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A model of connectivity for regional development in the learning economy

Authors: *Giuseppina Passiante*¹ and *Valerio Elia*²

¹ Department of Innovation Engineering, Faculty of Engineering, University of Lecce – Via per Monteroni, sn – 73100 Lecce – Italy. Phone: +39 0832 320210 Fax: +39 0832 320211 e-mail: passiant@ingle01.unile.it

² *e-Business* Management School, ISUFI-University of Lecce – Via per Monteroni, sn – 73100 Lecce – Italy. Phone: +39 0832 421201 Fax: +39 0832 323796 e-mail: valerio.elia@isufi.unile.it

Abstract

The adoption of advanced Information and Communications Technology (ICT) can be successful in stimulating economic development in regions that have traditionally disadvantaged by distance to markets, under-invested basic infrastructure, and under-utilized capacity. ICT significantly affects business operations through its ability to improve the process of knowledge creation and transfer, to re-define business routines, apply new marketing and sales methods, develop new products/services, and overcome geographical boundaries. Additionally, ICT positively impacts quality of life and government functioning. These results promote competitive advantage for a community. The extent to which communities can take advantage of this new ICT-based phenomenon can be shown to be directly affected by its degree of “connectedness”. There are different models, around the world, of connectivity as a means for economic development. These models refer to the use of ICT in new and innovative ways to empower residents, institutions and regions as a whole.

In this paper we discuss the possibility to create such innovative milieu in the Salento region (in the South of Italy), by the adoption of an advanced telecommunication infrastructure Internet-based. We present the “Salento in Rete” project based on a strong partnership between the “e-Business Management School” of ISUFI, Nortel Networks and local institutions. The aim of the project is, by the implementation of a digital network, to foster the creation of relational (i.e. social) networks of innovation.

The contents of the paper are:

1. A conceptual framework of the regional development versus innovation; the networks of innovation dynamics; the Smart Community model;
2. The “Salento in Rete” project: vision and action plan;
3. Conclusions.

1 CONCEPTUAL FRAMEWORK

The organization of production in the learning economy involves local systems or regions in a transformed way compared to their role in previous modes of economic coordination.

Numerous authors such as de Vet (1993), Ohmae (1995), Florida (1995), Cooke (1995), Sabel (1995), Storper and Scott (1995), Cooke and Morgan (1998), make the case that the regional level of economic organization has become more important in the global economy emerged from 1980s and 1990s restructuring process.

1.1 Regional development and innovation

A strong relationship exists between regions and innovation processes. Here, following Cooke and Morgan (1998) the term innovation include both *technological* innovation in firms and industries and *institutional* innovation in regions and countries. The way technological and institutional changes combine to produce economic growth is described by Freeman (1997) and Lipsey (1997).

The relationship between regions and innovation has to be searched in the interactive nature of the innovation (Lundvall, 1988, 1992, and 1999), (Cooke and Morgan, 1998). The interactive model of innovation carries radical implications not just for firms but also for a wide array of public and private institutions. This model “underscores the importance of cooperation between firms and institutions and, thus, the role played by links and networks involving different organizations” (OECD, 1992). The networks of innovation (Rallet and Torre, 1998), (Cohen and Fields, 1999) link firms, banks, research organizations, universities, government institutions, etc. More generally, they link regional organizations and institutions that, with the regionalization of innovation programs as part of a wider decentralization of industrial policy, play a more and more relevant role in determining the economic development of the region itself.

In a network of innovation the links between organizations are knowledge-based linkages (Nonaka and Takeuchi, 1995), (Rallet and Torre, 1998) that enable *learning* processes in an organization or in a region (in one sense learning is a first step for innovation). In the “new economy” characterized by accelerating technological change, shorter product life cycles, globalizing markets and more knowledge-based products, “knowledge is the most strategic resource and learning the most important process” (Lundvall, 1994). In this sense the “new economy” is, following Lundvall, a “learning economy”. Since learning is an interactive and socially embedded process, the social and political system of a region shape the learning efficiency of an organization in that

region. Indeed organizational and regional learning critically depends on sharing knowledge (tacit, codified or both) but also they depend on trust and commitment among members of the network. Without a minimum of social cohesion the capability to learn to master new technologies and new and more flexible forms of organization will be weak (Lundvall, 1999).

