

Regional growth and the right balance of internal and external connections

Lanfranco SENN

1. Introduction¹

With increasing globalization over recent decades, the impacts of economic stimuli at the national level have diminished in terms of their importance for economic processes; the stimuli are increasingly originating at the international level. As markets integrate the competitors of firms are generally firms from other countries and the domestic market is no longer and not necessarily the most important one. At the same time, the internal resources of firms are no longer sufficient for their competitiveness in a globalized World, and, to sustain their growth, they have to rely increasingly on external resources and embedded -- but also imported -- knowledge in particular, which are normally accessible at the local and regional level (Audretsch, 1988). The regional scale, therefore, has increased in importance for economic growth as a result of globalization forces; competition is now centered on region-region interactions with the regions often located in different countries.

This paper is concerned with the study of regional economic growth in advanced countries. The focus is essentially on the dynamics of regional performance and on the mechanisms that allow some regions to grow more rapidly than others, to become more competitive and to remain so in the long run. This paper therefore draws on regional science literature that is concerned with the growth of regions with the primary purpose of clarifying which mechanisms are at work and the secondary purpose of clarifying which development policies ought to be applied. The distribution of economic activities, involving the detection and explanation of location and agglomeration, its efficiency and its evolution, is the other traditional body of economic geography literature from which the analysis in this paper also draws heavily (Isard, 1956; Gabszewicz et al. 1986; McCann, 2002).

These two strands of literature cannot be considered as separate; on the contrary, they are clearly complementary since no agglomeration takes place without growth differentials; nor can the dynamics and development patterns of regions be studied or influenced without knowing what drives location decisions and what agglomeration/dispersion forces are at work. However, the study of regional growth remains essentially a study of the dynamics within and between regions, where elements of change are more important than comparative equilibria.

The study of the determinants of regional growth is not only interesting from a speculative point of view because it sheds further light on some under-investigated aspects of the phenomena. It is much more interesting when it provides a theoretical basis for more effective development policies. In this respect, it is clear that the situation and characteristics of regions belonging to advanced countries are different from those of regions belonging to emerging or under-developed countries.

We start from concepts deriving from the observation of real facts, and analyses the different ways in which it is possible to enhance regional growth in a competitive world. We are therefore concerned with:

a) the growth of regions (both advanced and lagging) in the developed world, in particular the causal variables that could be an endogenous trigger to growth. In this sense, particular attention is paid to innovation because, in developed countries, competition is no longer achievable through cost reduction alone, but through a continuous process of upgrading production in both manufacturing and services. Innovation itself is seen as a process based on knowledge and learning;

b) regional competition, because in an integrated world the processes taking place locally are not independent of external ones. One of the main pre-conditions for regional competitiveness is regional attractiveness, because firms look for the best production conditions. Competition is a dynamic process and implies continuous change and adjustment; this is why innovation (of product, process and organization) is so important;

c) agents of innovation and competition. They are not anonymous and may consist of individual agents (such as firms, entrepreneurs, skilled workers and public institutions) but more and more frequently these

¹ This paper is co-authored with Ugo Fratesi

agents integrate in networked and interacting systems. The individual agents often have some sense of belonging to their localities but, even more importantly, the interaction among agents takes place more easily when they agglomerate. This keeps the local scale fundamental in the consideration of all economic processes notwithstanding the presence of globalization forces that have generated larger and larger numbers of footloose firms.

The approach here is neither microeconomic, investigating individual firms, nor macroeconomic, investigating the system as a homogeneous aggregate; the most fruitful approach is a meso-economic one, investigating the interactions between both micro and macroeconomic forces.

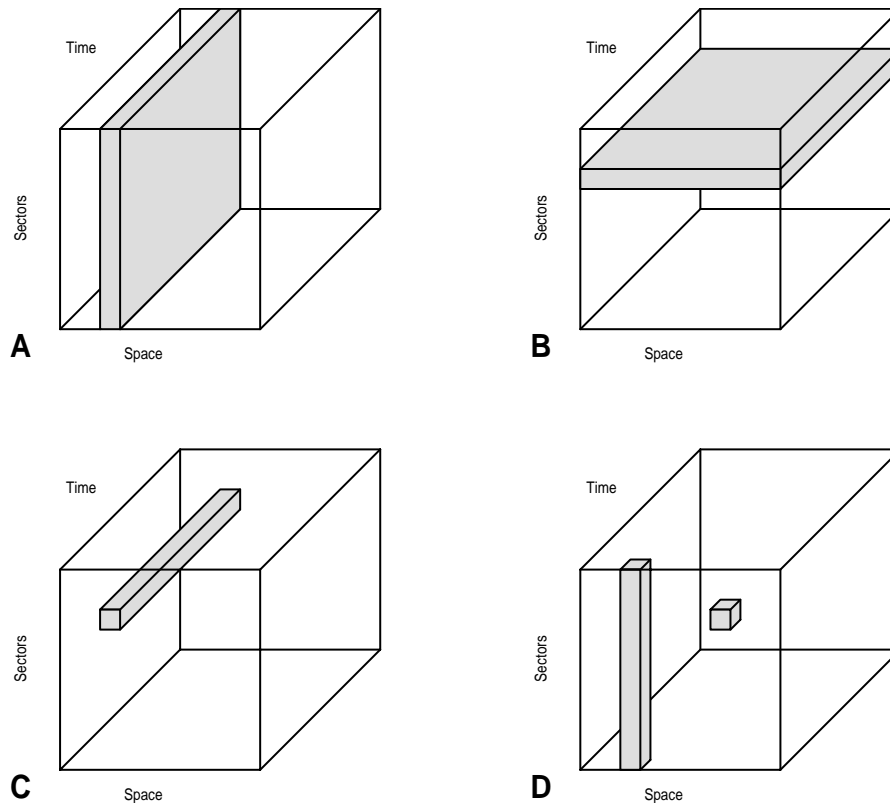


Fig. 1. Different possible scales for growth and innovation analyses.

To illustrate the approach, consider the representation of space presented in figure 1, where the three main dimensions of the economy at a macro level, the spatial dimension, the sectoral dimension and the time dimension are represented. In figure 1a, regional development analyses are revealed, where the economy is sliced vertically into regions and their dynamics are investigated.

The study of the evolution of industries, typical of evolutionary industrial economics, is represented in figure 1B, where the economy is divided horizontally into sectoral slices. This approach has progressed considerably in recent years (see Malerba, 2006, for a recent survey). Modifications of industries have important spatial implications, which however are not normally at the core of these analyses even though spatial patterns of innovation differ greatly from sector to sector (Breschi, 2000).

Our approach operates in the manner of Figure 1A and we will focus on regions, extending the analysis to industries only where this is regionally and structurally relevant. Hence, the approach in the paper belongs to the tradition of regional development theories, but, in contrast to the more traditional analyses, we will not consider the region as an economic unit per se. Rather, interactions between and within regions are very relevant to the performance of individual regions in an integrated world and will be at the core of the analyses that follows.

