

GEO-ECONOMIC DYNAMICS OF THE INFORMATION AND COMMUNICATION TECHNOLOGY AND LOCAL SUSTAINABLE DEVELOPMENT

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There is wide consensus on the fact that globalisation is generating unprecedented opportunities for development, but also some concerns for its economic, social and environmental sustainability. Globalisation of markets and acceleration of technological revolution have changed the way economic systems evolve all over the world with some contradictory effects: on the one hand, accelerating economic growth, on the other hand, producing frictions and perverse effects. The technological revolution originated by the progressive convergence of software and telecommunications and fostered by the advancements in the digital technology is significantly changing the scenario in the world countries and regions. Recent studies (Bencardino et al., 2003) point out the innovative capability of the information economy in the local geo-economic dynamics, highlighting specifically risks and opportunities of the global market development that make more independent information from traditional diffusion vectors.

Today the information (in analytical factorial and planning terms) is split from “doing” economy, “*information superhighway is about the global movement of weightless bits at the speed of light*” (Negroponte, 1995). This substantial information (or knowledge towards development) dematerialization process, generally is linked to services’ increasing supply, particularly Information and Communication Technology (ICT), that creates a wide and general transversal impact and invades all the human activity and action fields. This contribution aims to analyze the role of ICT in the region’s economic territorial development through the impact analysis generated on the territory, starting from the critical revision of some basic question:

- which are the existing approaches that relate the ICT to territorial development?
- which procedures and techniques permit the ICT use for the sustainability of - development and to worth the local planning capabilities?
- how much is important the relationship between ICT and knowledge production (human capital) in the territorial development process?
- how to lead a ICT project to support the lower competitive areas catching-up¹ rather than improve the digital divide?

From the analysis and the evaluation of various studies and research related to ICT (also in indirect way) figure out many approaches, methodologies and models diversified in contents and action’s territorial scale: net-new-virtual economy, e-government, e-democracy, e-commerce, e-business, digital divide, cyberspace, virtual reality, networks communities, etc. This model-lexical multiplicity does not found yet a coherent organization in terms of analysis and environmental-territorial planning. The contributions are heterogeneous and less integrated: economic models (Saxenian, 1994; Fujita, Krugman and Venables, 1999; Le Blanc, 2004) are facing sociological analysis (Rheingold, 1994; Wellman and Giulia, 1999), innovative approaches, like G.I.S., are still used as CAD (Computer Assisted Design) and not as “planning philosophies”, the territorial analysis are still realized as separated sections and this approach does not permit a data cross section that is a fundamental element of a integrated analysis.

The evaluation’s results made in this first research step show the worthiness of the new technologies: the telecommuting infrastructure endowment is considered an reliable territorial competitiveness indicator; the new economy (also after the 90es) still remain an regional economic development engine; the social relationships (in the developed Countries) are more

¹ Here the *catching up* is not to reach the “leader” areas development level but to realize a sustainable development coherent with the neighbour context .

and more dominated from the virtual component² (chat rooms, e-mail, virtual communities); human capital training is always more oriented to use “immaterial” instruments and facilities (on-line degree, e-learning). The characteristics of this “knowledge products” (weightless, expensive to produce but cheap to re-produce; difficult to use without an adequate knowledge base; with a net structure and consequently realizing a services territorial network) are the foundations of the new insediative trends caricaturizing spontaneous territorial evolution and the consequent planning proposals. The creation of new telecommuting endowments and their use in the suburban areas played an essential role in the transformation of the urban *core* in urban-rural regions, modifying the planning criteria of metropolitan and wide areas (cfr. II SDEC preliminary studies). The planning approach moves from a pyramidal structure and a “top-down” organization that put the city on the top of the relationships to a bottom-up “system” view where the new information technology multiplied interaction possibilities.

In this way the urban and territorial functions, that in the first step of the global economic organization does not have localization constraints and “explode” in the territory (Camagni, 1998) creating the Pierce Lewis’ idea of “galactic metropolis”, or Bernardo Secchi’s “città diffusa” or Andrè Corboz’s “hypercity”, could be re-thought according to equilibrium models closer to real demand. The traditional location theories are so to be considered obsolete and require to think new territorial and socio-economic planning models as well as to update criteria and values necessary to obtain scale economies.