The role of trust relationships and of collective value systems in affecting the regional development emerges in the “social capital” concept popularised by Putnam (1993). Following Putnam, social capital is the result of the common history (along the centuries) shared by the members of a local or regional community. The institutions and the organizations of this community, with their social relationships, form *networks of civic engagement* that facilitate the activities of politics, production and exchange. In such communities people know one another and they meet frequently in non-work related organizations and activities. Business relationships are embedded in community and family structures, and are these structures that reinforce trust.

But if it is the past that establishes a certain pathway for the creation of social capital networks, and if, by definition, the past is basically fixed, how then can social networks be created? In this sense the concept of social capital is very limited for framing policy choices.

On the other and, if the Putnam’s model explain the regional development in a country like Italy, it does not fit the experiences of others regions like Silicon Valley. As noted by Cohen and Fields (1999) “the sources of technological dynamism in Silicon Valley can be described in many ways, but there is little truth in the idea of Silicon Valley as a community of dense civic engagement”. In Silicon Valley social capital can be understood in terms of the collaborative partnerships that emerged in the region fostered by economic and institutional actors in search of objectives related specifically to innovation and competitiveness. According to Cohen and Fields (1999) what these networks of innovation in Silicon Valley share with the networks of civic engagement is simply and only a common network-like structure. The fact that economic and institutional actors of the Silicon Valley fostered the creation of innovation networks provides encouragement for efforts to create innovative milieu in other regions.

1.2 Networks of innovation and networks externalities

From previous discussion and from a large variety of literature (and of approaches) emerge that networks play a major role in regional economic and technological development. More generally, following Shapiro and Varian (1999), the learning economyⁱ is driven by the *economics of networks*.

According to Lundvall view, learning processes require:

- Sharing knowledge (tacit, codified, both);
- Trust and collaborative partnerships.

The observation of these points in a given region highlights the establishment of networks of relationships or of a social capital. Such region is what economics literature calls regional networks of innovation, regional systems of production, regional systems of innovation.

As noted by Rallet and Torre (1998) public actors try to develop regional technological policies directed towards the support of collective processes of research and innovation. Thus local or regional institutions support the development of collective networks of actors.

To derive some policy implications for the development of networks of innovation we need to understand the dynamic of these networks in terms of interactions (i.e. flows and linkages). A panoramic view of the different approaches is done by Archibugi, Howells and Michie (1999). The stylized facts emerging from this panorama are:

- a) The networks are defined in terms of the volume and characteristics of linkages between the actors or nodes (organizations in a region) of the system;
- b) Flows and linkages in a network of innovation define the way it functions and operates;
- c) A key element determining the dynamic (and the evolutionary behavior) of a network of innovation is the changing relationships (in terms of flows and linkages) patterns between the actors that compose the system.

In the framework of the learning economy a key element determining the dynamic of an innovation system (and thus of a network of innovation) is learning (Lundvall, 1995), so that, according to the point c) in our list, learning processes depend from changing

patterns of flows and linkages in the network. Learning, also, plays a major role in determining the *connectivity* (i.e. the binding) of the system because it takes place at all levels: individual, organizational, and inter-organizational. In this sense learning process involves an interactive and collective dimension.

In exploiting the networks advantages over others forms of organization we have to consider the *network externalities* (Shapiro and Varian, 1999) feature: they refer to the attraction power of large networks respect to small ones. Network externalities are what lie behind *Metcalf's law*: if there are n actors in a network then the total value of the network is proportional to $n \cdot (n-1) = n^2 - n$. So a tenfold increase in the size of the network leads to a hundredfold increase in its value. Communication or transportation networks have this feature: the more people or destinations it can reach, the more valuable a network becomes.

What about the networks of innovation? Following the analogy with communication and transportation networks, more people, institutions and organizations take part in the network greater is its value. In terms of policy implications for regional development this means that:

- One need to increase the participation of regional actors to the regional networks of innovation. The participation can fostered by the adoption of ICTs and by the implementation of communication networks with a wide variety of access channels. ICTs increase access to new people and organizations, and facilitates social networking by weakening social, spatial and temporal barriers.
- One need to improve the interconnection between several networks (from inside and outside the region). Interconnection is not only a technological task: it requires also organizational and social tasks to reach efficiency in use.

1.3 The Smart Community model

From previous discussion emerges useful policy implications for regional development. These implications trigger what one call the Smart Community model.

