

*Ryszard Domański\**

## LEARNING REGIONS IN THE NETWORK ECONOMY

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A characteristic feature of the modern economy is an increase in the importance of the network of links between enterprises, administration, and scientific-technological centres. The reason, which is also the driving force, of the accelerated development of networks is a change in the production system and a change in the spatial organization of production that accompanies it. These changes occur as a result of differences in demand which entail a diversification of production. The diversification of demand and production enhances the information absorptiveness of the economy and is further reinforced by information technologies. The diversification of the demand shortens production series and as a result diminishes the economies of scale. Hence, a more diversified economy can operate and develop if the reduction in the economies of scale is more than offset by new kinds of effects. What constitutes their source are networks. The type of networks that are distinguished by high efficiency are those that develop in the process of learning of the economy at the regional level. The aim of the article is to reproduce this process. The reproduction procedure consists of several steps and leads to the systematization of our knowledge, i.e. an ordered description and explanation of the process.

### INTRODUCTION

Social life, including the economy, requires co-ordination necessary to maintain order and efficiency. Practical experience and its generalization have led to the building of several co-ordination models, the main one of which includes market mechanisms, hierarchy, and networks. The reflections on these models are based on the works by Frances, Levačić, Mitchell, Thompson (1991) and Powell (1991).

In the most general terms, co-ordination means joint, orderly action to achieve a definite aim. Through co-ordination, partners' efforts can be given a common direction, while bottle-necks and resource shortages can be eliminated. Hence the notion of co-ordination is closely associated with that of efficiency.

Opinions differ as to the efficiency of the particular models of co-ordination. Liberal doctrines claim that spontaneous co-ordination by market processes is the best; they are critical of imposing upon socio-economic life a co-ordination procedure that was not spontaneous initially. Opponents of liberalism indicate many fields which require action organized in a hierarchical

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\* Department of Spatial and Environmental Economics, Poznań University of Economics

way. In the field of the economy, one of the factors stimulating the development of this trend have been works by Keynes recommending demand control and indicative planning. However, there are domains in which neither the market nor hierarchy ensures proper co-ordination. They include those in which informal mechanisms of co-operation among comparatively independent entities are significant. The co-ordination of those fields takes place through intertwined chains of social, political and economic relations assuming the form of networks.

Each of those models can occur in a variety of forms. Each is a field of struggle between competitive opinions concerning the co-ordination effects of different approaches. A mid-stream opinion treats all three models as complementary approaches, not antagonistic or mutually exclusive.

Nowadays new forms of co-operation develop which are connected with the growing diversification of economic activity. They take on the form of networks. An economy in which the proportion and significance of networks are great is usually called a network economy. The advancing diversification of economic activity and the ramification of networks require more and more information about the changing demand, links among enterprises, local environments, new researches and development, financial limitations, and determinants of the decision-making process.

In the last decade there has been a revival of interest in the network economy in this new sense. It has coincided with interest in a knowledge-based economy. These two components have coalesced to produce a new field of economic and regional inquiry, viz. a learning economy and learning regions.

The world literature on the subject has been accumulating, but it has not left the initial exploratory stage yet. There is a need to conduct more comprehensive studies. They can be expected to develop rapidly, not only because they concern an important field of the economy, but also because their subject matter is interesting of itself. A scientific school of much renown in the European literature is the group of Swedish scientists A. Andersson, D. Batten, B. Johansson, A. Karlqvist, and C. Karlsson. There are scholars from other European countries co-operating with them: M.J. Beckmann (Germany), R. Capello (Italy), P. Nijkamp (Netherlands), and J. Simmie (UK). The basic assumptions and concepts of this school can be found in the books by Andersson et al. (1993), Johansson et al. (1994), Batten et al. (1995), and Simmie (1997).

In the Polish literature of recent years, apart from the well-established paradigm of management sciences, there have appeared overviews and conceptual studies in the field of the network economy and learning regions (Herbst 2000, Maleszyk 2000). Issues concerning the knowledge-based

economy and information society have attracted more interest (Kukliński ed. 1995, Kukliński and Orłowski eds 2000, Kukliński ed. 2000, Wierzbicki 1998, Wierzbołowski 1998).

