ORGANISATIONAL NETWORK TOPOLOGY OF THE KNOWLEDGE-DRIVEN ECONOMY: ORGANISATIONAL CONDITIONS OF KNOWLEDGE VALORISATION

Panagiotis Damaskopoulos, MA, PhD
INSEAD
Boulevard de Constance
77305 Fontainebleau Cedex
France
Tel: +33 (0) 1 60 72 41 39
e-mail: panagiotis.damaskopoulos@insead.edu

ABSTRACT.

This paper develops a framework of analysis of the emerging organisational network topology of the new knowledge-driven economy in order to identify critical success factors in the process of innovation. The central argument of the paper is that innovation constitutes the foundation of the competitiveness and value-creation capabilities of economic organisations. However, innovation is not something happening "inside" organisations but rather at the networked interfaces of organisations with the business, regulatory and institutional environment within which they operate. The new knowledge-driven economy is an emerging economic system that is powered by information and communication technology (ICT), is knowledge-driven, is organised around electronic and organisational networks that generate knowledge and transform industries and markets, and is dependent on dynamic and flexible regulatory public institutions. For new ICT to diffuse throughout the whole economy, thus enhancing the knowledge and learning capabilities of organisations, business firms, market conditions, and the culture and institutions of society need to undergo substantial change. It is the dynamic interdependence of these conditions that is the source of innovation and value creation in the new knowledge-driven economy. This is why the agenda of research on the dynamics of adoption of new economy practices, innovation, and economic growth needs to be expanded beyond the level of the firm. It needs to be built around the dynamic interrelationships between technological transformations, firms' organisational and knowledge-creating capabilities, emerging market and industrial structures, and public institutions.

INTRODUCTION

Information and communication technology (ICT) is today recognised as the epicentre of a profound economic dislocation associated with what has come to be known as the transition to the new knowledge-driven economy. The capacity of organisations to engage in learning processes has increasingly come to be viewed as a crucial determinant of innovation, enterprise performance and economic development [Lunvall and Johnson, 1994, Nonaka and Takeuchi, 1994, OECD, 2001]. In the emerging new economy innovation constitutes the foundation of the competitiveness and value-creation capabilities of economic organisations. Innovation has emerged as a strategic issue because of the disarticulation of established economic and social structures and processes that the new economy and the new society bring in their path. This disarticulation is the product of the interplay of technological, industrial, economic and social transformations. The alignment and re-articulation of technological capabilities, especially ICT, through novel knowledge-creating organisational forms geared to constant innovation and value creation is the intangible quality that today determines the competitiveness of economic organisations and the national and regional environments within which they operate.

Innovation is not something happening "inside" organisations but rather at the networked interfaces of organisations with the business, regulatory and institutional environment within which they operate. The process of innovation is increasingly driven by open-source networks of cooperation and involves dynamic interrelationships between technological transformations, organisational capabilities of firms, and public institutional and regulatory structures supportive of innovation and entrepreneurship. In other words, for new information technologies that power the new economy to be able to spread throughout the whole economy, thus enhancing productivity growth, business firms, the culture and institutions of society need to undergo substantial change. This is why the agenda of research on the dynamics of adoption of new economy practices, innovation, and economic growth needs to be expanded beyond the level of the firm. It needs to be built around the dynamic interrelationships between technological transformations, firms' organisational knowledge-creating capabilities, emerging market and industry structures, and public institutions [Boyer and Saillard, 1995; Berger and Dore, 1996, Castells, 2000].

The paper is structured around three dimensions. The first advances an analysis of the pattern of change associated with the passage to the new knowledge-driven economy with specific attention to the open-source networked nature of innovation. The main argument here is that in the emerging economic environment it is networks, not firms, which are increasingly becoming the basic units of economic activity and analysis. The second concentrates on the emerging organisational forms that underpin processes of innovation. Innovation is a function of organisational forms that generate synergistic relationships between technology, organisational flexibility, and highly skilled labour. Organisational passages that convert knowledge into innovation and improved economic performance run through networks within, between and across organisations. In this context, the paper explores the concept of the "network enterprise". The third dimension develops an analysis of the interfaces between firms and their public regulatory and institutional environment. Paths toward innovation are highly differentiated across institutional geographies. In this respect, the paper explores a key element in the emerging industrial geography of the new knowledge-driven economy – "clusters of innovation", that is, the organisational and institutional matrices – including firms

that are networked within and through such clusters, public institutions, universities and research centres – that underpin accelerated paces of technological uptake, organisational knowledge creation and their deployment for innovation and value creation.