A Smart Community is a geographical area ranging in size from a neighborhood to a multi-county region whose citizens, organizations and government institutions *use* ICT

to strategically position that region for economic, social and technological development. The extent to which communities can take advantage of ICTs is directly affected by its degree of “connectedness”. Connectivity refers to the access to the global digital network that includes satellites, cable TV, new wireless systems, mobile telephones and the Internet.

But according to Lundvall (1999) investment in technology which neglects user competence, social needs and the need for organizational renewal can do more harm than good in the context of the learning economy. Technology is an instrument and not a goal in itself. As with other instruments, the positive impact will depend on the skill of those *use* it.

According with this view the transformation of a traditional community in a Smart Community can be obtained stimulating the creation of: (1) an interactive communication infrastructure in the region to connect citizens, local communities, government institutions, territorial entities and companies, (2) a series of “vertical applications” to stimulate the economic and social growth of the region, i.e. the development of a social capital, (3) the intellectual capital to manage innovation and to take advantage of the new media.

To enable the transformation from traditional community to Smart Community one has to reach some objectives which are:

- to diffuse ICT-based technologies and services throughout the Salento community to render them as familiar and accepted as television or the telephone;
- to generate competitive advantages through the use of ICT-based intelligence, in particular promoting the use of electronic commerce;
- to develop competencies through a strategy of interactive, continuous learning – a key element for the economic and social growth of the Salento community within the context of the learning economy;
- to generate network-facilitated synergies and alliances to better compete in the learning economy;
- to reduce the innovation gap in the sector of research and development, as well as in the adoption and transference of technologies with respect to competing territorial systems;

- to support the actions of public and private organizations in improving services for local citizen.

2 THE “SALENTO IN RETE” PROJECT

The aim of the project is to implement a Smart Community in the Salento region.

2.1 The Salento region in the “Mezzogiorno” of Italy

Salento is in the Southeast on the Adriatic Sea, in the Mezzogiorno region of southern Italy. Mezzogiorno, that is one of the “Objective 1” regions, presents a significant anomaly in the economic and monetary unification of Europe due to several negative economic conditions in Italy as compared to other European Union nations. With respect to the EU average, Italy’s unemployment rate is twice that of the other nations, and yearly economic growth is significantly lower, at less than one percent. Comparing the Northern and Southern regions of Italy it is clear that substantial regional disparities exist that greatly contribute to the aggregate negative economic indicators.

One of the most striking disparities between the Northern and Southern regions of Italy involve the extent of infrastructures development. The relatively poor infrastructure in the South, as well as other structural problems in the region, have discouraged investment and led to a situation in which the dispersion of regional unemployment rates in Italy is estimated to be the largest among OECD countries. This discrepancy can be seen by the fact that by 1997 the unemployment rate in the North had declined to approximately 6%, while unemployment in the Center was 10%, and in the South it had reached 23% and was rising. In addition to these regional differences, there are considerable disparities in unemployment rates across different demographic sectors.

Additional structural inefficiencies exist such that bureaucratic fees as a cost of business for firms in the Mezzogiorno are 40% greater with respect to firms operating in other regions of the country. The environment for business in the Mezzogiorno is further impacted by the region’s lower productivity levels as compared to the North – despite a lack of wage differentiation – thus implying significantly higher unit labor costs in the South. These inefficiencies have limited the growth of private enterprise and have further contributed to the under-utilization of labor capacity in the Mezzogiorno.

Despite the fact that these structural problems exist there has been much recent progress made in improving the environment for economic growth in the Mezzogiorno. Some signals that indicate the potential for successful development of the region include the growth in local exports and regional tourism, as well as the increase in entrepreneurial enterprises – particularly among the region’s youth. Additionally many recent privatizations, particularly in the banking sector, have occurred resulting in increased efficiency of financial services. Increased efficiencies have also resulted in the public administration sector as legislative reforms have increased the accountability of elected officials to their constituents, as well as strengthened the cooperation between local businesses and government. Furthermore, although the presence of criminality has consistently discouraged investment in the Mezzogiorno, during the last ten years this situation has begun to change and authorities are now placing greater emphasis on resolving this problem. These signs of positive change illustrate the potential that exists for further development of the Mezzogiorno.