In addition, the definition of region itself is not always constant in spatial analyses and it has been taken for granted for a long time that different intersections of geographical, administrative, economic, historical or social definitions are possible (Peare and Thomas, 1968; Dawkins, 2003). For example, in the literature on Regional Innovation Systems a region is defined as “a meso-level political unit set between the national or federal and local levels of government that might have some cultural or historical homogeneity but which at least has some statutory powers to intervene and support economic development, particularly innovation”

(Cooke, 2001, p.953). Administrative powers are not necessary for our purposes, while the presence of people in a territory, with some economic or social contiguity is fundamental for our operational concept of region. What we have in mind when we talk about regions is thus an economic region not very dissimilar to the conception of Boudeville (1966) as a continuous economic space à la Perroux (1950).

In principle, the territorial scale of this argument should not be relevant because any territorial scale could present problems of growth, development triggers, exposure to competition, they could be endowed with the same types of agents and so forth. However, to set in motion a sustainable competitive pattern of growth, a minimum threshold is needed, either in terms of geographic concentration or in terms of specialized/diversified structure. The number, characteristics and behaviour of agents are also important. Therefore, although a predetermined scale of analysis is not necessary, we will refer implicitly or explicitly to regions which, by and large, tend to converge towards the size of an administrative region that might approximate to an EU NUTS2 Region. Moreover, we may end up referring to administrative regions not because of theoretical necessity, but because policy issues are absolutely relevant and policies, even those generated by higher administrative levels, are normally implemented within administrative boundaries.

The focus on regions does not imply that clusters are irrelevant. On the contrary, the interest in clusters is explicit. However, this interest is not direct but comes from the influence of clusters on the development of regions and countries (Porter, 1998; OECD, 2001; Rosenfeld, 2002, and, on a more critical approach, Martin and Sunley, 2003). A dynamic analysis based on the cluster (figure 1C) can be considered as working in an interception between the regional and the sectoral dimension. In fact, among the most diffused at present and most general cluster definitions, that of Porter (1998) focuses on the geographical concentration of interconnected companies².

In theory, a region may not have a cluster defined as such but, generally, one or more will be present.

When an economic region coincides with a cluster, as is the case with some industrial districts (Becattini, 1990), innovative milieus (Aydalot, 1986), new economic spaces (Scott, 1998), or local production systems (Crouch *et al.*, 2001), the cluster itself should be considered as a particularly homogeneous economic region. When more than one cluster is present in a region, the dynamics of all of them predominantly determine the regional performance. The encompassing definition of a cluster and the eagerness of policy makers to imitate success stories has given rise to a cluster relevance in policies that is considered excessive by Asheim *et al.* (2006), in particular due to the theoretical shortcomings of the broad and static definition of Porter (1998) and to excessive reliance on case studies. The analyses of clusters we deem appropriate, on the contrary, will always be explicitly dynamic (in terms of generation and evolution) and involving theoretical argumentations instead of case studies. Moreover, our interest in clusters comes from the fact that it is often argued that the clustering of firms in related industries enhances knowledge creation (Maskell, 2001; Maggioni, 2002).

The approaches adopted in this paper ought to apply, with different degrees of relevance depending on the case, to economic regions, administrative regions and clusters; however, static analyses of regions and/or clusters (figure 1D) will not be featured, since they provide only a modest contribution to the explanation of growth and, even more importantly, because regional competitiveness does not last forever and its prerequisites have to be continuously renewed and evaluated over time.

It is hence normal that *sustainability*, the condition for persistence of growth over time is relevant to any analysis focused on long-term dynamics. Sustainability has many different definitions and measures, often involving environmental and socio-economic aspects (Hanley, 2000). In particular, environmental aspects have gained increasing attention in regional science (Batabyal and Nijkamp, 2004) but they need a different toolbox; hence the use of sustainability here will be socio-economic in nature. For our purpose, a process is deemed sustainable if the growth of today does not negatively affect the basis for growth tomorrow. Strictly linked with sustainable growth is the concept of *resilience*, i.e. the ability of a territorial socio-economic region to react to the modification of the external environment without losing its internal cohesion or its ability to grow.

2 In less recent works, such as Czamanski and De Ablas (1979), the cluster concept was “devoid of any spatial connotation” (ibid, p.62), being a subset of industries with closer than average connections, whereas the ‘industrial complex’ was meant to be a cluster with spatial concentration.

2. Innovation as the key determinant of sustainable regional performance in the advanced World

In older theories, the performance of regions, as well as the performance of countries whose theories were adapted to the study of regions, was basically due to demand in the Keynesian tradition, and supply, in the neoclassical tradition (Capello, 2007). Theories such as the economic base recognized the presence of external demand factors as the source of regional growth. On the other hand, other theories, based on supply aspects, put the trigger of growth on internal factors, but these were mainly seen as the endowment of production factors, focusing especially on labour, capital and land. Other theories explored the role of geographical location and accessibility, important because of their effects on transport costs.

Only more recently, in the last 20 years, has the focus on material resources been deemed less important than the presence of less material or completely immaterial resources (human capital, knowledge, trust, embeddedness, etc.), thus addressing issues that help explain the capacity to innovate.

Within neoclassical mainstream macroeconomics, starting with the seminal work of Romer (1986), the presence of knowledge, modelled as a public good, allows for long-run endogenous growth. In more complex models (Romer, 1990, Grossman and Helpman, 1991), some agents/firms/sectors produce innovation as an output, which is afterwards used as an input by other firms; this makes innovation non-rival partially excludable rather than public and this is enough to assure endogenous long run growth. These developments have also strongly influenced regional theories, although they have limitations for this use (Martin and Sunley, 1998).

The New Economic Geography, which applies mainstream economic techniques to the analysis of spatial aspects and which started (Krugman, 1991; Venables, 1996) with the study of the static aspects of location and agglomeration, is now also developing (Martin and Ottaviano, 1999; Baldwin and Martin, 2004) dynamic models in which growth and location take place simultaneously, in order to detect the growth effects of agglomeration and the agglomeration effects of growth. In these models, growth takes place through innovation modelled as in the new growth theory.

Evolutionary theories, starting with the seminal work of Nelson and Winter (1982), have pointed out the importance of innovation as a dynamic socio-economic process which leads to the economic performance of firms, sectors and nations. In particular, a broad set of literature has developed that investigates the National Systems of Innovation (NSI), (Lundvall, 1992; Nelson, 1993; Edquist, 1997). The NSI theory has rapidly found its counterpart at the regional level with the introduction of the notion of a Regional Innovation System (e.g. Cooke, 1996; Brackzyk *et al.*, 1998; Cooke *et al.*, 1998) and the interpretative scheme of the Triple-Helix (Leydesdorff and Etkowitz, 1998) which sees innovation as the outcome of the interaction of three main groups of local actors: firms, government and research institutions.

