

Knowledge Economy

Aphra Kerr and Seán Ó Riain

Department of Sociology, National University of Ireland, Maynooth.

Pre-publication version which appears in Kitchin R, Thrift N (eds) *International Encyclopedia of Human Geography*, Volume 6, pp. 31–36. Oxford: Elsevier. ISBN: 978-0-08-044911-1

Keywords: knowledge, post-industrial society, world summit on the information society, intellectual property, informational capitalism, time-space.

One of the most influential approaches to the understanding of contemporary socio-spatial organization is that which emphasises the emergence of a ‘knowledge economy’. The knowledge economy highlights the increasing importance of the informational content of goods and services, the mobilization of knowledge in the production process, the occupational trends towards professionalisation, the commercialization of knowledge and the sectoral shift from an economy based on the manufacturing of industrial goods by production workers to one based on the design of informational goods and services by knowledge workers (Reich, 1991; Castells, 1997; Jessop, 2000).

This informational form of capitalism is also linked to socio-spatial change and particularly the rise of a global economy, spanning local and national borders and apparently operating on a planetary scale (Giddens, 1990). Furthermore, this global informational capitalism is also characterized by new organizational forms, typically captured under the loose rubric of ‘network’ forms of organisation (Freeman and Louca, 2000), and new patterns of socio-spatial inequality, linked in part to the ‘digital divide’ but reaching more broadly into the restructuring of work, employment and social reproduction.

We examine a number of key questions regarding this knowledge economy. First, we look at the origin of the concept as well as early attempts to define and map the knowledge economy empirically. Second, we examine a variety of perspectives on the socio-spatial organisation of the knowledge economy and approaches which link techno-economic change and social-spatial organisation. Building on a critique of these perspectives, we then go on to develop a view of a knowledge economy that is contested along each stage of the process of the production, use, ownership and transformation of knowledge. We show that these struggles occur both globally and locally and are crucial forces shaping contemporary socio-spatial organisation. Finally, we briefly discuss the

emergent patterns of socio-spatial inequality associated with this politically constructed knowledge economy.

Origins of the Knowledge Economy: Empirical and Conceptual

For many people the US was the first information/knowledge economy. This view has its theoretical and empirical origins in the work done by Fritz Machlup (1962) and his study of the economic contribution of the knowledge and information industries to the US economy. Machlup recategorised national statistical data and found that information industries accounted for almost 29 percent of the adjusted Gross National Product (GNP) in 1958 and that information occupations accounted for 32.4 percent of total employee compensation.

Machlup has been credited with founding the ‘economics of information and knowledge’ sub-discipline. For him information and knowledge were intrinsically related but nevertheless distinct, for while informing can bring about knowledge not all information is knowledge. He defined the production of knowledge as ‘any human activity effectively designed to create, alter or confirm in a human mind – one’s own or anyone else’s – a meaningful apperception, awareness, cognisance or consciousness of whatever it may be’ (1962:30). His taxonomy of knowledge was broad and included knowledge outside the formal economy, although he admitted that he could not measure the contribution of such knowledge to the economy.

Machlup’s approach was replicated by others and these early statistical studies of knowledge production highlight significant shifts in terms of employment and work from the late 1940s in the US and at varying times in other OECD countries. For Machlup and many others the growth of information industries and information type jobs was driven by technology, particularly computer technology. For others the seeds of these changes were sown further back when the technologies of the industrial revolution, like steam and electricity, created a demand for communication and automated control (Kumar 2004). Overall early mapping studies of the knowledge economy were highly problematic in terms of their methodology and one must be careful when using their results. They also contained little theoretical or explanatory substance.