The most diffuse opinion looks at telematics as a solution. The typical problem of space-time cost³ for informations, goods and people exchange was initially faced thorough planning solutions like the productive and exchange activities’ spatial concentration (in order to reduce the mutual distances and the consequent times needed to cover them). If on the one hand this approaches generated clear advantages (agglomeration economies), on the other hand created new costs (jam, agglomeration dis-economies) derived from the urbanization and settlement densification processes. Telematics could be used instead as a means able to fall down costs generated from the so called “space-time friction” thank to its ability to “erase” the frictions due to physical constraints and to make possible a “real-time” communication using the virtual space in place of the territory. Apart from the futuristic view that from this framework could be lined out, the real question is if the ICT’s huge development possibilities (see Internet) also include real using possibilities on the side of users (the demand) that, differently from the traditional media, are the producers (they model the net defining and submitting the contents), but suffer the negative impacts (radiations, electromagnetic pollution)⁴, and on the side of the territory (less developed countries).

The emergence of the ICT has presented developing countries with new opportunities for success but at the same time increased the risk of their marginalization. Two extreme scenarios are usually presented. In the optimistic scenario, new information and communication technologies allow developing countries to bridge the technological gap that exists between them and the developed world, enabling them to catch-up with (and, with sufficient optimism, even ‘leapfrog’ over) the current economic leaders. The alternative, dismal scenario, is that new technologies will enable faster growth in the developed world, and the developing countries will languish. In this scenario the current digital divide will create the basis of greater divergence in economic outcomes, both between the developed and developing worlds, and within countries. Of course, both scenarios lead to the same policy imperative: the idea that developing countries need to invest more in ICT, if not to catch up, to prevent being left behind in the digital race.

Moreover, starting from the Net access differences highlighted between users characterized from different income, education and regional origins (according to Zook

² Virtual means: «almost or nearly the thing described, but not completely», while Real means «existing as a thing or occurring as a fact; not imagined, supposed or pretended» (Oxford – 1995)

³ It must be added to the space cost, already present in the calculus of the so-called “economic distance”, the “friction cost” calculated functionally to time consuming.

⁴ The actual trend of the national (Legge Quadro) and international (International Commission on Non Ionisat Radiations Pollution- ICNIRP) normative moves towards cautelative and preventive chooses, that is considers also the situations where the causal link between exposition and human well being could not defined clearly.

research– 2000 – about the gap between developed and less developed countries) and analyzing the server and home page distribution (Broder et al., 1999), is clear the Net is not a real territorial net, but a complex structure with holes, concentrations and blind-alley looking like a “papillon”. Physical access, however, is but the first, and perhaps least significant barrier to exploitation of the new technology. This is suggested by low Internet usage rates even where access is available in developing countries (Pigato, 2001). Access is constrained by inappropriateness of content (e.g., lack of local language content) and lack of familiarity with the medium (Nanthikesan, 2000). In this framework it’s immediately clear that the preliminary investment in human capital: i) is the crucial element to use the all possibilities given from the ICTs and oriented to face the problem of the technological suitability related to local contexts; ii) support, from an economic-territorial point of view, the local productive systems improving their ICT’s scale economies, leading them to compete with the cities and so becoming new “Net’s information nodes”.