The Regional Innovation System does not constitute the only paradigm in which space and innovation co-evolve. Innovation is seen as a territory-specific feature in a large number of other approaches, where it is no longer a process fully internal to the firm. Starting with Aydalot (1986), the GREMI Innovative Milieu school (Aydalot, 1986; Camagni, 1991; Maillat, *et al.*, 1993; Ratti, *et al.*, 1997) has investigated how the co-presence of economic actors in the territory and the relationships between firms in particular, can act to reduce dynamic uncertainty and hence favour innovation locally. These relationships have to be competitive and cooperative at the same time, so that firms will not fear opportunistic behaviour and could also act together in the common interest.

The interaction of economic and social aspects and the focus on intra-firm and within territory relationships as a way to achieve external economies able to compensate for the lack of internal economies of scale, are not new. They were present for example in industrial districts (Becattini, 1990); however, the focus of the milieu school is essentially dynamic and the innovative characteristics of the territory are essential in the definition of the milieu itself, in addition to fostering competitiveness.

There is a series of other approaches and contributions that, even if they do not exactly constitute a school, move in the same direction and at the same time see innovation as the main driver of competitiveness and an essentially local process (see Simmie, 2005 for a review). Among these are the new industrial spaces (Piore and Sabel, 1984; Scott, 1988), the learning region (Lundvall and Johnson, 1994; Florida, 1995; Morgan, 1997) and Porters (1990) 'competitive diamond', which has been defined by its author so that the interactions between its four sets of factors are more effective when the firms are clustered in space.

It should be remembered that innovation is a peculiar economic concept/entity, especially because it includes 'public' and 'private' aspects (Dosi, 1988). For instance, it is characterized by a degree of

appropriability which varies across industries and time (Dosi, 1988). Technological innovation itself is not to be seen as a purely public good since acquiring the technology of others through imitation is costly, and only part of knowledge is codifiable in handbooks (Archibugi and Michie, 1998). On the other hand, new knowledge can be utilized by different firms and regions at the same time. Finally, although it can be accumulated like capital, knowledge accumulation is highly path-dependent and innovations can be introduced only on the basis of knowledge previously possessed in the same or other closely related fields.

Innovation remains a territorial process despite claims from authors such as Cairncross (1997) of the so-called 'death of distance,' since the ability to understand does not flow as easily as information does (Morgan, 2004). In fact, learning normally takes place at the regional level (Storper, 1995; Florida, 1995, Malmberg and Maskell, 2006) and geographical proximity normally enhances the other types of proximity (Boschma, 2005). In particular, the territorial level allows types of learning different from those internal to the firm, such as collective learning which takes place through the mobility of qualified workers within the local labor market or through the relationships between customers and suppliers (through which technical and managerial information flows) or through imitation processes by firms which did not innovate in the first place, and generates what may be referred to as local spin-offs (Camagni, 1991b)

Since, as we have illustrated above, territories have to compete in the global economy through a continuous processes of innovation, the first aim of this paper is to investigate the regional factors and mechanisms that are needed for these processes to take place.

3. The phenomena and factors of growth in innovative regions.

To investigate the conditions which help a regional system to innovate and compete, we start from actual observation of regional growth phenomena. First of all, any regional growth process undergoes some dynamic structural change. We observe that a regional economy grows over time either quantitatively (through the enlargement of its economy) or qualitatively (through the change or adjustment of its structure and sectoral mix). This change is either endogenously pushed or exogenously pulled by competition that, also for regions, is no longer national but global.

Hence growth normally involves structural change. However, this may occur disruptively or gradually with a smooth process. Creative destruction has been seen to be a common feature of innovation processes which need to replace old routines with new ones and in the process face resistance; all regional agents, public and private, prefer the gradual option. Not all structural changes, however, can take place gradually and this provides the opportunity for the local systems that are most keen to change to operate in a better position to exploit any window of opportunity. At the same time, strong discontinuities can interfere with the social fabric and lead to the de-structuring of the local production system; hence, sustainable growth processes tend to limit strong discontinuities as much as possible.

Innovation is the broad conceptual category and factor which is recognized in the literature as allowing growth and structural change to occur; in the various approaches that have been described, innovation may take place through different processes (accumulation of knowledge, research and development, invention, productivity increases), and may be:

- radical and creative. In this case, significant discontinuities will probably be generated and major changes in the regional production systems will be needed in order to introduce it ;
- incremental. In this second case, radical change is not needed to implement it. At the same time, especially in this case, path dependence phenomena may occur and regions may react to radical external innovations with incremental innovations and minor adaptations. In the short run, this strategy may be fruitful, but over a longer period, the detachment from state-of-the-art technology will harm competitiveness.

Innovation may affect products, processes, organizations and may take place in two ways: either it is strategic, i.e. endogenously determined for the purpose of competing, or it comes from the adjustment to external influences or challenges. The most competitive regions are strong in strategic innovation, whereas decline can be postponed by adaptive innovation. Adaptive innovation occurs through the absorption of

3 In other cases it is more fruitful to add a third category and distinguish between radical, adaptive and incremental innovations depending on whether the innovation is completely new or applies to innovations from other fields originally developed for other purposes or it is the expansion of something that already exists (Bramanti and Senn, 1991).

someone else's ideas. The ability of regions to do this depends on their attitude to change, which depends in turn on a large number of structural socio-economic factors, and on their ability to access external ideas, which depends on the role and connections of the region in inter-regional networks.

The factors that are believed to affect the competitiveness of regions can be grouped in various ways. First, there are a number of *microeconomic* factors, some of which are traditional while others were more recent. Investment is needed for regional firms to grow and renew their productive possibilities, hence the importance of the availability of capital. Moreover, capital ought also to be available for risky investments, since every innovation involves uncertainty; venture capital enables this, and is hence important, especially for innovative companies and high-tech clusters (Bottazzi and Da Rin, 2002; Bresnahan and Gambardella, 2004). Further, these opportunities are especially important for small and medium firms, which experience greater difficulties in finding traditional loans (Pollard, 2003) and which, according to some studies, tend to be more often involved in radical innovation (Almeida and Kogut, 1997).

Another main factor of dynamic competitiveness for regions is the presence of tacit and codified knowledge (Fischer, 2003). The latter can be easily transmitted with new communication technologies, but needs people able to understand and use it. The former, on the other hand, cannot be blueprinted but can only be transferred through common experience (Fisher, 2001). In both cases, what is relevant is the number and the type of agent, their ability to interact and their previous knowledge. Defined as such, this microeconomic factor encompasses the traditional role of labor and also the more recently introduced developments in human capital theory (Lucas, 1988). Obviously, the quality of schooling assumes an important role in this case (Wossmann, 2002).

The second group of factors are traditional *macroeconomic* ones, but often presented in a more modern framework. One factor that remains very important, despite the reduction in transport costs, is accessibility, which depends on the geographical location of the region and its endowment of infrastructure. Starting with Krugman (1991), it has been shown that reducing transport costs may lead to increasing agglomeration; moreover, transport costs remain one of the few factors that can be almost fully controlled by footloose firms (Vanhove, 1999). Finally, starting with Aschauer's (1989) seminal contribution, a broad literature has developed to measure the effects of infrastructure, and especially transport and mobility infrastructure on regional and national growth.