The aim of the present article is to reproduce the process of the emergence of new properties of regions in the conditions of a network economy and a knowledge-based economy. The new properties enhance the efficiency and competitiveness of regions in the national and international economies. The reproduction consists in the systematization of knowledge, thus allowing a description and explanation of the process. In the procedure the following were determined:

(1) the new properties of regions emerging in the conditions of a network economy and a knowledge-based economy. These are: (a) an increase in the importance of the regional level in the spatial organization of the economy, and (b) advantages resulting from the interactive process of learning by regional economic entities;

(2) conditions in which the new properties can appear at this level. They include: (a) the growing diversification of the modern economy, (b) the transformation of metropolitan areas, and (c) the presence of untraded relationships in them;

(3) the mechanism of the emergence of new properties. It consists of: (a) local learning processes, (b) the attraction and flow of knowledge, and (c) synergistic effects produced by the interaction among the above-mentioned factors.

## **1. NETWORK AS A SYSTEM OF EFFECTIVE ORGANIZATION OF A DIFFERENTIATING ECONOMY**

What forces in the modern economy are responsible for the formation and diffusion of economic networks? They are gradually mounting and periodically accelerating transformations of the structure of industry and the entire economy (Batten, Casti, Thord 1995). They lead to growing diversification of products and services. The diversification, which is driven by information technology, makes industry and the economy able to absorb more data. Other new technologies, including material engineering and bioengineering, are further components of the innovation bundle transforming today's economy.

The new technologies, including information technologies (Zuscovitch, Justman 1995), differ from those of the earlier stages of technological-economic progress in that they allow enterprises to respond elastically to changes in the environment in which they carry out their economic activity.

This makes it easier for them to adapt to the diversifying needs and demand by diversifying their products and services.

But the diversifying production requires a greater variety of skills. When enterprises want to satisfy more diversified, specific needs rather than offer mass-consumption goods, they have to co-operate with other producers and consumers in order to define specific utility features of their products. There is an explosion of diversity and complexity which embraces various types of knowledge, and enterprises are not able to manufacture all their ingredients on their own. Hence the proliferation of micromarkets in which these ingredients as well as specific, very complex products and services meet. At the same time the economy grows more and more global, which imposes many systems of norms in those micromarkets. Each micromarket becomes a world of detailed trading regulations as well as technological and environmental norms with which one has to be familiar and which one has to take into account when devising competition strategies to be employed in macromarkets. In turn, the increase in the importance of information and knowledge as well as in their absorptiveness is the driving force of the growth of agreements on co-operation between enterprises and research and development (R&D) units.

The present-day increase in the diversity of products and services means an unprecedented diversification of the division of labour. However, this process has limits determined by the market. Diversity has to pay. Any form of technological and organizational progress is beneficial for sustainable development only if it can generate an economic surplus through the market. Technological and organizational progress which does not add a reinforcing component to the developmental fuel leads, sooner or later, to decreasing returns. In the mass production system, standardization and enlargement of the scale of activity generated an increase in the income. In the modern, knowledge-absorbing production system based on greater diversity, an economic surplus must be produced by a different sort of mechanism. This different mechanism requires co-operation which assumes the form of economic networks. Networks are a new form of organization and co-operation in the economy which has to face a difficult challenge: simultaneous growth of diversity and efficiency. The surpluses obtained thanks to networks are in the category of synergistic effects.

Other stimuli to co-operation and network development (Zuscovitch, Justman 1995) result from the need for capital accumulation. Long-term and indivisible investments require big outlays over a long time. This kind of investment involves risk. In the 19th century the risk was distributed among many investors by dividing property into shares. Advanced specialization connected with the new technologies and the satisfaction of specific needs and

changeable demand also involve risk. Its division takes place through the mechanism of co-operation.