1. LOCATING THE STRATEGIC IMPORTANCE OF NETWORKED ORGANISATIONAL KNOWLEDGE

One of the remarkable trends of the era of "irrational exuberance" was the almost exclusive emphasis of much business academic and professional commentary on the dot.com phenomenon and, in retrospect, the unrealistic valuations of high technology and Internet-based firms. Indeed, the proliferation of the "e" portions attached to economic activity, coupled to the rapid introduction of the Internet in established business processes gave the impression that what was "new" in the emerging economic environment was the "transfer" of business processes online. In the wake of the collapse of the high-tech stock bubble academic and business opinion are marked not only by uncertainty but also by scepticism as to whether the technological transformations associated with ICT and the Internet were the harbinger of a new phase in the development of the global economy or simply a temporary phenomenon that was brought about by speculation. What is in question today is whether the technological, economic and organisational changes associated with ICT amount to the formation of a new economic system, a new economy. In this context, it is imperative that research in the domain of e-business in particular and the knowledge-driven economy in general be underpinned by explicitly articulated operating assumptions and conceptual categories.

E-business is not an economic activity conducted through computer-enabled electronic networks. E-business is a central component of a new economic system that is powered by ICT, is dependent on highly knowledgeable labour, and is organised around electronic and organisational networks. The historical specificity of this new economic system is that it is *knowledge-driven*, it is *global* and it is *networked* in terms of technology and organisation. It is *knowledge-driven* because the productivity and competitiveness of economic units depend upon their ability to create, process and convert information into knowledge geared to innovation and value creation. It is *global* because the core processes of production, consumption, and circulation are organised on a global scale through functional linkages among economic agents. It is *networked* because productivity and competition are organised through a global network of interaction between and across business networks. These three central features do not mean that the emerging economic environment leads towards convergence of economic systems. ICT broadens the scope of economic activity, which means that business systems interact on a global scale. In this context organisational forms diffuse across institutional environments, borrow from each other, and create organisational amalgams that correspond to common patterns of business organisation and competition, while adapting to the specific social environments within which they operate. In other words, forms of economic organisation are mediated by antecedent organisational forms, institutional structures and cultures. This mediation is of fundamental importance in the acceleration, or deceleration, of learning processes and processes of innovation [Castells, 2000, OECD, 2001].

One of the key drivers of change in the emerging economic environment is closely linked to two key industries that not only introduced process and product/service innovations, but also applied such innovations to their own structures and processes, which resulted in higher

growth and productivity, and through competition, to the diffusion of new business models throughout the economy. These industries are *ICT* and *finance*. Indeed, it is the global interconnection of the financial markets facilitated by ICT and regulatory reform that makes the new economy global. At the core of the new ICT industries are the Internet-centred firms and Internet-related components of "old economy" types of organizations. However, the centrality of Internet-related economic activity is not related to the until-recently exponential revenue growth and market capitalization value of Internet-related firms. Instead, their economic and business significance lies with the potentially dramatic impact of ICT on the way "old economy" business, is conducted [Castells, 2000, Cairncross, 2002].

The financial component of the new economy is related to the successive rounds of innovation during the last quarter of the 20th century that have resulted in a profound transformation of financial markets both organizationally and technologically. Financial markets are increasingly globalised and interdependent while they are one of the leading domains of application of new ICT. The global financial market is a central component of the emerging economic system. The ability of capital to flow in and out of securities and currencies across markets, and the hybrid nature of financial derivatives, are intertwining through regulatory changes. At the same time, ICT-enabled innovation is transforming the nature of financial transactions. The widespread use of ICT and the Internet have fundamentally changed financial trade between companies, between companies and the investment community, between sellers and buyers, and not least, the stock exchange markets. This change has important implications not only for financial markets but also for the entire economy. ICT-enabled transaction mechanisms reduce transaction costs, thus significantly increasing market volume because the globally interconnected financial markets are able to mobilize savings for investment on a planetary basis, while accelerating the turnover of investment [Strange, 1986, Canals, 1997, Orléan, 1999, Castells, 2000].