Beyond transport infrastructure, research infrastructure, either public or private, has become particularly important for innovative regions, especially when it interacts with firms. Business-university relations, for example, have been shown to be a key factor for competitiveness (OECD, 2002) and university decentralization has also been used successfully as a policy instrument (Andersson *et al.*, 2004) even though the effects of academic expenditure depend on the existence of a critical mass of high-tech employment (Varga, 2000). Considering innovation as an interactive process needing regional and external knowledge and actors, networking infrastructure is even more important than just traditional infrastructure.

The last macroeconomic factor is the industrial structure of the region. To compete worldwide, firms need to have strong complementarities with other firms, possibly within the same territory. The characteristics of the local productive fabric, and in particular the presence of local input-output relations, affect not only the costs of firms, but their innovative performance as well, due to the need for interaction between different types of firms. This aspect is investigated in Folloni (2009) and in Bramanti and Fratesi (2009).

The third group of factors influencing regional competitiveness is *institutional* and *cultural*. Institutional economics, an approach first introduced by North and developed by many others, conceives growth as determined simultaneously by economic mechanisms and actual actors (Davis and North, 1971; North, 1990). As mentioned in the definition of the first paragraph, the region in this paper is not only a territory, but is mainly composed of the set of economic, social, political or administrative actors that live within the territory. These actors interact inside and outside the territory both as individuals and through higher-level structures, or institutions, that are one of the main characteristics of regions. Institutions can include very different things as one can see from the partitioning of Pardo (2005) into five types: associative, behavioural, cognitive, regulative and constitutive. The study of the formation and evolution of regional institutions, especially those involved with innovation, is a main point of interest of the paper itself, since it is generally thought to influence the performance of territories (Cooke and Morgan, 1998). The mechanisms of governance are an important determinant of the regional innovation processes and for example it is possible to classify regional innovation systems as 'grassroot', 'network' and 'dirigiste' depending on which agents are the initiators of the innovation process (Cooke *et al.*, 2004).

The local market itself is not only a way of organizing the relationship between the actors, but can be a competitiveness factor for innovative firms. Porter (1990, 1998) identifies the conditions of local/national

demand as a major stimulus of the innovativeness of firms, which increases their global competitiveness. Also from the point of view of pure demand, in the presence of increasing returns to scale, the size of the local market is important in determining the profitability, number or dimension of local firms, a point which is emphasized by new economic geographers when they talk of the 'home market effect' (Krugman, 1980).

The other factors belonging to this group are even less material. In particular, there is considerable evidence to support the role of entrepreneurship in territorial development and cluster formation (Audretsch and Keilbach, 2004, 2005; Feldman and Francis, 2006; Garavaglia and Breschi, 2009), since not all agents share the same risk-awareness and nor have they the same ability to perceive economic opportunities. Moreover, the local culture (or 'atmosphere') can be more or less supportive of potential entrepreneurs and in this way contribute to determining whether a potential entrepreneur will actually become one.

Recently, the role of the creative environment for local growth and the attraction of innovative persons has been highlighted (Florida, 2002, 2005). In particular, the city and the region can be seen as the main geographical scale for creativity processes to take place because they allow face-to-face contacts (Scott 2000, Storper and Venables, 2004; Scott, 2006).

The factors of *spatial organization* constitute a fourth group, and mainly come from economic geography. Local spillovers are a strictly territorial factor which affect the performance of regions. The literature on spillovers is broad and basically consists of contributions investigating growth or knowledge spillovers (Audresch and Feldman, 2004), the process in either case is unintentional, so that Maier and Sedlacek (2005) classify them as externalities. In the first case, the growth of neighbouring regions directly affects the local performance. In the second, spatial proximity is a factor that allows easier transfer of information from one firm to others that are geographically close; the mechanisms through which this may occur are various and need careful investigation (Breschi and Lissoni, 2001a and 2001b). Local knowledge spillovers are important because they may allow regional firms to achieve better innovative performance than they would have done by themselves and in this way boost regional performance. At the same time, the firms which develop the original innovation may find it harder to internalize the results of their R&D investment and this may discourage them from pursuing it. Many empirical studies have been done on the relationship between knowledge spillovers and regional growth (Döring and Schnellbach, 2006), estimating the effects of spillovers (e.g. Van Stel and Nieuwenhuijsen, 2004; Fritsch and Franke, 2004) and characterizing them, e.g. the maximum distance beyond which their effects are no longer significant (which Bottazzi and Peri, 2003, estimate as 300 km). The quality and magnitude of local spillovers depends on the characteristics of internal networks, an issue which will be further developed in the next section.

A second spatial factor is the presence of agglomeration economies, either sector-specific (localization) or not (urbanization). The co-location of a large number of firms and workers in the same place generates externalities which are beneficial for the innovativeness of firms located in the region. If the concentration exceeds a certain threshold, however, congestion dis-economies may arise and reduce the advantages; with respect to this, the threshold is not fixed but the provision of adequate infrastructure and the modifications in the economic structure, for example with an economy becoming less material, can increase it. The advantages of agglomeration may be static, measured in terms of higher regional income or higher firm productivity, or dynamic, appraised by regional or firm growth, (Rosenthal and Strange, 2004).

The regional urban structure is very closely related to this. In addition to being a place where the traditional sources of external economies (labour market pooling, social overhead capital, diversified providers) are strong, the city assumes an even more important role when competitiveness is based on the above-mentioned creativity and on innovation (Simmie, 2001). There is evidence that cities play an important role as incubators of new innovative enterprises, due to the technological uncertainties associated with the early stages of innovation and to the role that a diversified urban environment plays in facilitating search and experimentation in innovation (Feldman and Audretsch, 1999). At the same time, the city can act as a milieu (Camagni, 2001). Finally, the cities act as hubs for the international and international networks of transfer of that knowledge which is not diffused but rather organized in urban hierarchies and networks.

The last group of factors affecting regional performance can be broadly defined as *relational*. Territorial economies can be thought of as stocks of relational aspects, and untraded interdependencies are even more important than market-traded ones for the performance of some very successful advanced regions (Storper, 1995, 1997). Social networks, and in particular the presence of trust relationships, are a major cause of the agglomeration of economic activities, even though they are neither necessary nor present in every case (Gordon and McCann, 2000). The importance attributed to social capital in the theories of regional growth has been increasing since its re-discovery by Putnam (1993). The relationships between the agents in the

territory may allow collective learning (Capello, 1999), which makes it possible for territories where firms are small to be as efficient in the creation and renovation of knowledge as larger firms are.

All the factors described above have to be inter-connected and are complementary. All may be internal or external, but at the same time not all aspects are present in all (successful) regions at all times and with the same intensity.