Moreover, the very way of satisfying specific demand requires co-operation in order to identify and stimulate new needs. The learning of this new skill is a collective task undertaken as part of co-operation. Also in this case the returns obtained under the mass production system through standardization and diminished due to diversity and reduction of scale are compensated for by another kind of returns, viz. information benefits. These are external benefits, and networks are structures created to capture and put them to practice. In this role networks are an organizational tool supporting the learning process by combining individual and group motives and interests.

Absorbing innovations is easier through collective learning. In the mass production system the structure of capital, labour and production is relatively stable, diversification occurs gradually and in longer time periods. By contrast, in a system based on intensive use of information, competition necessitates the frequent introduction of new combinations. A firm can cope with the challenge by applying research results. The application requires an adaptation of basic knowledge to the firm's needs, or access to technical information outside the firm. However, specialized high-tech knowledge is often unavailable on the open market. It is only offered by some application-oriented enterprises or research institutes. In this case it is more rational to enter into a long-term co-operation agreement with them than to buy a specialized service in the form of single transactions. Such long-term co-operation agreements encourage the inventors, research institutes and application-oriented enterprises selling specialized services to care for the quality and efficiency of those services, and hence for the interest of the purchasing enterprise.

Networks affect market dynamics. They can accelerate or slow it down. Market competition makes economic links tenuous; they come into being, mature, and disappear. The main consequence of the development of networks, especially in the capital form, is the fact that they introduce some inertia into the market and slow down its adjustment to the changing conditions of competition.

Network elements change at varying rates. Networks have their own infrastructure, not only technical, but also organizational, financial, legal, and even social. It defines the limits of common action. Current action can be visualized as flows in networks. There are significant differences between the rate of changes in the network infrastructure and network flows. The differences define the time it takes to restore equilibrium after disturbances, and also subordination relations. For example, in telecommunication networks the restoration of equilibrium in information flows can be done within minutes

from a disturbance, while its restoration in the infrastructure may take hours, days, months, or even longer. The stability of infrastructure provides a basis for predicting quickly changing flows and for steering them according to preset rules. In the case of city transport the rules (the rules of the road, signs, lights, sound signals) enforce safe behaviour on the roads, and besides they can cause a change in traffic direction if the right direction is too congested. Generally, network elements, which change slowly and are equipped with durable devices, subordinate fast-changing flows to themselves.

## 2. NETWORK AS AN INSTRUMENT OF ECONOMIC POLICY

These examples make one think about the position of economic entities in organizational networks. A dominant position means the possibility of exerting an influence on the operation of the entire network, to the great advantage of the dominant entities. Since it is possible to occupy more or less influential positions, the dominant entities can enter into oligopolistic conspiracies. Their consequence is the limitation of competition. In theory, this can be justified when negative effects of a coalition are offset by an increase in benefits of a dynamic nature, i.e. by a greater ability to diversify skills and production.

The position of entities in a network is closely observed by people responsible for the economic policy of cities and regions. It is not of the slightest interest to a city or region what entities are located in them. They want to attract dominant entities, because this attracts other entities and kinds of activity. The location of an isolated entity can have a restrictive influence on local and regional development. Especially in a small town, this entails a one-sided development with all its effects of economic monoculture. Big corporations which are the core of a network are not guided by the principle of a town's balanced development. They locate their establishments and branches in various towns, regions and countries guided by the principle of the maximization of benefits for the corporation from the entire set of locations in which they start an activity. It falls to the local authorities and communities in the individual places to take care that their development is harmonious.

The network economy is a very suitable, and potentially highly effective, tool of the economic policy of a big city. Its economy shows increasingly acute fragmentation; the harmonization of diversified activities can bring it considerable synergistic effects. However, a suitable forum should be created for co-operation, a network of links, and an efficient mechanism of their operation. Networks are an indispensable instrument of a big city's economic policy, especially when the city authorities want to change over from the delivery of city services to creating opportunities for various groups of interest.

This changeover is favourable to job creation, an increase in the incomes of enterprises and people, environmental and spatial order, and the enlargement of human and social capital.