The dialectical interplay between ICT and finance has been in many ways the central axis, the *flywheel* that accounts for the dynamism, global reach, and innovation potential of the emerging knowledge-driven economy. The technological infrastructure of financial markets allows for processes of financial innovation and the development of new financial products that create and allocate value on a planetary basis out of trade in securities. On the other hand, ICT-enabled financial innovation encompasses an increasingly larger sphere of economic life where almost any potential source of value can be converted into a security and traded in financial markets globally through ICT-enabled transaction systems. This process of conversion of potential sources of value into financial securities, i.e., securitisation, is the driving force of the financial industry. Financial markets, in this respect, constitute a strategic network of the new economic environment. For it is there that value is assigned to economic activity as represented by its stocks, bonds, derivatives or any kind of security. The valuation of companies, and thus their capacity to attract capital, depends in a fundamental sense on the judgment of the financial market [Castells, 2000].

The question of how this judgment is and should be formed is one of the most complex questions in contemporary economic analysis and is the subject of considerable debate. Nevertheless, recent experience and research suggest that *expectations* (on the part of financial markets) about the future growth projections of enterprises in terms of actual profitability and future financial value and *trust in the institutional environment* within which financial markets and enterprises operate are central determinants of investment [Castells,

2000, Castells, 2001]. However, to reach the financial market, and to compete for higher value in it, firms have to go through innovation in technology, processes, product/service lines, management quality, and branding. Indeed, the ability to innovate in these domains becomes the cornerstone of competitiveness in the emerging economic environment [Tuomi 1994]. But the key to innovation lies in creative thinking and knowledge applied toward the identification of value-creating opportunities. It is leveraging these opportunities that leads to value creation. Indeed, today the connection between organisational knowledge and innovation has become so critical that many companies consider organisational knowledge, coupled to organisational processes geared to continuously improving information and communication channels, as risk management. The reason is that sharing and transferring knowledge within and across organisations enables companies to increase organisational and operational transparency, which, in turn, helps to reduce risk. In other words, organisational knowledge is about access to timely and relevant information and the conversion of information into knowledge through open organisational channels of communication, which combine to improve judgment on the performance of a firm [Dore, 2001].

However, paths toward innovation are conditioned by three structural transformations associated with the new economy that have significant implications for the organisational structure of the firms operating in it. First, ICT centred on the Internet, in combination with globally integrated financial markets, tend to overcome one of the historic impediments to market transparency: geographical distance [Harvey, 1990]. Transparency is a highly transforming condition that affects two dimensions of the business process. ICT increase transparency in the operation of financial markets. Openness of corporations to financial markets is primarily a function of the financial disclosure regulations that govern public trading, i.e., access to capital markets. ICT increase transparency in that they enhance the ability of shareholders and other stake-holding constituencies of organisations to track more intensely the performance of managers and align it more closely toward maximising the value-creating capabilities of organisations [Goldman Sachs, 1999].

On the other hand, ICT increase price and process transparency. Pricing becomes more transparent as more transactions can be put to the test of auction. Customers can track the progress of their orders while suppliers can get information electronically out of their customers' databases. This kind of transparency affects every aspect of business operations. Small changes in things such as price, product quality, service, responsiveness, and even partnerships could, in theory, be rapidly registered in market share shifts. Putting a business process online has effects throughout a company, since it introduces more information and volatility into strategy. As a result, partnerships and customer relations that underpin existing business models are being reconfigured. In reality, excepting financial markets where they are negligible, switching costs for most industries still represent a significant element of friction. Nonetheless, the Internet contains the potential to move most industries closer to textbook transparency. As a recent authoritative report notes, the Internet is "the mother of all looking glasses" [Morgan Stanley Dean Witter, 2000].