2.2 Setting the vision of Salento in Rete

The Salento region exemplifies a typically peripheral territory with limited access to ICTs, under-invested infrastructure, and under-utilized labor capacity. Yet, with the adoption of an advanced ICT strategy there is now an opportunity to apply a new and innovative integrated approach to regional development and to position Salento in the learning economy framework.

With this new approach it is expected that the mission of Salento in Rete could achieve the following objectives:

- *To create an economic and social environment oriented towards growth.*

A territorial system based on connectivity will allow stakeholders to better adapt to changes in the global environment. In this environment the infrastructures investments needed to create and share knowledge are important for the competitive advantage of a region. This new type of infrastructure – based on information and communication systems – is needed in addition to investments in traditional infrastructure (i.e., for the movement of people and goods, such as roads, airports, etc.).

- *To promote regional development through creation of an “opportunity network” for established local businesses and external firms that choose to invest in the Salento region.*

In this case ICT is needed to:

- a) create an information system promoting (1) the resources of the region and (2) the opportunity for investment in terms of incentives, tax breaks, etc., which are intended to attract foreign direct investments in the region;
- b) create competitive advantage within the context of the learning economy, i.e., through use of e-commerce technology and applications;
- c) create a strong level of integration among the business and scientific research sectors, thus favoring cooperation among stakeholders and thereby producing innovation (i.e., “cooperation for competition”).

As a result of the increased number of information channels and the mobility produced through connectivity, this highly competitive system naturally reinforces competition and a free market environment. In particular this competitive result of connectivity is important in the service sector, i.e. public utilities and business services, to facilitate increased efficiency of the system itself.

- *To promote and improve human resource training through a system of continuous learning that better responds to the demand for a skilled labor force.*

A fundamental problem affecting Italy’s labor market is the low level of job-related skills among entrants into the labor market. The large earnings premium for skilled workers, especially in the higher-wage and dynamic sectors of the economy, indicates that, as in other industrial economies, skill-biased technological change has increased the demand for skilled relative to unskilled labor. Additionally, the high rate of youth unemployment and the relatively large number of young labor market participants looking for their first jobs indicate some basic problems with the prevailing job-matching mechanisms (i.e., a likely mismatch between the skills emphasized by the educational system and the skills desired by prospective employers).

The use of ICT attempts to create a link between the schools, institutions, universities, and research centers of a territory, as well as apply new and innovative

educational methods based on the concept of interactive and distance learning. As the information system created by the use of ICT improves the job-related skills of local citizens the adoption of advanced technology can serve to equilibrate labor supply and demand in a territory. Local citizens benefit from skill-improving opportunities regardless of their geographic location, thus making them better able to enter the labor force with marketable skills.

- *To improve the efficiency of public administration which allows local governments to provide real-time services to citizens while at the same time assuring their privacy (through use of digital ID technology).*

In particular the use of ICT serves to simplify administrative procedures involved in the issuing of licenses/permits through increased coordination among different government offices.

2.3 The project start-up

The initial task in developing the Salento in Rete project has been to organize a planning group made up of business people, regional government officials and people coming from University. For the establishment of this planning group, on November 1999 was signed an agreement between:

- ISUFI – University of Lecce;
- Banca 121 (one of the most innovative Italian banks located in the Salento region);
- Salento Chamber of Commerce;
- Salento regional government;

This group validates the importance of collaboration between the public and private sector and the need to involve all stakeholders in shaping the Salento future. According to our view of the networks of innovation, the fortune of a region depends on the collaboration of the public and private sectors – teamwork among governmental units, business firms, voluntary and civic associations, marketing organizations, schools and Universities.

The tasks that planning group is developing are:

- A definition and diagnostic of the Salento's condition, its major problems and their causes. The group will use the *place audit* for a systematic examination of the

Salento economic/demographic characteristics, followed by an attempt to sort them into competitive strengths and weakness, followed by an effort to relate them to opportunities and threat;

- A vision of what the Salento region can be and of the long-term solution to Salento's problems based on a realistic assessment of the community's values, resources and opportunities;
- A long-term plan of action involving several intermediate stages of investment and transformation;
- The creation of internal consensus and effective organization.

In the following we report some major results (just a very preliminary work) of the planning group tasks.

2.4 The action plan: towards a Smart Community

The planning group follows an issues-driven approach to develop applications and technology. The model addresses four areas in sequence: issues, applications, technology and products. Analyzing the Salento community issues by following this sequence produces network products that are solutions to specific issues targeted by the community. More specifically, adopting a methodology applied in others regions, mainly in Canada and US, the planning group is going to implement a virtuous circle with several iterated steps like in Figure 1.