Networks are a policy instrument used in the development of innovations, especially in their interactive form. To the many examples of technological and organizational innovations a new one has recently been added, viz. quality improvement. Quality is understood as the entire set of properties of products or services that affect their ability to satisfy the existing or anticipated needs. Quality management is thus one of the managerial innovation techniques. The scope of the notion it covers tends to grow larger and larger, so that now organizations are interested in all-embracing quality management (Kunst, Lemmink, Prins 1996). In this extended technique quality is a constant function pervading all aspects of an organization's activity (both enterprises and non-profit organizations). This function refers to all people working in the organization, their activities, decisions, and behaviour.

The extension of the issue of quality to the whole of management increases the demand for additional knowledge and skills. This additional knowledge is necessary, e.g., to quality inspectors employed by an organization. For a long time the inspectors were treated as persons who delayed processes rather than improved them. To discuss quality problems in depth, they looked for partners outside the organization rather than inside it. Hence they were interested in projects concerning inter-organizational networks.

Another reason for getting interested in networks has been the costs of quality management. A network organization is less costly than economic advising and the training of workers by external consultants. By combining resources and experience, economies of scale are achieved. They are of special importance to small and medium-sized firms, because they help to overcome the obstacles of the scarcity of resources and high costs of quality management, which often makes it difficult for those entities to launch internal quality programmes. Networks create conditions for the exchange of information and experiences in the fields of quality and obtaining practical knowledge by the partners which they can use in their organizations.

Various types of initiatives for total quality management have developed, including schemata, organizations, clubs, and committees. Schemes are fairly formalized arrangements. They have well-defined targets, tasks of participants, time of duration, and effects. They are mainly designed to help small and medium-sized businesses. Most organizations are non-profit associations; they usually have a large membership, which requires a formalized structure. Clubs are informal in character and provide a forum for the exchange of information and experiences. Their membership and scope of activity are limited. Their

activity is organized by sectors at a national or regional level. They are financed from members' fees. Committees are specialized advisory organs or supra-network organizations of experts representing particular networks. The aim of the committees is to enhance communication among organizations and to establish a co-ordinated strategy of their operation.

Networks develop at various spatial scales. Apart from the scales of towns, regions and countries, they also operate at an international level. Examples are network connections within the European Union. In order to improve those connections, the EU plans a wide-ranging expansion of the network infrastructure.

Network conceptions also penetrate into geopolitics. Their implementation gives a new meaning to boundaries, states and constitutions. Lambooy (1997) sums up the new geopolitical tendencies in the following way: there is no global village, there is a world in the form of Perroux networks which develop their own hierarchies and markets exceeding the rules laid down in constitutions. This situation will probably require constitutional amendments.

### 3. LEARNING ECONOMY

We tend to associate learning with the intellectual development and improvement of qualifications of human beings. However, an analogous qualitative growth is shown by social, economic and spatial entities (cities, regions). The notion of learning as applied to enterprises and their urban and regional surroundings has appeared in the literature only recently. It is a derivative of the notion of innovativeness understood broadly as the popularization of inventions, new technologies, new products, new economic and financial organizations, and new social institutions and structures.

Learning is a collective process, or even a social process at a larger scale. Its participants are small, medium-sized and big enterprises, local and central administration, universities and research institutes, professional organizations, economic self-government organizations, and social institutions.

Learning takes place through interaction and co-operation among those entities. Scientists studying this issue claim that conditions especially favourable to the efficiency of learning occur at a regional level if large metropolitan areas have developed in the regions.

Such regions offer conditions favourable to the development of knowledge and innovations, the creation of co-operation networks embracing enterprises and scientific units, the emergence of a regional labour market with a well-developed sector of creative and R&D work open to flows, and the rise of new firms from the internal structure of large enterprises and scientific institutions.



At present they are the main factors of economic growth of regions. However, the network of links among co-operating entities is not limited to a regional level. It also embraces national, international and global levels.