The second implication of the new economy acts on the level of the spatial organisation of firms. As information technology and the Internet become entrenched into corporate life, the economic foundation of the firm changes. Business theory on the spatial configuration of the firm has argued that the boundaries of firms are determined by the cost of transactions, and especially the cost of communication [Coase, 1937]. One of the central canons that guided

business practice for much of the 20th century was that an enterprise should aim for maximum integration as a key to competitiveness and efficiency. In the new economy, by contrast, disintegration and decentralisation are becoming the new canon for competitiveness. There are primarily two reasons for this. The first is that the knowledge needed for any economic activity has become highly specialized which means that it is becoming increasingly costly and complex to maintain the necessary competencies for every major task within any given organisation. And since knowledge is a quality that can be rapidly depleted unless it is used constantly, maintaining within an organisation an activity that is used only intermittently leads to incompetence. The second reason why disintegration and decentralisation are becoming important is that the physical cost of communication is becoming virtually nil which means that in order to organise efficiently firms must search for the most economically optimum form of organisation [Drucker, 2001].

The reduction of the information costs attached to transactions, thus, unleashes a process of reconfiguration of the internal and external boundaries of firms. The reduction of information costs enhances organisational capacity to link different operations within and between firms and outsource critical business process components. An important implication of this is the acceleration of the cycle from conception to rollout. At the same time, the Internet is a fertile ground for the development of new ideas and hence competition, which reinforces the need for companies to develop mechanisms for "reading" and adjusting to the shifting conditions of competition. Within companies, the implication is a greater need for collaboration in order to maximize synergies and increase efficiencies across all lines of the business process.

The third implication of the new economy is that it introduces a dialectic of centralization/decentralization in companies. This is largely a function of software standards required in order to enable the transfer of information within and between organisations with different software systems, naming conventions, procedural methodologies etc. At the same time, standardisation increases the capacity of all parties involved (management, employees, external partners) to "see through" the entire process. Transparency, in other words, though it significantly enhances the influence of shareholders also increases the potential of other corporate stakeholders or partners to "see through" a company's activities. More specifically, it enables management to contribute to the activities at the frontlines of the company's operations. On the other hand, in the context of the pattern of economic change and heightened competition companies need information at the frontlines of their operations. Hence the need for decentralised organisational forms that enhance the autonomy of employees not only in the generation of knowledge but also in terms of decision-making and action, in order to acquire knowledge of developments at the frontlines of their operations (i.e., the market touch-points with customers, suppliers etc.) and to constantly adjust to shifts in the competitive environment within which a company operates [Cairncross, 2002].

The structural impact of this set of transformations is that the process of innovation is increasingly becoming a function of open-source networks of cooperation. Open-source networks are composed of teams of company employees and entrepreneurs within as well as across the formal boundaries of organisations Innovation itself is driven by three main factors. The first is the generation of new knowledge in the form of scientific and technological know-why, know-how and know-what and know-when and the practice of management. This presupposes the existence of well-developed public and private R&D systems able to provide the key ingredients of innovation. The second is the availability of highly educated, motivated

and autonomous labour, capable of applying new knowledge in innovative ways to increase productivity and improve business performance. The third factor is the existence of entrepreneurs. Entrepreneurial drive is a key element of innovation since it functions as a catalyst in the transformation of new business ideas and projects into innovation and improved business performance [Castells, 2001].

In the emerging economic environment timely access to information related to each market a company is operating in is critical for competitive success. However, such access in a constantly changing economic environment marked by highly diverse market dynamics is not feasible on the basis of inflexible and top-down organisational structures. ICT allows for the simultaneous decentralisation of the information retrieval process from different spaces and for its integration into a flexible system. This technological structure spans different institutional and regulatory spaces which present the potential for large multinationalfirms to link with small and medium size enterprises according to contingent project demands forming networks that are able to innovate and adapt continuously. Business projects are implemented in diverse domains and can be directed to product and service line development and organisational tasks across different territorial areas. Successful business project implementation is a function of information that is generated and processed on the basis of ICT systems between and across companies, on the basis of knowledge acquired from each area. In other words, the key passages of information and knowledge that underpin the process of innovation run through networks: ICT and organisational networks within, between and across companies [Castells, 2000, Castells, 2001].