The knowledge production, and its protection (the so-called Intellectual Property Rights), thus become a crucial development task. During the past decade many developed countries have pushed for stronger protection of intellectual property rights (IPRs) through bilateral, regional and multilateral actions. In this context, the *Agreement on Trade Related Aspects of Intellectual Property Rights, including Trade in Counterfeit Goods* (the TRIPS Agreement⁵) emerged as one of three multilateral agreements (together with GATT and GATS) laying the fundamental framework under which the World Trade Organization (WTO) operates. Some authors (Chin and Grossmann, 1990; Deardorff, 1992; Panagariya, 1999) argue that with the TRIPS Agreement the international monopoly of the knowledge producers has been improved to the disadvantage of consumers, generating a distributive conflict between the North (innovator and knowledge producer) and the South (knowledge and technology consumer). According with this view Primo Braga, Carsten and Paz (1999) underline that in terms of social welfare distribution the North, improving its monopoly level, will determine a deathweight loss extracting a part of the South surplus. Using a dynamic model Helpmann (1993) too argues that a harmonization of the IRPs harms the South. Without direct investments a stronger protection involves a worsening of the exchange rate because of the increase of the (more expensive) Northern productions. The innovation rate first increase but then decrease and the South is harmed too in terms of intertemporal allocation of the consumption.

On the basis of these considerations, the South would adopt a IRPs policy less restrictive than the North one, indirectly boosting the imitation and play a role of global free-rider rather than support a harmonization program of the IRPs policies. More cautious Dewan and Rodrik (1991), analysing the possibility that a region could be not only a consumer but even a innovation producer, argue that the forces boosting the South to become a global free-rider are moderated from the possibility to have to protect its own innovation in the next future. From this point of view, the IRPs protection could be useful to the South also considering that South and North are characterized from different preferences, capacities and technological needs and the North resources for R&D are limited. This suggests that the developing countries are advantaged by participating actively in creating an international IPRs protection system and in setting its rules through the revision of the TRIPS Agreement. Developing countries will obtain more benefits from this protection system according to their capacity to boost local research and innovation; although it will be not enough if not accompanied with a compensation mechanism able to adjust the unequal distribution of the TRIPS Agreement advantages. From a localization point of view industry is facing significant changes in its business environment. New technologies and globalization have modified the competition conditions and accelerated the knowledge diffusion, leading to new production patterns and wider consumer choices. The “new industrial space” (Castells 2002, Scott 1998, Henderson 1989) is characterized from the technological and managerial capability to divide the productive process in different places, re-unifying it in a second step through telematic links and guaranteeing precision and flessibility in the manufacturing process tanks to microelectronics. Moreover the geographic peculiarity of every single step of the productive

⁵ As of early 1999, the Agreement was binding to all of the WTO’s 134 members and would also become binding to all potential new entrants to the WTO.

process is due to the needful specificity of the working force and environmental characteristics.

It's possible to note a similar trend in the labour market too, that moves from a urban to a "local" dimension, with 60-70% of the new professionalism (information's elaboration, distribution or production) localized in the metropolitan area. Some interesting cases could highlight the telematic network efficiency about its capability to connect in "real time" demand and supply: the informations from firm to carriers to lead the distribution according to jam and dealers requirements; the so called services "civic networks" and the public transport workers who use telematics to give in real time informations to users and to satisfy the public demand in a effective way.

These changes have to be looked in the framework of the European integration process which has seen the abolition of trade barriers, the creation of a single market and now of the world's second largest single currency area in terms of economic size after the United States. Closer European integration has had an important impact on the location activities within the EU. Industries have been given the opportunity to exploit differences in comparative advantages, creating the potential of an increase specialization of countries and regions. There are gains to be expected from these developments as international competition and specialization associated with scale economies increase productive efficiency. However, there are also adjustment costs and risks associated with such developments. Economic integration and the resulting fall in trade costs tend to raise the attractiveness of central areas relative to peripheral ones and may thus result in an increased concentration of industries in central locations. In other words, the gains of increased integration may be unevenly distributed. Also, the increasingly specialized countries or regions may become more vulnerable to the effects of shocks affecting particular industries.

The rising importance of electronic commerce may have some of the same effects as the European integration process. In particular, the electronic delivery of knowledge-based products is becoming more and more common. Digital information products can be transferred instantly and with minimal costs across national borders, leaving producers a wider choice to locate their production facilities. On the other hand, the production of such digital information products often requires intensive interaction between those involved, giving rise to scale economies and a clustering of economic activities in attractive locations. However, as final delivery costs are no longer important, such location are no longer necessarily at centres of final demand and other locations factors (as the environmental quality) may become more important.