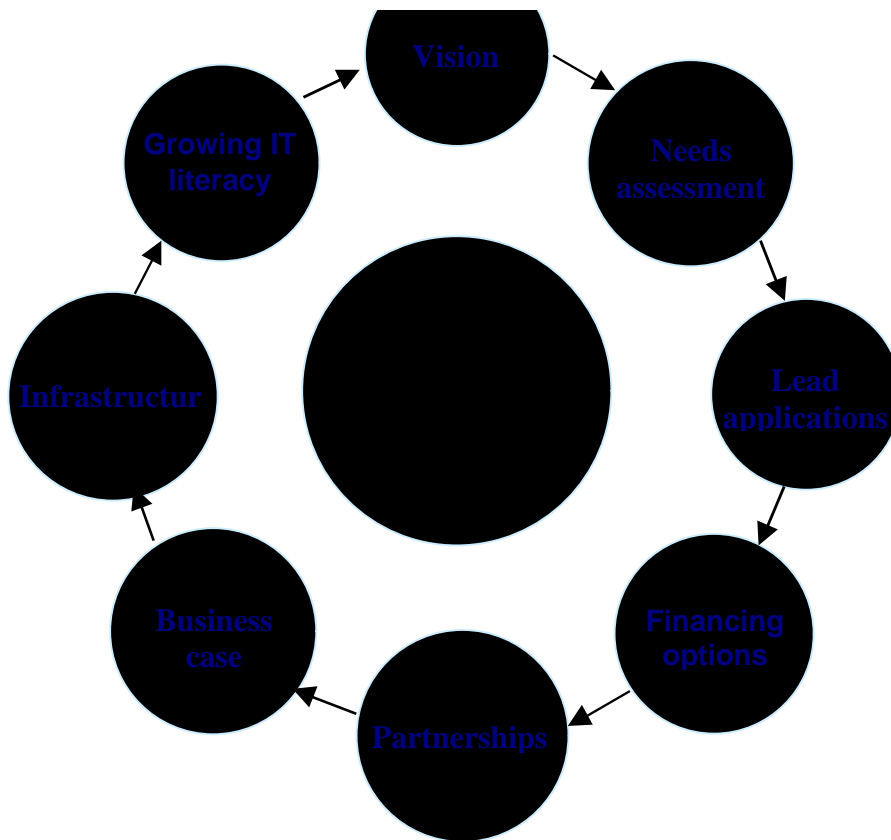


Figure 1 – *The action plan of Salento in Rete: the virtuous circle.*

The issues-driven approach promotes an advanced telecommunications infrastructure through the development of sophisticated network applications. The applications developed by the Smart Community are (1) based on the specific needs of the community, (2) can attract financial support, and (3) can be quickly moved to financial self-sufficiency. Furthermore, the applications have an impact that goes beyond a specific constituency to affect the entire community.

Among the various types of applications that should be implemented in Salento in Rete are:

- Teleradiology/Remote Diagnostics: through the use of remote medical diagnostics communities in territorially peripheral areas can have access to the best, highly specialized medical care which may not otherwise be readily available – such as timely medical diagnosis and access to specialists outside the local community.
- Integrated Patient Records: this application benefits the community by providing timely and up-to-date access to the health records of patients served by separate health care service facilities.

- **Teleworking:** with the appropriate telecommunications infrastructure and services in place communities can benefit from new employment opportunities. Workers can be employed either from home-based offices or Teleworking Centers.
- **Municipal Amalgamation and Land Registry:** through this network application there is an opportunity to use telecommunications to deliver information and services to the public and to better manage the centralization of certain public administration functions.
- **Opportunity Network:** to attract investment from businesses interested in locating or expanding in the community there is a need to present a detailed view of the community's strengths, advantages and capabilities to the widest possible audience of companies and investment intermediaries. A sophisticated telecommunications capability is necessary to deliver detailed economic information to businesses throughout the community and around the world.
- **Geographic Information Systems (GIS):** as local governments and municipal service providers are being required to do more with fewer resources, many are looking to information technology to improve the way they do business. GIS applications have proven effective as a governmental support system.
- **Distance Learning:** citizens living in territorially peripheral areas face substantial barriers in accessing higher education and training due to distance and costs. The delivery of shared courseware between urban and rural centers using distance learning techniques reduces costs and provides users with courseware that would otherwise be unavailable.