2. KNOWLEDGE AND ORGANISATIONAL DESIGN: THE "NETWORK ENTERPRISE"

It is this set of structural transformations associated with the emerging knowledge-driven economy that largely accounts for the ascending importance of intangible corporate assets in the process of value creation [Lev, 2001]. The growing importance of intangibles can be appreciated in historical perspective. For much of the early 20th century multinational firms were domestic firms organised internationally on the basis of a structure of subsidiaries that were operating quasi-autonomously within territorially defined institutional jurisdictions. During the closing decades of the 20th century multinationals tended to become increasingly organised on a global basis that was defined by product and service lines. More recently corporate strategies underpinning foreign investment are geared toward the development of structured relationships between companies operating in different sectors and institutional environments. In the emerging context, it is alliances, joint ventures know-how agreements and minority stakes that are becoming the critical components of innovation strategies. At the same time, the organisational topology of the operations of multinational firms spans a global institutional and regulatory matrix. This means that the critical tasks of management are becoming balancing acts of conflicting demands between short-term profitability and long-term strategic growth made by the modern corporation's stakeholding constituencies: shareholders, i.e., financial markets, especially institutional investors and pension funds, customers, knowledge employees and communities [Drucker, 2001].

In other words, the transition to the knowledge-driven economy involves a shift in the parameters of the valorisation process which increases the value of the intangible assets of

organisations and more specifically their "organisational capital". Organisational capital is not a "thing"; it is a relationship of different intra-organisational components or departments on the level of the corporation itself and the relationship of these to the competitive business environment within which the company operates. Successful management of "organisational capital" depends on the knowledge-generating and learning capabilities of organisations and their deployment for innovation and value creation. The correlation between knowledge and organisational change and adaptation is a function of the fact that in the new economy though investment in technology is important, it is innovation in processes, product and service lines that is the key determinant of the innovation capabilities market capitalisation of firms [Brynjolfsson, Hitt and Yang, 2000, Bounfour and Damaskopopulos, 2001].

The term "organisational capital" refers to a nodal concept that is composed of several subcategories of intangible capital. It encompasses, but is not restricted to, the following. Market capital: not the physical qualities of the products a firm produces, but the intelligence and know-how that go into creating and developing new products and services. It also includes intangible attributes that are closely related to products such as trademarks, patents, brand reputation, corporate reputation, and other marketing materials; Intellectualcapital: the knowledge, skills, and competencies that managers and employees possess; Structural capital: any type of knowledge or innovation that affects IT platforms, internal processes, which are critical to the production and distribution of a firm's products and services; Relationship capital: the company's relationship with its customers and other stakeholders, including financial markets and the investment community, government and community institutional structures; Communications capital: the benefits of leveraging and communicating intangibles which may result in positive analyst recommendations, increased investor demand, premium pricing, more committed employees, and so on.

The growth of the strategic importance of intangible assets can be understood as a shift that places increasingly higher value to the information assets, or more correctly, knowledge assets of corporations. The differentiation of *information* from *knowledge*, in this context, acquires strategic significance. The value of information generated by computer systems depends on human interpretation. Knowledge, by contrast, resides in a social inter-subjective context and the human capacity for action based on that information. Thus, knowledge in a corporate organisational context can be distinguished from information since it is more directly linked to action and organisational performance. Organisations, of course, cannot manage knowledge *per se*. They can, however, create an environment that fosters the continuity, creation, and sustained use and of knowledge and its application within the organisation [Davenport and Prusak, 1998; Von Krogh, Ichijo, Nonaka, 2000].

Efficiently managing "organisational capital" depends in a fundamental sense on the development of organisational forms that generate mutually reinforcing dynamic interrelationships between ICT, organisational flexibility, and highly skilled and motivated labour [Bresnahan, Brynjolfsson and Hitt 2000, Bounfour and Damaskopoulos, 2001]. There is a particular organisational form that has emerged as a critical component of competitiveness in the new economy: the 'network enterprise' [Powell, 1990, Powell and Smith-Doerr, 1994, Applegate et al 1999; Dutta and Evgeniou, 2002; Hagel and Seely Brown, 2001]. In contrast to earlier vertically integrated hierarchical organisational structures, this is a flexible organisational form of economic activity, built around specific business projects and strategic objectives. The business projects themselves are set in motion through the

