (innovative) system which is not only capable of adapting external knowledge (know-how), but also producing this knowledge, rises. The region evolves from the place with low factor costs of manufacturing to a high-tech strategic place of the world where the presence of global actors is no more coincidence but necessity. Therefore, cooperation of endogenous forces of regional systems with exogenous forces of the global manufacturing system can affect regional growth and development in a good way.

Finally, we can define upgrading of territorial systems as the process of making the manufacturing feasibilities and improving the level of technological development more complex. These processes concern not only the industrial sphere, but influence transformation of social, economic and ecological subsystems of the territories. Although these transformations may not always be considered as positive, they are however necessary as territories with no opportunities for transformations will experience economic and political failures in the world economic system.

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