More qualitative and theoretical work was done in the 1960s and 1970s by sociologists like Daniel Bell. Bell achieved widespread notoriety for this work on the ‘post-industrial society’, a term he was later to use interchangeably with the information and the knowledge society. His examination of the social

structure (defined as the economy, the occupation system and technology) found that between 1947 and 1968 service employment grew by almost 60 percent while growth in manufacturing remained below ten percent in the US. Within service employment Bell suggests that automation and technology were having an impact not only on the sectors in which people were working but also on what they were doing. For Bell these shifts signalled a fundamental change whereby economic activities no longer involved man struggling against nature but rather involved man and information. He also argued that theoretical knowledge was of growing importance as a source of innovation and for policy formation. Thus Bell highlights the growing importance of one type of knowledge, 'theoretical knowledge' in the economy. and for him knowledge is defined as 'what is objectively known, an intellectual property, attached to a name or a group of names and certified by copyright or some other form of social recognition (e.g. publication)' (1974:176).

Bell's work stands as one of the first attempts to offer an explanation for the development of a post-industrial knowledge economy. His explanation rests on the importance of technology and the crucial role of 'theoretical knowledge'. He has been accused of being a 'technological determinist' whose understanding of social change is too dependant on the role of technology and someone whose work was driven by an implicit assumption that economies would converge on the 'most advanced' model if the right technologies were adopted (Webster, 1995). Indeed one of Bell's central, and most criticised, points was his division of societies into pre-industrial (Asia, Africa, Latin America), industrial (Western Europe, Soviet Union, Japan) and post-industrial (United States). However he brought a vital focus on the specific importance of knowledge, albeit one particular type of knowledge.

Attempts to take techno-economic changes seriously were also evident within attempts to locate information and communications technologies within broader and more complex histories organised around successive 'techno-economic paradigms', where new technologies became the basis of new products and cycles of investment and production, prompting economic and social re-organisation (Freeman and Louca, 2000; Perez, 2002). While there is a lingering technological determinism in these studies, the historical locating of the knowledge economy and the opportunity for comparison with other techno-economic paradigms was of great value in introducing a historical dimension that went beyond simple modernisation perspectives.

Increasingly economists and policy makers today believe that technological change and investment in new knowledge are important sources of economic

growth and key aspects of a knowledge economy. Patent data provides one indicator as to the level of new knowledge produced in an economy and according to one source it was not until the early 1980s and the 1990s that patent data in the US started to accelerate, particularly in new sectors like biotechnology and computing (Powell and Snellman, 2004:203). In part this may be due to a new more proactive and pro-patent legal and regulatory regime, which by all accounts is another key feature of the knowledge economy, but in part it may also signal increasing investment in research and development in those sectors.

Many economists have become interested in the specific characteristics of information, and endogenous growth theory has placed technological change at the heart of economic growth. These theorists place investments in human capital and research and development at the centre of economic growth and suggest that these investments generate increasing returns to the spread of technical and business knowledge (Arthur, 1994). Similarly, economists such as Douglas North have picked up Bell's interest in the underlying logic of social transformation that is driving the growth of a knowledge economy. However, rather than focus on shifting technologies as Bell did, they located the source of the knowledge economy in growing social and organisational complexity, creating a need for greater organisational integration of knowledge to manage transactions (North, 2005).

Machlup's challenge to take the expansion of a knowledge economy seriously has therefore been taken up, with efforts to identify the characteristics, dynamics and history of such an economy. However, in the process, Machlup's own emphasis on the location of commercial and bureaucratic knowledge within the broader range of knowledges that are produced everyday in social interactions and institutions was lost. The 'knowledge economy' has come to be seen as unproblematically identified with specific industries, occupations and technologies, rather than as a social and political construct.

Socio-Spatial Organisation of the Knowledge Economy

Bell devotes relatively little space to analysing the relationship between knowledge, technology and space. In recent years, however, the spatial organisation of the knowledge economy has become a focus of much debate in human geography and beyond, with a variety of competing concepts of socio-spatial organisation (Ó Riain, 2006).