cooperation of networks of various and flexible duration periods, diverse origins and compositions of skills and competencies. Indeed, such is the structural change associated with the transition to the new economy that the basic unit of economic activity and theoretical analysis is increasingly the network, not the firm. The firm continues, of course, to be the basic repository of property rights, strategic management and the accumulation of capital. However, business practice is increasingly a function of *ad hoc* networks whose expertise is solicited for the achievement of specific business project goals. In terms of its internal organisational structure the "network enterprise" is characterized by several main trends: its organization is structured around process, not task, it has a flat organisational hierarchy, the work process is organised on the basis of teams, customer satisfaction is the primary measure of business performance, the structure of reward is based on team performance, the maximisation of contacts with suppliers and customers is an integral part of the business process, and information, continuous training of employees at all levels are considered critical to business success [Castells, 2000].

3. ORGANISATIONAL KNOWLEDGE BEYOND THE BOUNDARIES OF THE FIRM: "CLUSTERS OF INNOVATION"

It is synergy among these networked organisational components and their interaction with the business, regulatory and institutional environment in which firms operate that decides the innovative capabilities and competitiveness of organisations in the knowledge-driven economy. ICT and the Internet have long been considered as bringing about "the end of geography" since the transparency they introduce into the economic process makes location less important - organisations have access anywhere and any time. Yet, recent research demonstrates a remarkable geographical concentration of not only the production process of technologies that presumably annihilate geography but also the continuing concentration of significant ancillary services key to the new knowledge-driven economy, services ranging from finance to legal services and advertising. Why is this happening? Research shows that spatial concentration and geographical proximity continue to hold a fundamental importance in fostering innovation. Innovation, in other words, is not something happening "inside" organisations but rather at the interface of organisations with the business, regulatory and institutional environment within which they operate [Sassen, 1991, Saxenian, 1994, Porter, 1998, Gambardella and Malerba, 1999, Saskia Sassen, 2000, Crouch, 2001, OECD, 2001].

A key element in this spatial concentration has to do with "clusters of innovation" which denote organisational, social and institutional matrices that underpin accelerated paces of technological uptake, organisational knowledge creation and their deployment for innovation. These matrices incorporate specific sets of relationships of production and management, embedded in social and institutional structures that support a culture of entrepreneurship and encourage the development of new business processes geared to innovation. The central feature of the institutional infrastructure of these spatial concentrations is the synergistic network relationships they foster among and across firms and institutions of the public sector. Typical components of a "cluster" include companies that are networked within and through the cluster, venture capital firms, public institutions such as boards of trade and dedicated investment-attracting and promotion agencies (necessary for the creation of a business-friendly environment), universities and research centres (necessary for the support of networked R&D activities and the generation of know-why, know-how, know-what and

know-when). The key in the competitive position of "clusters of innovation" is their ability to generate synergy, that is, the added value that results not from the cumulative economic impact of the critical elements present in the cluster but from their interaction in a way that fosters innovation [Castells and Hall, 1994, Castells, 2000, Morgan et al., 1999, OECD, 2001].

Research indicates that the processes of organizational learning which are central to continuous innovation themselves display a spatial logic of concentration, which increases the importance of new forms of comparative differentiation across regions. Spatial proximity between organisations is crucial to the exchange of information and knowledge through which organisational learning emerges [Storper, 1995]. However, it is important to differentiate between "organisational proximity" and "spatial proximity". The former does not necessarily depend on the latter since the growing sophistication of ICT opens up new possibilities for the growth of effective learning networks among organisations based upon spatially dispersed interaction [Castells, 2000]. However, it remains the case that the critical elements of organisational learning continue to take place within networks of organisations that are spatially proximate. Spatial proximity may create the conditions for organisational learning through channels of social interaction; for instance, by increasing the frequency of personal contacts among the agents within the innovation system. More fundamentally, however, at least some of the key elements of knowledge which are generated and disseminated through interaction are tacit, that is they are embedded in particular local social systems of interaction. Access to this social field of knowledge, as a result, depends on participation in the local social system within which such knowledge is produced [OECD, 2001].