Starting from these considerations the contribution outline the planning grid within experiment a local system development planning model coherent with one defined from the european integration process. The proposed model start from the *territorial governance* concept and means ICT as not a new technological wave to face with or a static analysis instrument, but as a real planning philosophy. In this way become clear the possibility to exceed the constraints due to individual resources' scarcity taking advantage of a *virtual agglomeration*, identified in business-cooperation ties, at level of experiences exchange and resources sharing, but especially in the develop of *external scale economies*. These last are generated from an activities management costs falling down for a jointed use of a services and infrastructures oriented to mitigation or even elimination of production impacts on environment.

The impact's prevention approach on the ecosystem using ICT is generated from the need to create competitive and sustainable growth (development) processes. ICT permits a general firm performances improvement functionally to a range of constraints and opportunity represented from the local context elements, contrary to the nowadays situation considering the single environment aspects directly linked to managerial and operative procedures of the new economy. In this direction are moving the normative and the (voluntary) instruments in the European context implementing processes' restructuring models focused on waste and productive disadvantages minimization and looking for a territorial performances' continuous improvement. So it's clear the need of a adequate (and new) prevention and calculation methodology of the environmental implications to overcome the traditional quantitative setting of the feasibility assessments that use partial techniques and of purely economic style (i.e. preferences and sensivity analysis) whenever examine innovative activities.

This last approach, when considers the environmental variable, shows all its limits, because the wideness of geographical scale leads “simply” to minimize the negative effects (the so called externalities) of the ICT’s territorial internalization processes. From this kind of consideration it’s generated the need to develop an analysis method able to identify *all the relationships*, direct and indirect, between ICT and environmental system. According to the sustainability concept the answer could be found in a *multidisciplinary approach*, specific of the Strategic Evaluation Assessment (SEA) analysis procedures, that, using the ICT capabilities, allows to integrate the different planning aspects and needs in order to achieve an equilibrium between environment and firm quality. Moreover it would foster a territorial and socio-economic development endogenous model applying different quali-quantitative techniques corresponding to the local and global environment complexity.

It’s obvious that a similar approach means an effort greater than one needed to calculate the costs to minimize the polluting emissions or to preserve the non-renewable resources, and asks to extrapolate and understand too the ecosystems phenomena using a careful results integration activity of the sectorial analysis carried out on the base of articulated *environmental indicators* system. This approach thus is not a simple quantification or contabilization of purely economic measures about components don’t having economic value and don’t want to foster interventions characterized both from a high added value and a environmental impact. On the contrary, if correctly applied (in complete and preventive way) to a development project, it gives the necessary data to define the Starting Environmental Quality (that is in project absence) without which would be impossible to calculate the Final Environmental Quality caused from the project’s effects (Prezioso, 2003). In this way, the *environmental* (or territorial) *quality* is an initial status does not improves its level subsequent to spatial economy action, because this last, acting on the territory, always causes a decreasing of the starting conditions (in terms of resourceses utilization, of equilibrium parameters modification or of negative externalities production). Could be reached instead only a minimization of the decreasing through a careful planning alternatives choice and evaluation that find in the ICT new possibilities and capabilities.

The *firm* (expected) *quality*, is increased from the projects realization (the same ones that impact on the territory), and assumes inverse value of the environment quality. In this case too, the new possibilities given from ICTs, allow to increase the firm expected quality value proportionally to firm capacity to plan and realize the project. Environmental decreasing minimization jointed with firm expected quality maximization obtained through ICT, lead to a new equilibrium state that becomes the reference indicator in the feasibility planning and development sustainability assesments. Moreover stretching the agglomerative dynamics (typical of the productive districts) to integrated territorial systems ICT based of various territorial scale, could lead to adequate the production to modern sustainable dynamics overcoming the constraints due to the procedures charge required from a management according to the environmental quality.