Time Space Distanciation

Reich (1991) argues that new information and communication technologies make it possible and even necessary to reorganize firms into 'global webs' and employees into global telecommuters. For Reich these webs operate smoothly, destroying constraints of space and social structure, moving in conjunction with the ever-circling hands of the clocks on the walls of corporate offices around the globe. The global workplace is essentially a 'virtual place' where the constraints of space, social organization and local institutional arrangements have been overcome. The politics of the workplace is replaced by a virtual space of knowledge sharing and creation, particularly for 'knowledge workers' such as software developers. Space is dis-embedded while control of the labour process is essentially cooperative.

Reich's analysis of the process of globalization is compatible with that of Giddens (1990) who argues that globalization occurs through a process of *time-space distanciation* - where time and space are universalized and 'lifted out' or made independent of their immediate contexts. For Reich the global workplace is dis-embedded from its temporal and spatial contexts and becomes a 'pure' space for communication and innovation among employees. Giddens' analysis casts light on how this is possible. He argues that communication across distance depends upon the existence of expert systems, or systems of knowledge which actors understand and trust (such as the technical language of high tech industry), and upon symbolic tokens, or media of communication that can serve as coordinating mechanisms for long-distance social relations where social cues and monitoring are absent or opaque (e.g. money). So for these analysts the knowledge economy and its technologies are central to both the content and circulation of the new economy. However, technological determinism once again rears its head in this work. For Reich, symbolic analysts get rewarded fairly for their skills and knowledge, and all types of knowledge are evaluated fairly - the politics of the recognition and rewarding of knowledge are neglected. Giddens' emphasis on symbolic media and expert systems opens up the possibility of analyzing how the organization of these media shape the knowledge economy itself. However, in Giddens' work these are seen simply as carriers of information rather than as contested fields of socio-spatial structuring of the knowledge economy.

Time Space Compression

Other authors have portrayed a fundamentally different global workplace where 'globalism' - whether it is the ability to create virtual connections or to

become increasingly mobile across the globe - is distributed unequally. Harvey (1989) argues that time and space have not become distanced as Giddens claims, but that mobile capital and corporations have colonized local spaces and time has annihilated space in a process of *time-space compression*. Corporations assert their control over technological change through shaping the trajectory of research and its goals, and protecting their 'intellectual property rights' and monopolies of the means of communication. The promise of global communications creating an 'electronic republic' is undermined by commercialisation, corporate dominance and media concentration (McChesney et al. 1997).

Such a perspective rightly draws our attention to the critical importance of corporate power and capitalist social organization in shaping the knowledge economy, particularly given the growing global media oligopolies, the decline of public service media and the commercialisation of the Internet. However, it blinds us to the ongoing dependence of capitalists themselves upon the knowledge production of workers and citizens, suggesting that there is a much greater field of struggle and contestation within the knowledge economy than these analyses suggest. An emphasis on time space compression crucially directs our attention to corporate power in the knowledge economy but overstates the degree to which capitalists can secure control over knowledge and underestimates the various struggles and negotiations that are taking place within the knowledge economy

Time Space Embedding

Differ though they may on the degree of capitalist domination of the 'space of flows', both of these theories of time space distancing and compression agree that globalization is increasingly disembedding the globalised economy and workplace from their local contexts. Other theorists have argued however that the demands for increased flexibility and specialized learning in the knowledge economy actually make embedding the global workplace in local spaces even more critical. Efficient production and constant innovation require the construction of shared physical spaces where workers can interact and communicate on a face-to-face basis and where shared goals and meanings can be created and maintained (Saxenian, 1994; Storper, 1997). Global competitiveness is therefore dependent on increased spatial embeddedness. The local spaces which can achieve this happy state of affairs will be able to buffer themselves somewhat from the demands of globalism because they possess territorially specific and unique institutional and cultural capacities – although the importance of social interaction will often promote new forms of

global organization, such as transnational technical communities (Saxenian, 2006). Global workplaces are deeply embedded in these territorially and temporally specific contexts under a process that might be called *time-space embedding*.