Thus, while there is accumulating evidence of structural changes that sustain trends toward the globalisation of economic processes this does not render the comparative difference among localities any less significant. On the contrary, a critical issue in the growing importance of locality has to do with the modalities and patterns of organisational learning that are implicated in the complex interactions between global and local processes. The specific elements that structure the social and economic fabric of regions, that is, their economic structures, patterns of social and political relations, cultural and institutional settings, are themselves critical factors that condition and shape emerging patterns of economic development and organisational forms. Hence a key question regarding a locality's economic trajectory is the extent to which its social institutions can operate as frameworks enabling responses to the challenges of the new knowledge-driven competitive environment [OECD, 2001]. In other words, in order to reap the benefits associated with participation in a cluster, firms, public bodies and all the central elements that compose the duster need to be "learning organizations" [Morgan, 1997]. It is this amalgam of private enterprises and public institutions that is at the centre of systems of innovation in the knowledge-driven economy.

CONCLUSION

The economic dislocation associated with the transition to the new economy brings in its path a set of transformations that amount to a shift in the parameters of the process of value creation. In the emerging new knowledge-driven economic system innovation constitutes the foundation of the competitiveness and value-creation capabilities of economic organisations.

However, as a consequence of the structural transformations that the emerging new economy brings in its path, innovation is migrating toward a more complex topology of networks which "pass through" the organisational structures of individual firms and the market, regulatory and institutional environment within which they operate. Innovation is not something happening "inside" organisations. The process of innovation is increasingly driven by open-source networks of cooperation and involves dynamic interrelationships between technological transformations, organisational capabilities of firms, and public institutional and regulatory structures supportive of innovation and entrepreneurship.

The diffusion of new ICT throughout the whole economy, which is a key condition for productivity growth, depends on broad-based transformations involving business organisations, the culture and institutions of society. The central challenge of modern management as well as public policy-making in this respect has to do with the development of strategic synergies between technological transformations, firms' organisational and knowledge-creating capabilities, emerging market and industrial structures, and public institutions. This is a tall order but as with previous profound economic dislocations the central challenge confronting individual organisations and economic systems is not one of adoption of technology on the level of the firm. It is one of developing institutions that nurture and support the economic potential of the emerging new knowledge-driven economy within a flexible but socially balanced mode of economic development.

References

Applegate, Lynda M., F. Warren McFarlan, James L. McKenney (1999), *Corporate Information Systems Management: Text and Cases*, McGraw-Hill.

Archibugi, Daniele et al. (ed.), (1999), *Innovation Policy in a Global Economy*. Cambridge University Press.

Berger, Suzanne and Ronald Dore, (1996), *National Diversity and Global Capitalism*, Ithaca: N.Y.: Cornell University Press.

Bounfour, Ahmed and Panagiotis Damaskopoulos (2001), "Managing Organisational Capital in the New Economy: Knowledge Management and Organisational Design" in Brian Stanford-Smith and Enrica Chiozza (eds.), *E-work and E-commerce: Novel Solutions and Practices for a Global Networked Economy*, Volume 1, Amsterdam: IOS Press.

Boyer, Robert and Yves Saillard, (1995), *Théorie de la regulation: l'état des saviors*, Paris: La Découverte.

Bresnahan, Timothy, Erik Brynjolfsson and Lorin Hitt, "Information technology, workplace organization, and the demand for skilled labor: firm-level evidence" Cambridge, MA: MIT-Sloan School Center for E-business, working paper.

Brynjolfsson, Erik, Lorin M. Hitt and Shinkyu Yang, (2000), "Intangible Assets: How the Interaction of Companies and Organizational Structure affects Stock Market Valuations", MIT Working Paper, July at http://ebusiness.mitedu/erik/

Cairncross, Frances, (2002), *The Company of the Future: Meeting the Management Challenges of the Communications Revolution*, London: Profile Books.

Canals, Jordi, (1997), *Universal Banking: International Comparisons and Theoretical Perspectives*. Oxford.

Castells, Manuel, (2000), *The Information Age: Economy, society and Culture.* Volume I: *The Rise of the Network Society*, Volume II: *The Power of Identity*, Volume III: End of Millennium, Oxford.

Castells, Manuel, (2001), *The Internet Galaxy: Reflections on the Internet, Business and Society.* Oxford: Oxford University Press.

Castells, Manuel and Peter Hall, (1994), *Technopoles of the World: The Making of Twenty-first Century Industrial Complexes*, London.