4. Innovation, networks and the importance of balanced connections

Among all the factors that shape regional growth and that facilitate innovation, we want to direct attention here to the role of networking. Already in Marshall, the possibility of facilitating knowledge flows was cited among the causes of agglomeration, but it is only recently that networking has been definitively recognized as a crucial factor both for economic growth and competition, and for the internalization and diffusion of innovation (Fisher, 2003). Many recent theories of regional growth are based on the role of networks (innovative milieus, industrial districts, local systems of production, regional innovation systems, learning regions, etc.).

The emergence and consolidation of networks stems both from hard support (infrastructure and telecommunications) and from soft factors, specifically the development of economic, social and political-administrative relationships. Networking takes place either between the regional economy and the global economy or within the regional economy itself. These two cases will hereafter be referred to as openness and embeddedness/robustness. They take different forms and occur through different channels.

First, inter-regional, *external* networks and connections take place through interregional trade, which allows the exchange of goods and, less rapidly, of the technology incorporated into these goods (learning through reverse engineering). Also interregional input-output relationships for the exchange of intermediate goods allow for the same consequences: the fragmentation of production increases interregional dependence and theoretically places production networks in a much more complex and integrative structure (Jones and Kierzkowski, 2005)

A second major channel is international foreign direct investments (both inward and outward) which generate stable interregional economic relationships and are a very important channel for technology transfer (Baldwin *et al.*, 2005) since, for example, a subsidiary controlled by a multinational corporation brings new products, new routines, new managerial expertise into the local economy. These can be acquired more or less rapidly by the local system through labour market mobility (Fosfuri *et al.*, 2001), input-output linkages and reverse engineering. At the regional level, national capital flows are equivalent to FDI.

The movement of workers between regions acts as a third important channel through which interregional networks are set up. In fact, workers embed knowledge of a large number of technological and organizational aspects. Moreover, in order to establish relationships with other regions, some knowledge of the local customs is often essential and is facilitated by people with personal experience. Also the personal relationships generated by interregional movement of people are often essential in the establishment of business relationships.

Interregional networks can be directly related to innovation and knowledge transfer, for example when firms collaborate in consortia, or when firms within a region interact with external research institutions or universities. Finally, interregional relationships can also be mediated through higher level organizations such as a regional government which is directly involved in economic agreements with other regions as counterparts.

Within regions, *internal* networks are set up through channels which are generally quite different, often being more informal. In this second case in fact, we deal with phenomena such as governance, social capital, collective learning, productive interdependence and labour market integration. All these channels are essential for local spillovers to occur.

Local input-output relationships are one major formal channel for internal network to be set up. The importance for the regional economy of firms located in a region being linked to local suppliers (so that they become more embedded in the local economy and hence less footloose) has been emphasized. The local labor market is another main channel for internal networks to be established. The mobility of workers and labour market pooling and poaching have been traditionally interpreted as major factors of agglomeration, allowing firms to find the skills they need for their activities locally. Moreover, the mobility of workers is a channel for local knowledge spillovers to take place from firm to firm, and allows for collective learning.

Formal and informal institutions are the third major channel for internal networks. They allow firms, entrepreneurs, managers and qualified workers to exchange knowledge and information about the market, business opportunities, innovations invented outside the region, and best practices. Some of the connections are directly dedicated to knowledge exchange through business-university relationships, the creation of consortia between firms, and joint research projects.

It has to be emphasized here that internal networks go far beyond pure exchange to involve non-material aspects. For example, internal networks are particularly facilitated by a sense of belonging to the local community, which facilitates the formation of trust relationships between local economic agents. Trust implies that firms do not fear opportunism when undertaking joint-ventures, their relationships can be re-organized without fear of reprisals and that they are able to act collectively, which brings advantages to the whole group (Gordon and McCann, 2000). The existence of trust relationships has been shown to be fundamental in many successful areas, such as Silicon Valley and the Italian industrial districts, and is one of the factors which the innovative milieu school advances as fundamental evidence for facilitating innovation.

Both types of interconnections are needed: within the region and between regions. The first ones, involving firms, workers and institutions, are needed for knowledge and innovation to circulate within the regional economy and enhance the strength of the regional system, otherwise the firms would be competing in an atomistic and, eventually, footloose way. The link between innovation and external knowledge, which is another main topic of the paper, is also fundamental at the regional level (Malecki and Oinas, 1999; Bathelt *et al.*, 2004). In fact, the process of innovation creation, which starts from local knowledge, is a very important mechanism but only for a very few pioneering regions and only in a few specific sectors is the regional component of creation of knowledge large with respect to the acquisition, adaptation and mastering of external, mainly international, knowledge.

Inter-regional networks are hence needed for innovation, since the region is too small an entity to produce internally all the knowledge needed to compete globally and needs to learn and import external knowledge continuously.

The good balance of the two mechanisms is a pre-requisite for sustained competitiveness (see figure 2) and, although research of each is extensively reported in the literature, the operation of a good balance of internal connections and inter-regional connections is an aspect into which further research is needed. In fact, the prevalence of one type of connections entails risks for the region (Bramanti and Miglierina, 1995).

If external networks are much stronger than the internal ones, the region risks *disintegration*. When firms are only marginally embedded in the territory, for example because they have few local suppliers, because they get most knowledge from outside the region, because the entrepreneurs are not personally locally networked, the firms themselves can easily relocate to follow better business opportunities such as lower production costs.

If the internal networks are strong and the region is weak on external connections, there is the opposite risk of *localism*, which implies a regional economy is unable to acquire and master external knowledge and is hence likely to be less innovative and potentially less competitive. Moreover, overstrong internal ties, resulting from very tight social networks, can make it difficult for firms to explore different modes of production and to change their organization to meet external challenges. Finally, overstrong internal networks can make knowledge spillovers too great and in this way lead to the re-location of innovative firms away from the local system (Alsleben, 2004).

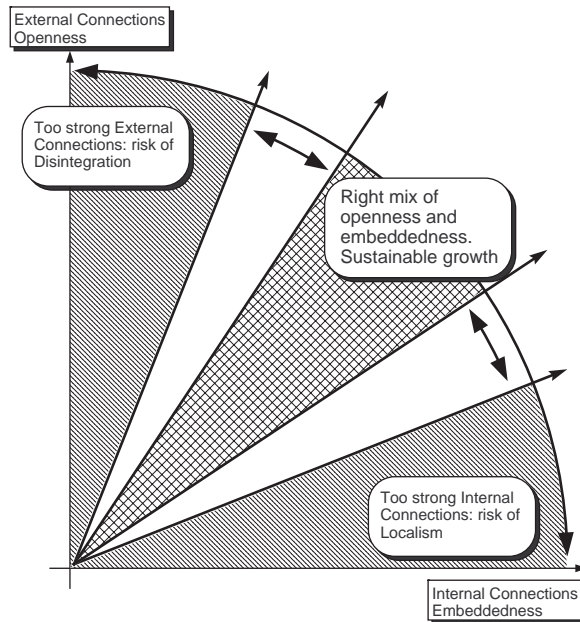


Fig. 2. The right mix of internal (Embeddedness) and external connections (Openness). Source: our adaptation from Bramanti and Miglierina, 1995.