The development of economic and scientific-economic networks is a characteristic feature of the contemporary economy at all the spatial scales. It is connected with the growing diversification of economic activity resulting from new technologies, the diversification of needs of consumers and producers, labour divisions, and the internationalization and globalization of the economy. The diversification may limit the scale of activities pursued so far, or cause the appearance of new activities on a small scale (in manufacturing this means a shortening of the series of products). This is a process favourable to the setting up and development of small and medium-sized enterprises. However, the diminishment of scale entails an increase in unit costs of an activity. If economic growth involved only this, it would mean a decrease in efficiency. Fortunately, the factors lowering efficiency are accompanied by factors that offset them. The most innovative activities more than equal the decrease; for a period of time they generate extraordinary benefits.

#### **4. TYPES OF KNOWLEDGE AND THE LEARNING ECONOMY**

In practice, there are many forms of knowledge, learning, and scientific networks. The basic concepts used in this chapter have been taken from Asheim and Dunford (1997), and Keeble and Wilkinson (1999). In the discussion about networks and learning, knowledge appears in the following forms:

1. Tacit knowledge (a), embedded in tradition fixed in the patterns of behaviour and working habits of people and organizations, popularized in the local community and passed on from generation to generation, and expressed knowledge (b), published and codified.

2. Codified knowledge of universal significance and codified knowledge of a local importance.

3. Common knowledge and knowledge shared by individuals, institutions and enterprises specializing in a given field, which is their share, or a component part, in the study of this field.

4. Materialized and non-materialized knowledge. Materialized knowledge is included in technical means which can function on the basis of codified, commonly available knowledge. Non-materialized knowledge denotes skills which are not contained in technical means, but in the external socio-economic environment favourable to innovations.

A learning economy has the following distinguishing features: (1) the dominance of ICT (information, computer, telecommunications) technologies; (2) links between these technologies and the organizing paradigm and flexible manufacturing methods characteristic of a post-Fordist economy; (3) gaining competitive advantages by enterprises and regions through innovations treated as a strategic way of competing; and (4) the perception of innovation as a socially and territorially embedded interactive process which develops in a favourable institutional and cultural context.

The social and territorial embeddedness of the interactive process creates conditions for collective, regional learning. The effect of this learning is the formation and further growth of a regional (local) base of common and shared knowledge acquired by individuals making up a manufacturing system, especially a system in the form of small and medium-sized application-oriented businesses as well as industrial and service enterprises employing advanced technology. Such a base allows its shareholders to co-ordinate activities and to solve current technical and organizational problems. Bases can be created as a result of a planned or spontaneous action. A planned action usually consists of R&D co-operation between small and medium-sized firms and a local higher school. Another kind of base is created as a result of the mobility (change of work, migration) of researchers, managers and highly qualified workers within a regional labour market with a well-developed sector of creative and R&D work. Movements of this personnel and their professional contacts may initiate co-operation which can then develop and assume a variety of forms. A manifestation of the movement of materialized knowledge is the setting up of new innovation firms through sprouting from the already existing local firms and institutions.

## 5. THE LEARNING PROCESS

Learning serves to include new information to the knowledge base. Thanks to it, the skills of the base members expand and the possibilities of their practical use grow. From the fact that the base of knowledge and skills forms and develops owing to the creative participation of its members, and the participation of its members in its practical use is their right, it follows that learning is a collective process by nature.

Learning that enriches the regional base of knowledge takes on different forms. Tacit knowledge is acquired primarily by learning through action and use. This type of knowledge is supplemented by interactive learning, which is a more advanced form of learning. It is claimed (Asheim, Dunford 1997) that it develops together with a category of knowledge called localized (regional)

codified knowledge. It is to be distinguished from codified universal knowledge. There are some differences of opinion, though, as to whether localized codified knowledge has to be translated into a decontextualized form in order to enter universal circulation. Those who do not see it as necessary argue that the translation would eliminate specific contextual conditions of regions and reduce the knowledge of regional agglomerations that has developed in those conditions, and ultimately, the innovative and competitive potential of the regions.