3 CONCLUSIONS

Starting from the observation that government policy and decisions by major institutions may play a critical role in regional development, we are trying to design a project for development of the Salento region. Some general considerations can be made about a theory of regional development in the framework of learning economy:

- According to Lundvall view, learning processes require: sharing knowledge and trust and collaborative partnerships (i.e., a social capital in the region);
- The knowledge exchange and the creation of social capital, can be fostered by creation of networks of relationships between the actors of a region;

- These networks should be focused on the pursuit of innovation and competitiveness, thus the terms networks of innovations.

The Salento in Rete project was triggered by the previous considerations. Our view is that the creation of networks of innovations can be fostered by the implementation of a Smart Community as described in this paper.

ⁱ Shapiro and Varian call the new economy “information economy”, but we prefer the Lundvall definition in terms of “learning economy” in which the networks concept is stronger.

REFERENCES

- Archibugi, D. *et al.* (1999), ‘Innovation Systems and Policy in a Global Economy’, in Archibugi, D. *et al.* (eds) “Innovation Policy in a Global Economy”, Cambridge University Press, Cambridge.
- Cohen, S.S. and Fields, G. (1999), ‘Social Capital and Capital Gains in Silicon Valley’, *California Management Review*, Vol. 41, n.2: 108-130.
- Cooke, P. (ed.) (1995), ‘The Rise of the Rustbelt’, University College London Press, London.
- Cooke, P. and Morgan, K. (1998), ‘The Associational Economy: Firms, Regions, and Innovations’, Oxford University Press, New York.
- de Vet, J. (1993), ‘Globalisation and Local and Regional Competitiveness’, *STI Review*, 13: 89-121.
- Florida, R. (1995), ‘The Industrial Transformation of the Great Lakes Region’, in Cooke (1995): 162-176.
- Freeman, C. (1997), ‘Innovation Systems: City-State, National, Continental and Sub-National’, SPRU, University of Sussex, December.
- Lipsey, R.G. (1997), ‘Globalization and National Government Policies: An Economist’s View’, in Dunning, J.H. (ed.) “Governments, Globalization and International Business”, Oxford University Press, London.
- Lundvall, B.A. (1988), ‘Innovation as an Interactive Process: From User-Producer Interaction to the National System of Innovation’, in Dosi, G. *et al.* (eds) “Technological Change and Economic Theory”, Pinter, London.
- Lundvall, B.A. (ed.) (1992), ‘National Systems of Innovation: Towards a Theory of Innovation and Interactive Learning’, Pinter, London.
- Lundvall, B.A. (1994), ‘The Learning Economy: Challenges to Economic Theory and Policy’, paper to the EAEPE Conference, Copenhagen, October.

Lundvall, B.A. (1995), 'The Global Unemployment Problem and National Systems of Innovation', in O'Doherty, D.P. (ed.) "Globalization, Networking and Small Firm Innovation", Graham & Trotman, London.

Lundvall, B.A. (1999), 'Technology Policy in the Learning Economy', in Archibugi, D. *et al.* (eds) "Innovation Policy in a Global Economy", Cambridge University Press, Cambridge.

Nonaka, I. and Takeuchi, H (1995), 'The Knowledge-Creating Company', Oxford University Press, New York.

Ohmae, K. (1995), 'The End of the Nation State: The Rise of Regional Economies', Free Press, New York.

Putnam, R.D. (1993), 'Making Democracy Work: Civic Traditions in Modern Italy', Princeton University Press, Princeton.

Rallet, A. and Torre A. (1998), 'On Geography and Technology: Proximity Relations in Localised Innovation Networks', in Steiner, M. (ed.) "Clusters and Regional Specialization", J H L DEWHURST.

Sabel, C. (1995), 'Experimental Regionalism and the Dilemmas of Regional Economic Policy in Europe', paper to international seminar on "Local Systems of Small Firms and Job Creation", OECD, Paris, June.

Storper, M. and Scott, A. (1995), 'The Wealth of Regions: Market Forces and Policy Imperatives in Local and Global Context', *Futures*, 27: 505-526.

Shapiro, C. and Varian, H.R (1999), 'Information Rules', Harvard Business School Press, Boston.