“In the new global context the local agglomeration, far to be an alternative to spatial dispersion, becomes the base of participation to a regional economies global network [...] Regions and networks are really inter-dipendent nodes within the new spatial mosaic of the global innovation. Globalization, in this context, is not the declination of universal processes but, on the contrary, the calculated syntesis of cultural diversity in the shape of diversified innovation regional logics and capabilities”. (Gordon 1994, p. 46).

This integrated systems could develop Common Territorial Directional Centres to manage all the aspects regarding analysis, research and development, information management and extern relationship activities in the environmental field, to foster and promote the activities’ local development. Many studies have emphasized that there is a leapfrogging element in the use of ICT (World Bank 1998; Kenny, 2002). It is argued in these studies that the use of ICT leads to more effective economic reforms as it enhances public administration’s efficiency and reduces bureaucracy. In turn, increased access to information and knowledge would result in higher people’s participation and higher human development (UNDP, 2001). This may seem rather intuitive; a reduction in information asymmetry that enhances efficiency and access to knowledge to all would prevent one party from monopolizing opportunities for profit (gain) and at the same time allow participation of previously excluded groups.

REFERENCES

- Amin, A. and Thrift N., 1992, "NeoMarshallian nodes of global networks", *International Journal of Urban and Regional Research*, v. 16, n. 4, pp. 571-587.
- Ambak J., 1993, "The European (r)evolution of wireless digital networks", *IEEE Communications Magazine*, December, pp. 74-80.
- Bagnasco A. and Le Gales P., 2000, *Cities in Contemporary Europe*, Cambridge University Press.
- Batten D., 1994, *Network cities: flexible urban configurations for the 21 st century*, Mimeo.
- Batty M., 1990, "Intelligent cities: using information networks to gain competitive advantage", *Environment and Planning B: Planning and Design*, v. 17, n. 2, pp. 247-256.
- Bencardino F. and M.R. Napolitano (eds), 2003, *Economia del software e tecnologie dell'informazione e della comunicazione. Un confronto internazionale per lo sviluppo locale*, Milano, Franco Angeli (Collana DASES).
- Biswanger M., 1993, "From microscopic to macroscopic theories: entropic aspects of ecological and economic processes", *Ecological Economics*, v. 8, pp. 209-234.
- Boscacci F. and Gorla G. (eds), 1991, *Economie locali in ambiente competitivo*, Franco Angeli, Milano.
- Bresso M., 1992, *Ambiente e attività produttive*, Franco Angeli, Milano
- Broder A., Kumar R., Maghoul F., Raghavan P., Rajagopalan S., Stata R., Tomkins A. and Wiener J., 2000, "Graph structure in the web", *Computer Networks: The International Journal of Computer and Telecommunications Networking*, v. 33, Issue 1-6, pp. 309-320.
- Brotchie J., Batty M., Hall P. and Newton, P. (eds.), 1991, *Cities of the 21st Century*, London, Halsted.
- Brotchie, J., Hall, P. and Newton, P. (eds.), 1987, *The Spatial Impact of Technological Change*, London, Croom Helm.
- Camagni R. (eds.), 1991, *Innovation Networks: Spatial Perspectives* London, Belhaven Press.
- Castells M., 2002, *La nascita della società in rete*, Milano, Università Bocconi.
- Castells M. and Hall P., 1994, *Technopoles of the World: The Making of 21st Century Industrial Complexes*, London, Routledge.
- Chin J. C. and Grossman G. M., 1990, "Intellectual Property Rights and North-South Trade", Jones R.W. and Krueger A.O. (eds.), *The Political Economy of International Trade: Essays in Honor of Robert E. Baldwin*, Cambridge, MA, Basil Blackwell.
- Conti S., Dansero E. and Sforzi F., 1996, "Environment, innovation and reorganisation of industrial space. A theoretical framework", *Bollettino della Società Geografica Italiana*, s. XII, v. 1, pp. 45-64.
- Cornford J., 2001, *The Evolution of the Information Society and Regional Development in Europe*, Newcastle, University of Newcastle, Mimeo.
- Croci E. and Pesaro G., 1997, "Gli accordi volontari in campo ambientale: evoluzione del quadro di riferimento", *Economia delle fonti di energia e dell'ambiente*, n. 3, pp. 127-157.
- David P., 2001, *Knowledge, Capabilities and Human Capital Formation in Economic Growth*, New Zealand Treasury, Working paper 01/13.
- David P., 2000, *Digital Technology and the Productivity Paradox: After Ten Years, What Has Been Learned*, Stanford University. Mimeo.
- Deardorff A., 1992, "Welfare Effects of Global Patent Protection", *Economica* v. 59, pp. 35-52.
- Den Butter F. A. G. and Verbruggen H., 1994, "Measuring the trade-off between economic growth and a clean environment", *Environmental and Resource Economics*, v. 4, pp. 187-208.
- Dewan S. and K. L. Kraemer, 2000, "Information Technology and Productivity: Evidence from Country-Level Data", *Management Science*, v. 46 n. 4, pp. 548-62.