This model of learning and innovation is an alternative to the linear model and is termed an interactive bottom-to-top model (Keeble, Wilkinson 1999). It is one of its properties that apart from small, everyday innovations it allows the creation of radical innovations. This is made possible by the fusion of diverse creative factors and activities.

In the interactive model, learning and the generation of new and the development of existing knowledge are organized in the form of economic, scientific and scientific-economic networks. A network is an integrated, coordinated set of economic, scientific and technical relations holding inside, among and outside its component entities. The entities include: inventors, technologists, merchants, financiers, consumers, organizers and managers, together with the enterprises, offices and scientific institutions they represent.

The non-homogeneity of knowledge is the source of differences in opinions about its role in economic development. An earlier view emphasized the role of materialized knowledge in technical means. They are mobile and can function on the basis of universal codified knowledge. Thus, their relation with a place was not immediately striking. A more recent view, as presented above, stresses the importance of nonmaterialized knowledge embedded in the local environment and in the interactions between this environment and economic and R&D units.

The complicated nature of the interactions and networks they give rise to creates a demand for further innovations, namely organizational and institutional ones capable of promoting co-operation which, in turn, requires the local community and entrepreneurial circles to develop new properties (trust, readiness for co-operation, obeying the norms of economic ethics, capacity for self-organization). This means that organizations and institutions also have to learn.

## 6. IMPORTANCE OF THE REGIONAL LEVEL IN THE PROCESS OF LEARNING

The reason for the growing interest in networks is the ever greater demand for systematic co-operation among enterprises, scientific institutions, and administration. Networks develop at various territorial levels. In the modern market economy the importance of urban regions is on the increase owing to the external benefits they create and their spatial accessibility. Metropolitan areas and regional institutions also grow in importance as a way of economic co-ordination. Metropolitan areas create the best context for innovations. As a result, the level of metropolies and urban regions is an arena in which interactions materialize and competitive advantages they generate are exploited.

The economies of urban and regional agglomerations are not transferable. Technological progress generated by non-materialized knowledge and expressed in technical means requires individual technical skills, collective technical culture, and a developed institutional system. They are to a large extent embedded territorially. Similarly embedded are so-called untraded interdependences, which are sets of relations (Storper 1995) exceeding the traditional relations between suppliers and consumers. They also embrace formal and informal networks of co-operation and information, interactions among entities through the local labour market, and common beliefs and principles necessary to communicate and interpret knowledge. These economies are fixed assets of enterprises located in a region or group of regions. They give the region specific contextual conditions of fundamental importance for the innovation process. The success of urban agglomerations and regions in co-operation and innovativeness depends on the level of their organizational and institutional development. This level is often called institutional thickness (Amin, Thrift 1995).

The analysis carried out so far shows that in the intermediate layer of the knowledge-economy system at a regional level the following factors produce synergistic effects (Asheim, Dunford 1997): (1) agglomeration economies generated by territorially embedded knowledge materialized in technical means and economic activities, (2) the attraction and flow of nonmaterialized technical knowledge, (3) untraded interdependences, and (4) local processes of learning dependent on local codified knowledge and organizational networks. These effects are a new form of comparative advantages defining the competitive position of regions in an economy undergoing globalization.

## 7. CHANGES IN THE IMPACT OF VARIOUS KINDS OF KNOWLEDGE IN THE INNOVATION PROCESS

In the learning process various kinds of knowledge, including tacit and codified knowledge, are combined and absorbed by organizational networks. This process proceeds as a rule in small steps. Gradually, however, the knowledge base expands and operating systems which use it have to be modified. The knowledge keeps being enlarged through practical experiences gained with the help of the modified operating systems. With time, however, the knowledge base may turn out to be insufficient to adopt radical innovations. If knowledge enlargement is too slow, organizational networks become petrified in their structure and barriers develop that block the adoption of radical innovations, which require openness to the external environment and the absorption of diffusing scientific information.