5. Applying the argument to actual policies

The main argument of the paper is that regions, however their functional boundaries are defined, grow with a virtuous process if the public and private agents of its territory maintain an equilibrated set of connections both inside and outside the region, and can hence be defined as *interconnected territories*.

Some recent literature has defined the process by which the growth of regional territories is shaped not only by global forces but by their internal structure and governance, as ‘glocalism’ (e.g. Swyngedouw, 2000). Virtuous regions are in fact characterized by strong interconnections within the territory, with other territories and also on the global scale.

Only equilibrated combinations of local (internal) and global (external) interconnections can guarantee a virtuous cumulative growth process, inasmuch as strong internal interconnections (networks) not coupled with adequate external interconnections risk leading the territory into an implosive process; and strong external interconnections not coupled with adequate internal networking risk bringing about explosive growth (see Figure 2).

Some attempts have been made to derive this intuition from more general models of regional growth. Most of these attempts adopted a macroeconomic and/or ‘phenomenal’ approach, whereas a full micro-founded model has not been developed yet. One model is the Endogenous Interrelated Growth model (Bramanti and Miglierina, 1995), where the innovative capability of a region is made to depend on external connections, growth is made to depend on regional innovation, the generation of local economic and social connections is made to depend on growth and, finally, the equilibrium between internal and external connections within a region determines whether the region is able or not to maintain a sustainable growth rate (Figure 3). Other attempts to show theoretically the need to balance internal and external connections for instance Bramanti and Riggi (2009), Folloni (2009) and Bramanti and Fratesi (2009).

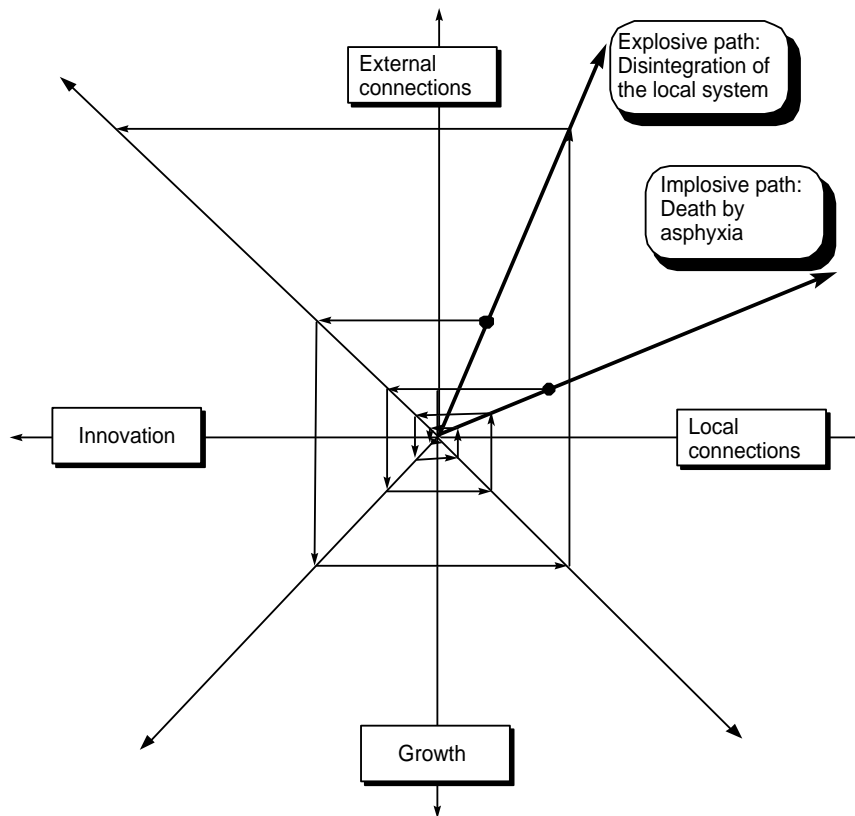


Figure 3. Explosive and implosive paths in the Endogenous Interrelated Growth model. Notice that the relations need not be linear but, since we have no demonstrated indication of their actual shape, we chose to represent them as such.

This theoretical intuition lacks sufficient empirical evidence at present. Tests may be carried out for the above mentioned or other models to demonstrate the existence of each functional relation contained in them, but the real objective for testing ought to be assessing empirically if the theoretical intuition of an equilibrium between external and internal connections being necessary for sustainable regional growth is corroborated. In fact, this would lead to the design of appropriate policies for equilibrated interconnections within and between territories, as summarized in Figure 2.

An attempt is hence made here to suggest some of the possible fields of application rather than to provide empirical evidence. Seven are exemplified, related to as many important areas of policy (among the many possible) in order to suggest a number of cases where proving the intuition would have important policy implications. The issues (corresponding to the next sections of the paper) are the following:

- Promotion of interregional and international trade.
- Attraction of foreign direct investments (FDI).
- Development of R&D and innovation.
- Tourism attraction and marketing.
- Management and governing the impact of large infrastructural projects.
- Promotion and consolidation of clusters, industrial districts and local production systems.
- Regional and urban strategic planning.

5.1 Promotion of interregional and international trade.

Interregional trade (both of final goods and intermediate products) is important for the competitiveness of local economies. Regions are in fact too small to be self-contained markets, and it is important for firms to be able to choose the most dynamic markets for their products. Moreover, to manufacture internationally competitive products, it is essential to select the best suppliers on an international basis.

Re-positioning is hence essential for many sectors, especially for those most internationalized, dynamic, qualified and least protected. These same sectors are those that grow most and those in which openness is highest and increasing fastest.

To allow the regional sectors to compete internationally, it is essential to have adequate local services, so that the local fabric can act as a stepping stone to allow local firms to participate effectively in the global competition.

Policies of trade promotion should hence enhance the market information available to local firms. This can be achieved, for example, by sectoral economic analyses; by providing support to the marketing of firms by giving them a recognizable “local brand” by which the firms can be immediately recognized as coming from a reliable area and hence be perceived favourably by potential customers and suppliers. Export consortia are one of the tools by which this can be achieved. Also, services are helpful that support local specializations and, in particular, their integration into production chains. Of course, all business services directed towards quality (even though not directly concerned with trade promotion) are of paramount importance.

If policies are only directed towards the internationalization of local firms, without targeting the local productive fabric at the same time, there is a risk that the most active firms will choose to re-locate outside the region, hence relegating the less active firms to the domestic market which is marginal at an international level but perceived as more protected and easy to understand. However, in a world with continually increasing market integration, even the protection of domestic markets is weak and decreasing, and the domestic market is insufficient in an international context: the growth potential of regions which are sheltered from the international markets is weak (Rodríguez-Pose and Fratesi, 2007). In this case, the regional economy can even die by asphyxia.

5.2 Attraction of foreign direct investments (FDI).

Foreign direct investments (FDI) increasingly choose between alternative possible destinations on the basis of a comparison between opportunities (e.g. incentives, labour costs, effective exchange rates) and the efficiency of territories and productive structures. Hence, the evaluation of localization factors takes place on a comparative and not an absolute basis, so that regions are in competition with other regions often located in a completely different economic and geographic context.