- ECOSOC - Economic and Social Council, 2000, *High-Level segment: Development of information technology in a knowledge-based global economy*, United Nations, (www.un.org/esa/coordination/ecosoc/itforum/index.html).
- European Union, 1994, *High Level Group on European Information Society*, Report to the European Council, 25 June.
- Forester T., 1991, "The electronic cottage revisited: towards the flexible workstyle, *Urban Futures*", n. 5, pp. 27-33.
- Forester T. (ed.), 1989, *Computers in the Human Context: Information Technology, Productivity and People*, Oxford, Blackwell.
- Freeman C. 1991, "Information technology and the new economic paradigm", Schutte H. (ed.), *Strategic Issues in Information Technology: International Implications for Decision Makers*, Maidenhead, Pergamon, pp. 159-175.
- Fujita M., Krugman P., Venables A., 1999, *The spatial economy. Cities, regions and international trade*, Cambridge MA, MIT Press.
- Gerelli E., 1995, *Società post-industriale e ambiente*, Laterza, Bari.
- Gillespie A. and Hepworth M., 1988, *Telecommunications and regional development in the information economy*, ESRC Programme on Information and Communications Technologies, Working Paper 1.
- Gillespie A. and Robins K., 1989, "Geographical inequalities: the spatial bias of new communications technologies", *Journal of Communication*, v. 39, n. 3, pp. 7-18.
- Gold J., 1990, "A wired society? Utopian literature, electronic communications and the geography of the future city", *National Geographic Journal of India*, v. 36, n. 1-2, pp. 20-29.
- Gordon R., 1994, *Internationalization, Multinationalization, Globalization: Contradictory World Economies and Spatial Divisions of Labour*, Santa Cruz, University of California Center for Study of Global Transformation, Working paper 94.
- Graham S. and Marvin S., 1996, *Telecommunications and the city*, London, Routledge.
- Harasim L. (ed.), 1993, *Global Networks*, Cambridge Mass, MIT Press.
- Healey P., Cameron S., Davoudi S., Graham S. and Madani-Pour A. (eds), 1995, *Managing Cities: The New Urban Context*, London, Belhaven.
- Helpman E., 1993, "Innovation, Imitation and Intellectual Property Rights" *Econometrica*, v. 6, n. 1, pp. 247-280.
- Henderson J., 1989, *The globalization of the High Technology Production: Society, Space and Semiconductors in the Restructuring of the Modern World*, London, Routledge.
- Hepworth M., 1989, *The Geography of the Information Economy*, London, Belhaven.
- Hepworth M., 1990, "Planning for the information city: the challenge and response", *Urban Studies*, v. 27, n. 4, pp. 537-558.
- Kellerman A., 1993, *Telecommunications and Geography*, London, Belhaven.
- Kenny C., 2002, *The Internet and Economic Growth in LDCs - A case of Managing Expectations*, Paper presented at the UNU/WIDER Conference on the New Economy in Development, 10-11 May, Helsinki.
- Le Blanc G., 2004, "Regional specialization, local externalities and clustering in Information Technology industries", Paganetto L. (eds.), *Knowledge economical, Information technologies and growth*, Ashgate, Hampshire, England.
- Longo E., 1997, "Vademecum per l'ISO 14000", *Impresa Ambiente*, n. 2, pp. 47-56.
- Mansell R. (ed.), 1994, *Management of Information and Communication Technologies*, London, Aslib.
- Mitchell W., 1995, *City of Bits: Space, Place and the Infobahn*, Cambridge Mass, MIT Press.
- Nanthikesan S., 2000, *Trends in Digital Divide*, Harvard Center for Population and Development Studies, Cambridge, Harvard.
- Negroponte N., 1995, *Being Digital*, London, Hodder and Stoughton.