Coase, Ronald, H., (1937), "The nature of the firm", *Economica.*

Cooke, Philip, et al., (2000), *The Governance of Innovation in Europe: Regional Perspectives on Global Competitiveness.* Pinter Publishers.

Crouch, Colin (ed.), (2001), *Local Production Systems in Europe: Rise or Demise?* Oxford University Press.

Damaskopoulos, Panagiotis and Mel Horwitch, (2002), "The 'new innovation' in the financial services industry: perspectives on institutional finance', Interim Report on the findings of the Inaugural Roundtable on innovation in the financial services industry, organised by INSEAD and the New York Polytechnic Institute for Technology and Enterprise, June.

Davenport H. Thomas and Laurence Prusak, (1998), *Working Knowledge: How Organizations Manage What They Know*, Cambridge, MA: Harvard Business School Press.

Dore, Lucia, (2001), *Winning Through Knowledge: How to Succeed in the Knowledge Economy*, Special Report by the *Financial World*, The Chartered Institute of Bankers in Association with Xerox. London: March.

Drucker, Peter, (2001), "The next society: a survey of the near future" *The Economist*, November 3rd.

Dutta, Soumitra and Theodoros Evgeniou, (2002), *CRM in a Networked Economy*, INSEAD working paper.

European Commission, (2000), *Innovation policy in a knowledge-based economy*; Maastricht Economic Research Institute on Innovation and Technology.

Gambardella, Alfonso and Franco Malerba (eds.), (1999), *The Organisation of Economic Innovation in Europe*, Cambridge University Press.

Goldman Sachs Investment Research, (1999), *E-Commerce/Internet: B2B: 2B or Not 2B*, November.

Hagel, J.ohn and John Seely Brown, (2001), "Your Next IT Strategy", *Harvard Business Review*.

Harvey, David, (1991), *The Condition of Postmodernity.* Oxford: Oxford University Press.

Krogh Georg Von, Kazuo Ichijo, Ikujiro Nonaka, (2000), *Enabling Knowledge Creation: How to Unlock the Mystery of Tacit Knowledge and Release the Power of Innovation*, Oxford: Oxford University Press.

Lev, Baruch, (2001), *Intangibles: Management, Measurement, and Reporting*, Washington DC: Brookings Institute

Lunvall, B. A. and Johnson, (1994), "The Learning Economy", *Journal of Industry Studies*, No. 1.

Morgan, K., Rees, G., and Garmise, S., (1999), "Networking for Local Economic Development", in G. Stoker (ed.), *The Management of British Local Governance*. Basingstoke: Macmillan.

Morgan, K., (1997), "The Learning Region: institutions, innovation and regional renewal", *Regional Studies*, No. 31.

Morgan Stanley Dean Witter, *The B2B Internet Report, Collaborative Research*, April 2000.

Nonaka, Ikujiro and Takeuchi Hirotaka, (1994), *The Knowledge-creating Company.* New York.

OECD, (2000), *A new Economy? The changing role of innovation in information technology in growth*, Paris.

OECD, (2001), *Cities and Regions in the New Learning Economy*, Paris.

Orléan, André, (1999), *Le Pouvoir de la Finance*, Paris.

Porter, Michael, (1998), "Clusters and the New Economics of Competition", *Harvard Business Review*, November-December.

Powell, W. W, (1990), "Neither Market nor Hierarchy: Network forms of organization", *Research in Organizational Behavior*, Vol. 12.

Powell, W. W. and L. Smith-Doerr (1994), "Networks and Economic life", in N. Smelser and R. Swedberg (eds.), *Handbook of Economic Sociology.* Princeton University Press, Princeton,.NJ.

Sassen, Saskia, *Cities in a World Economy*, 2nd Edition, London: Pine Forge Press.

Saxenian, Anna Lee, (1994), *Regional Advantage*, Cambridge MA: Harvard University Press.

Storper, M., (1995), "The resurgence of Regional Economies, Ten Years After: the region as a nexus of untraded interdependencies", *European Urban and Regional Studies*, No. 2.

Strange, Susan, (1986), *Casino Capitalism*, London: Blackwell.

Tuomi, Ilkka, (1994), *Corporate Knowledge: Theory and Practice of Intelligent Organizations*, Helsinki.