Since attracting FDI means not only attracting capital and production, but also technology, best practices and knowledge of international markets and establishing new linkages (Markusen and Venables, 1998; Lipsey, 2002), a policy of openness to FDI best brings positive effects if it is able to actively select firms and sectors through policies of information and promotion of the opportunities of the region, essentially abroad. This is most effective if the network of local entrepreneurial association extends globally.

Target sectors should not be selected on a purely external, exogenous basis – by choosing the internationally most performing sectors. Internal performance should take into consideration the characteristics and capacities of the local production system, so that incentives and facilitations go towards those sectors and firms which are best able to integrate locally and produce most development for the whole region.

Policies of external attraction need to be complemented by internal policies such as: de-bureaucratization and shortening of document processing times; offering integrated, systemic services (enhancing the productive environment); i.e. liberalization instead of protectionism.

Networks assume paramount importance since incoming FDI flows more easily when other firms from the investing country are already present, due to the perceived risk being lowered because of previous experiences (Buckley and Prescott, 1989). Firm networks are also important because they allow fruitful exchanges with complementary firms located abroad. Without this complementarity (and despite all efforts by the policy-maker) it is probable that the incoming investors will be opportunist, since they are non-selected, only coming to plunder the public incentives or the short-term opportunities which are often market-related. These investments will impoverish the local fabric instead of strengthening it, so that when these investments are withdrawn, the region is weaker than before the arrival of the investors.

Active policies are in any case essential, since without them the local characteristics are not enough to win the competition for FDI and hence the attraction rate diminishes in favour of the more aggressive areas/countries. This would be unfortunate for the region, since selected FDI can generate cumulative effects which go beyond directly generated employment to encompass employment in sub-contractor activities at a first stage and an enhancement of the local technological and innovative capabilities at a second stage.

5.3 Development of R&D and innovation.

The openness of a region to interregional and international connections favours the learning of best practices and the acquisition of technology developed elsewhere through imitation processes. Regions are in

fact too small to develop internally all the knowledge needed to be competitive, but acquiring external knowledge is possible if and only if there are people and firms within the region able to receive, interpret and use the new knowledge (Bilbao Osorio and Rodríguez-Pose, 2004; Malmberg and Maskell, 2006). Hence, innovation policies should target many aspects at the same time: first it is essential to target the participation of regional firms and research institutions in international research networks, to enable local actors to access innovation developed elsewhere and to participate in frontier research.

It is important to create real regional innovation systems, i.e. to make all the research and innovative components of the region act systemically in favour of regional growth and in particular of the strongest regional specializations, in a context which sees the region playing its specific role in the interregional and international distribution of poles of excellence. Innovativeness in itself is in fact not necessarily able to bring economic growth (Crescenzi and Rodríguez-Pose, 2009) and a cooperative attitude of the regional scientific and industrial worlds is a strategic pre-condition for an effective local knowledge-society. At the same time, it is also important to target the local “champion” sectors and try to attract selected “advanced” sectors. To do this, it is necessary to put in place internal actions which promote the research intensity of the region.

Actions targeting regional R&D capabilities may involve: private and public training; universities; business-university connections; technology transfer centres; centres for the technological integration of production chains; policies for youth training abroad with successive repatriation; specialized technical conferences; participation in research events abroad. The most important factor in any regional R&D policy is the attraction, training and retaining of specialized human capital, including the most entrepreneurial and/or creative people (for the importance of these aspects for regional growth see Bramanti and Riggi, 2008; Garavaglia and Breschi, 2009; Riggi and Maggioni, 2009 and Sacco and Segre, 2009, all in this volume). These people are currently the most mobile inter-regionally and internationally, so policies should facilitate the creation of contexts attractive to such people.

Although the targets are clear, policies in this field are not easy to design, since thresholds exist below which research facilities cannot be centres of excellence. Moreover, research has to be specialized and the research specialization of a region needs to coincide with the regional productive specialization if it is to bring economic development. Finally, there are two risks: first, that research produced locally could remain within the research centre without spilling over to firms or, second, the outcome of research could flow too far and generate its growth effects outside the region. The latter case is more likely when the regional productive and entrepreneurial structure is weak and not able to take advantage of the locally generated innovations. Hence, the need for a holistic approach to regional innovation policies.

5.4 Tourism attraction and marketing.

Incoming tourism has an exceptional multiplier effect on the development of the territories that host it. In fact, tourism is a service export activity (a territory which hosts tourists sells its services to a demand which is external—unlike most other service activities). This makes it acceptable to analyse the impact of tourism with export-led models; for example, tourism would belong to the base in an economic base model.

The Keynesian multiplier of the economic base and Input-Output multiplier are high because the direct demand for services is very diverse: accommodation, transport, food consumption, cultural and environmental goods, and manufactured or crafted products such as clothing and souvenirs.

If we look at the indirect demand of tourism services, sectors positively involved by tourism are even more diverse: agriculture, energy (such as petrol-derived products for transport, or electricity for accommodation), banking and insurance services (which are increasingly included in travel packages), industrial semi-manufactured components (such as wood for furniture in the hotels). A large part of these indirect effects are likely to remain in the region if the local fabric is strong enough to complement the external tourism attractiveness of the region and has the capacity to supply locally what the visitor requires. Hence it is clear that tourism, an external activity by definition, brings development to a region when it is coupled with a strong and diversified internal economic structure.

In the case of policies, it is therefore important to complement external with internal actions. A marketing policy which aims at tourism development by attracting visitors (either for leisure or business) from other regions or abroad, is hence a policy of external linkage which is essential and should be made effective. As far as the public sector is concerned, this policy will involve the creation of means of increasing the visibility of the region and the information available to the potential visitor, and of means of coordinating all tourism reservations. The private sector ought to retain control of such activities as tour operators and airlines.

However important it is for policies to attract tourism, these cannot be effective in generating regional development without internal policies that target the organization of the activities of tourists in the area once they have arrived. This should be done in an interesting and “creative” way: for example, by proposing that even less well-known localities host cultural attractions. It also means that the economy of the host region has to be ready to meet the demand not only of the front-office (direct) but also of the back-office (indirect and induced).

A good hotel or a good restaurant needs to be integrated into an efficient supply chain. There should not be shortages of input to make up the tourism product on offer, nor of intermediate products, otherwise there will be bottlenecks and a lack of prompt reaction. But it is also possible and necessary to organize “horizontal production chains”: for example, tourism itineraries integrated with a number of associated localities; hotel chains; organized inter-modal transport with single ticketing; cycles of events such as cultural festivals, or professional exhibitions and fairs.