- Norton B. G. and Toman M. A., 1997, "Sustainability: ecological and economics perspectives", *Land Economics*, v. 73, n. 4, pp. 553-568.
- OECD, 1992, *Cities and New Technologies*, Paris, OECD.
- Panagariya A., 1999, *Trade Openness: Consequences for the Elasticity of Demand for Labor and Wage Outcomes*, University of Maryland, Mimeo.
- Parker S. and Cocklin C., 1993, *The use of geographical information systems for cumulative environmental effects assessment*, *Computers, Environment and Urban Systems*, v. 17, pp. 393-407.
- Pickles J., 1995, *Ground Truth: The Social Implications of Geographic Information Systems*, London, Guildford Press, pp. 68-87.
- Pigato M., 2001, "Information and Communication Technology, Poverty and Development in Sub-Saharan Africa and South", *Africa Region Working Paper*, n. 20, Washington DC, World Bank.
- Pozzana G., Campari I. and Franchini D., 1999, *Valutazione d'Impatto Ambientale e Geographic Information Systems*, Angeli, Milano.
- Prezioso M., 1995, *La base geoeconomica della Valutazione di Impatto Ambientale*, Pacini, Pisa.
- Prezioso M., 1996, "Qualità ambientale e qualità d'impresa", *De Qualitate*, n. 4, April, pp. 8-15.
- Prezioso M., 1996, "Qualità ambientale e qualità d'impresa", *De Qualitate*, n. 5, May, pp. 16-21.
- Prezioso M., 2001, "La qualità nell'informazione per e nel processo di pianificazione", V National Conference ASITA, *La qualità nell'Informazione geografica*, Rimini, October 9-12, v. 1, pp. CIII-CXII.
- Prezioso M., 2003, *Pianificare in sostenibilità*, AdnKronos, Roma.
- Primo Braga C. A., Carsten F. and Paz S. C., 1999, *Intellectual Property Rights and Economic Development*, TechNet Working Paper.
- Rheingold H., 1994, *Comunità virtuali. Parlare, incontrarsi, vivere nel cyberspazio*, Sperling & Kupfer, Milano.
- Sassen, S., 1991, *The Global City: New York, London, Tokyo*, Princeton, Princeton University Press.
- Saxenian A., 1999, *Regional advantage: culture and competition in Silicon Valley and Route 128*, Cambridge, Harvard University Press.
- Scott A., 1998, *Region in the World Economy*, Oxford University Press, Oxford.
- UNDP, 2001, *Making New Technologies Work for Human Development. Human Development Report 2001*, United Nations Development Programme, New York and Oxford, Oxford University Press for UNDP.
- Vallega A., 1995, *La regione, sistema territoriale sostenibile: compendio di geografia regionale sistematica*, Mursia, Milano.
- Valvassori A., 1997, "Qualità ambientale e qualità totale: il ruolo delle norme ISO 14000", *Impresa Ambiente*, n. 7, pp. 60-67.
- World Bank, 1998, *World Development Report*, New York, Oxford University Press.
- Wellmann B. and Giulia M., 1999, "Netsurfers don't ride alone: virtual communities as communities", Wellmann B., (ed), *Networks in the Global village*, Boulder, Westview Press, pp. 331-366.
- Zook M., 2000, "The Web of production: the economic geography of commercial Internet content production in the United States", *Environment and Planning A*, n. 32.