The transmission of knowledge and its absorption in an innovative environment takes place through the following mechanisms (Keeble, Wilkinson 1999): (1) interactions between suppliers and consumers, and between producers and users of the means of production, (2) formal and informal co-operation among enterprises in the particular sectors of the economy, (3) mobility of workers between enterprises facilitated by the existence of a local market for highly qualified labour, and (4) the budding of new firms from existing establishments, universities, and public research institutes.

The development of knowledge and its applications is a process in which tacit and articulated knowledge interacts. The interaction follows a changing pattern which can be described as a cycle consisting of four stages. The first is a period of building common values and standards, and of absorbing technical knowledge. The sharing of common values, standards and assessment of the technology intended to be used is a necessary condition for the participants of the process to communicate and come to an agreement.

In the second stage, the entities which represent different, complementary kinds of knowledge, unite and seek a common idea which can materialize fruitfully in the form of a new product or technological process. This is the stage at which cross-fertilization of thought occurs among entities representing science, technology, organization of production, marketing, and finance. This collective effort can be successful if the contribution of each entity is understandable to the remaining entities. This is possible owing to an earlier acquisition of tacit knowledge which allows the entities involved to formulate and solve technical problems.

The verbalization by the entities of initial ideas about new ventures and discussions on the subject lead to a knowledge modified and understood inside the group. The modification should aim at the easier association of the new knowledge with appropriate technologies in the process of prototype building and testing. This is the third stage of the process.

In the fourth stage, the new product or technology goes to the production process. This is the moment when the knowledge that gave rise to new skills and was articulated in the stage of initiating a new venture becomes more and more tacit in the process of production. Its accumulation provides a basis for new knowledge developing in the course of learning through action and gradual technical improvements.

Innovations are thus a dynamic and cyclical process during which interactions develop among information, codified and tacit knowledge, and skills acquired on their basis. Tacit knowledge and the acquired skills have a specifically local character because of which information taken from outside has to be reformulated in such a way as to be readable inside the given group and the given system of learning. Such a reformulation is only possible in the case of slowly changing information. It is impossible in the case of the absorption of radically transformed codified knowledge. What is needed then is the development of new or a modification of the existing tacit knowledge. New or modified tacit knowledge favours the absorption of radically transformed codified knowledge and the acquisition of practical skills. The absorption of changes is easier when tacit knowledge is familiar to and shared by the creators of new knowledge, who can then give it a more readily absorbed interpretation conducive to applications.

## **8. EXTERNALIZATION AND INTERNALIZATION OF RESEARCH AND DEVELOPMENT ACTIVITY. CO-OPERATION OF BIG CORPORATIONS AND SMALL FIRMS**

The widening division of labour and specialization that accompany the economic and scientific-technological evolution co-occur with the branching out of R&D activities from big corporations. These activities are taken over by firms which mediate between science and the economy, and which specialize in the devising of new technologies and ways of applying them. By repeated mediation the firms gain experience and acquire new skills which they offer economic and scientific entities. This process is called the externalization of R&D activity.

In less developed regions an opposite process occurs at first. When branches of large transnational corporations are located in them, they are left to

themselves in the field of advanced technologies and have to create suitable units inside their own structure (internalization) because the local labour market does not ensure a supply of skilled workers. The situation changes when the branch of the large corporation is joined by a branch of a university. Together they encourage small enterprises which co-operate with big corporations to branch out. The corporations thus have the possibility of separating (externalizing) R&D activity, which stimulates the setting up of further businesses. The external factors which have initiated the development of a rather inactive region are now joined by internal factors generated by the co-operation of big and small enterprises and both kinds of enterprises with the scientific centre. In this way the development which was exogenous initially has become partly endogenous.

If there is tacit and articulated knowledge as well as technical skills accumulated in the regional environment, big transnational corporations can decentralize their processes of learning, or even their main creative activities, in order to take advantage of links with the regional innovation units. The created synergies enhance innovative capabilities of big corporations. If further development of co-operation requires a corporation to engage actively in collective learning, one might expect the benefits to be mutual, i.e. to flow also from the corporation to small local firms. On an inter-regional scale the dominance of big transnational corporations reinforces the tendency towards polarization in that it differentiates the innovativeness and economic dynamics of more and less attractive regions. Making regions more attractive through increasing their innovativeness becomes thus the main directive of the regions' policy of economic development.