This coordinated “systemic” offer highlights the importance of a high degree of internal networking consistent with the capacity for external visibility which is instead dependent on networking with the localities of origin of the tourists. On the other hand, if the territory is very attractive, with high levels of equipment and interest because the local system has been activated effectively, but is unable to read and interpret the external demand, there is a risk of over-investing in some infrastructure or initiatives for which there is insufficient market demand. Thus, it is important to know the external market and to segment the tourist market by country of origin but also, increasingly, by age, personal income and social status. In this case, too, there is a need for internal/external equilibrium.

5.5 Management and governing of the impact of large infrastructural projects.

All infrastructure, but in particular all complex infrastructure such as that for mobility or of telecommunications, effectively provide their function as enhancer of potential accessibility if they are well connected in networks.

When a person has to move, or goods have to be delivered from one place to another, this inevitably involves some long-distance traits and some short-distance traits, i.e. long-range networks and short-range networks. For example, a businessman travelling from New York (Manhattan) to Tokyo (Ginza), will necessarily use a flight between the two airports (long extent network) but he will have to add a number of short-range local stages, such as the trip from home to the airport and from the airport to the city centre, involving various means of transport. The fluidity, the comfort and also the total duration of a trip will hence depend on the effective integration of long-range and short range networks. Should the long-range networks be efficient but, once arrived at the destination airport should there be difficulties in getting a taxi or a train to the city centre, the global accessibility would be strongly penalized. On the other hand, if a territory had a capillary local transport network, but, due to the insufficiency of long-range connections, these would not allow rich external markets to be reached, the territory would implode due to the impossibility of maintaining external relationships.

The equilibrated construction of long-range and short-range networks avoids bottlenecks and allows a virtuous cycle of accessibility and development to be set up. In the opposite case, the accessibility would be limited to the gateways of cities and regions, the “hubs” - including airports, ports, train stations or multi-modal exchange facilities - but without an articulated system of origins and alternative destinations. In this case, the accessibility of the territory would be lacking despite high expensive investments in infrastructure.

To be effective, the integration of long-range and short-range infrastructural networks ought not only to concern homogeneous means of transport (e.g. roads with motorways or trains with metropolitan underground trains) but extend to different means of transport (intermodality) and to different operators, public or private. Physical infrastructure networks need the development and the integration of all transport (or telecommunication) that is offered in the network. Inefficient metropolitan services make it difficult to access airport flights, for example, being unable to be sure of catching a flight without leaving inordinately early. The same happens when the links and the integration of the means of communication or transport are lacking, which may cause bottlenecks, delays and queues in some air or rail services. All this can harm the development of a territory and hence we can say that the endowment of infrastructure is not enough if it is not complemented by effective management of services.

Finally, territorial development can be distorted by long-range and short-range infrastructure that is not in line with the needs of the areas served. This occurs both if the infrastructure of the inter-modal channels are

undersized (congestion) and if they are oversized (“cathedrals in the desert” phenomenon or stable under-use of infrastructure, which implies very high management costs of the infrastructure itself).

5.6 Promotion and consolidation of clusters, industrial districts and local production systems.

Firms, especially those which are small or medium sized, find it increasingly difficult to compete alone in the global market. They therefore need to delay their foray into the integrated international markets until they have developed some forms of cooperation with other firms, which often happens with other firms in the same territory because belonging to the same area makes forming economic and personal relationships easier. On a macro scale, a correlation is often observed in the life of territories between density and sectoral integration on the one hand, and competitive success on the other, whereas when density and integration are lacking, the territorial system tends to decline.

Cooperation with other firms can either occur horizontally, with other firms of the same sector, in order to generate external economies of scale or scope, such as in industrial districts, or vertically, with firms operating in the same production chain in order to have increasing efficiency and flexibility due to their links with subcontractors. Finally, collaboration and/or integration can also take place deliberately with a multiplicity of firms, especially of technological, productive and commercial services, in order to increase the effects of urbanization economies.

At the same time, if firms unbalanced their collaborations and connections locally, this would be negative for two reasons: first, on the demand side, they could become too focused on the local market without a reasonable probability that their production could be absorbed locally, and lose their ability to interpret and predict the trends in the international markets. Second, on the supply side, it is not always true that every input can be best obtained locally even if local connections remain important because they allow greater flexibility and interaction, to firms.

Also in the case of connections between firms, therefore, local networks have to be combined in an equilibrated way with relationships with external firms. Local networks are important because they foster the competitiveness of local firms, because they ensure that a consistent part of the input is local and because they tie firms to their territory, retaining them when other opportunities are available elsewhere. External connections, at the same time, are very important because they enable the arrival of market and technology information which is essential for the viability of local firms.

The implications that this discussion has for policies is that policies should foster internal and external networking, without focusing on just one of the two, since it is only the complement of the two types of network that really enhances regional development.

5.7 Regional and urban strategic planning.

With the openness of global competition, the self-sufficiency and the self-containment of urban and regional strategic planning are undoubtedly condemned to failure. Urban and regional competitiveness is increasingly characterized on the one hand by the identification and implementation of specializations in functions or sectors that are unique or rare in the world landscape, and, on the other hand, by the maintenance and development of a series of relationships between the region (or the city) and the rest of the world. These relationships are to allow exchanges, imitation and finally, to increase attractiveness.

It is significant that the most recent rankings of world cities put their accent on relational indicators (flows, interactive) rather than on the traditional indicators of localized activities (stocks, static) as the most effective measurement of urban hierarchy (Taylor, 2003).

Moreover, administrative boundaries of cities and municipalities are increasingly outdated, since they rarely coincide with the boundaries of economic, social and cultural relationships that link the areas to the external world. The same also increasingly applies to the identification of functional boundaries of regions and countries, which is more and more problematic. For example: where do global cities such as New York, Tokyo or London end today? This is almost clear, or at least conventionally defined, from an administrative point of view, but not from a functional point of view. The firms from these global cities which have localized their branches abroad certainly still contribute to the competitiveness and attractiveness of their mother cities even though they are mainly localized around the world. This is true also for second order cities on a global scale: for example, the fashion sector of Milan makes it a “world” city for the commercial

relationships of the firms linked in production chains with the fashion industry of Milan, even though they are localized (especially with regard to production) throughout the world.

From the point of view of regional and urban planning, this has made it necessary to conceive and implement development essentially strategic policies which on the one hand make the most of local strengths, but on the other also target international relationships.

Planning an effective development strategy for a region or a city which aims at improving its position in the respective international rankings often involves attracting international events (sports, fairs, culture, etc.) and/or specializing strongly with respect to the principal competitors. The planning of infrastructure and international accessibility is also part of a winning strategic plan, as are policies for territorial marketing and international missions of local representatives.

To sum up, the negative, implosive, implications of a planning self-contained in the internal boundaries are evident and those, as much negative, explosive, of a policy only devoted to external relations, which ends up exporting its own talents without re-generating the internal network at the same time. For example, it is always possible to host a fair in a large city, but it is necessary that the internal networks work systemically: all the local institutions in charge of all the relevant services, the environmental quality, the communication sector and the hotel hospitality need to collaborate with each other to prevent the single entities from gaining credit for themselves abroad without activating a systemic process of accumulation and growth for the whole city or region.

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