## **9. EROSION AND RESTORATION OF COMPETITIVE ADVANTAGE**

The innovation diffusion makes the competitive advantage that a region gained at some stage of a new production or technology subject to erosion (Asheim, Dunford 1997). Other regions join in with their lower production costs. The innovative region, if it wants to maintain the advantage, has to reconstruct its economy. The traditional competitive policy of lower wages and lower prices is no longer sufficient. A policy that is indispensable is one that leads to the creation of more and better jobs owing to innovation and the diversification of production of high utility value difficult to imitate by other regions which have not got the same opportunities of learning and the same external benefits. This is the so-called high road to development and job creation. Maintaining competitiveness, not to speak of attempts at raising its level, require an active innovative policy. If it is to be efficient, it is necessary

to identify economic logic first (Asheim, Dunford 1997). By offering clearly defined prospects, economic logic becomes a factor stimulating the propensity to save, invest, and develop economic activity. Various kinds of enterprises and professional groups find encouragement in it to improve their innovative capabilities. The next step should be the creation of systems of support for firms offering R&D and business services. Their activity will help many enterprises operating in the region to maintain and raise their innovative level. In order to obtain the financial means necessary to promote enterprises with their innovative aspirations, city and regional authorities employ various instruments of regional policy. Among other things, they encourage and organize public-private partnerships for the implementation of ventures that are important for the local and regional communities and economies.

## CONCLUSION

The main result of the above reflections, as intended, is the reproduction of the process of the emergence of new properties of regions in the conditions of a network economy and a knowledge-based economy. The new properties enhance the efficiency and competitiveness of regions in the national and international economies. The reproduction consists in the systematization of knowledge which allows a description and explanation of this process. In the procedure the following were determined: (1) the new properties of regions that mean an increase in the importance of the regional level in the spatial organization of the economy and that bring advantages resulting from the interactive process of learning by regional economic entities; (2) conditions in which the new properties can appear at this level; and (3) the mechanism of the emergence of these properties in the changing conditions.

The formation of networks is a response to new economic needs. The growth of the economy and people's incomes not only increases the demand for goods and services, but also diversifies it. The response of the economy to a diversified demand is the diversification of production and services. This entails the shortening of production series, which means a decrease in the economies of scale. The diversification of production and services has a limit imposed by the market. It must pay. For a highly diversified economy to operate and develop in conditions of reduced economies of scale, the reduction must be compensated for by other advantages. The compensating effects are generated thanks to the network organization of economic activities.

The diversification of demand requires producers to obtain information about changing consumer needs. This is a difficult task which can be made easier by co-operation among producers, and between them and consumers as



represented by their organizations. The data obtained through co-operation are further effects offsetting the lost profits brought in previously by mass production.

Networks are a form of interactive learning of the economy. They are an alternative to the linear model of learning (basic research, applied research, implementation, innovation diffusion). The subjects of networks are inventors, technologists, financiers, businessmen, consumers, organizers, and managers together with the enterprises, offices and scientific institutions they represent. They develop at various levels and various spatial scales, including the regional scale.

With the passage of time, networks tend to show some inertia which slows down their market adjustment. Hence, their existence is justified so long as their positive effects outnumber negative ones resulting from diminishing competitiveness.

The intricate pattern of interactions and networks that develop on their basis generates a demand for further innovations, namely organizational and institutional ones promoting co-operation and the development of local entrepreneurship.

In the modern market economy, network organizations are increasingly important in co-operation and the learning of the economy at the level of urban regions. It is at this level that agglomeration advantages, non-commercial interrelations, local learning processes, and the attraction and flow of knowledge are registered. Their interactions produce synergistic effects determining the competitive position of regions in an economy undergoing the process of globalization.

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