However, while recognising the spatial embeddedness of the knowledge economy is a vital contribution, these perspectives tend to neglect how this spatial embedding is itself shaped by power structures around innovation and knowledge, and focus on the process of innovation and knowledge creation rather than the politics of realising the returns to knowledge.

The Knowledge Economy as Embedded and Politically Contested

This section argues for a view of the knowledge economy as organised, politically constructed and contested through local and global networks and accountabilities. We suggest that it is crucial to examine the struggles along the entire chain of technology production and use (Kerr, 2006) and argue that two crucial dynamics of the knowledge economy are (1) the struggle between the ‘knowledge economy’ and the ‘knowledge society’ over the scope and boundaries of valuable and valued knowledge and knowledge work; and (2) the social shaping of technology production and use within the knowledge economy itself.

How does the Knowledge Economy Emerge from the Knowledge Society?

We can identify a relatively distinct sphere of the knowledge economy, based around ‘knowledge embodied in commercialised media’ including silicon chips, software programmes, games, media broadcasts, consultancy reports, and other relatively cosmopolitan forms of knowledge. These commercialised forms and media of knowledge, and the activities associated with their production and use, are the core of contemporary capital accumulation in the knowledge economy. However, they remain embedded in a wider process of knowledge production that is intensified by the movement towards occupations based on working on people, relationships, organisations – work that was often in the past done within the household.

At the core of the creation of the knowledge economy is a deep conflict over property rights – with a contest between a regime based on ‘property rights imperialism’ and one based on a ‘shared global digital infrastructure’ (Weber and Bussell, 2005). In the first, “the Northern corporations that currently dominate global ownership of intangible assets successfully defend their

politically protected monopoly rights while simultaneously extending those rights by transforming into private property an ever larger set of ideas, information, and images previously considered part of nature or a shared cultural heritage. In the other scenario, property rights are restructured along the lines pioneered by the open-source software community to create a “new commons” of productive tools which allows for both a more egalitarian redistribution of intangible assets and a wider, more effective engagement of human ingenuity for creating innovative solutions” (Evans, 2005: 86).

The outcome of the conflict between these regimes is not a technologically determinist matter of whether information wants to be ‘free’ or ‘expensive’ (Weber and Bussell, 2005) – it is a matter of political contestation. A crucial component of analyses of the knowledge economy then will be the analysis of this contested terrain of global technology production and business networks (Preston, 2001), the growth of high tech regions and transnational technical communities (Saxenian, 2006), the role of new forms of state developmentalisms (Ó Riain, 2004) and the negotiation of intellectual property regimes through international institutions such as the World Trade Organisation (WTO), the EU’s Lisbon Agenda and the role of the OECD in promoting the concept of the ‘new economy’ (Godin, 2004).

What are the Politics of Knowledge Production and Use?

Robert Reich’s ‘symbolic analysts’ that produce the knowledge economy are as subject to the politics of the workplace as any other workers. These workers work in a variety of settings and their workplaces are subject to a variety of different conflicts – that may, crucially, shape the outcome of their work (Barley and Orr, 1997; Barnes et al, 1996; Ó Riain, 2000). These workers work within informal compromises, forged between the technical communities that develop the technological standards and innovations and the lead technology firms that hold the intellectual property rights to many of those innovations. Such technical communities and cultures have long been central to processes of scientific development (Carroll, 2006). However, despite the variety of studies of knowledge production, we lack an ongoing dialogue between students of work, science and technology design that might articulate this more complex perspective on how the conditions of knowledge production shape knowledge itself.

Similarly, social scientists from Adam Smith to Frederick Taylor and on to Harry Braverman have long viewed technology as a source of automation and deskilling, whether for better or worse. However, more complex

understandings of technology use have emerged that emphasise how the politics of technology adoption and use shape and effect workers' skill, knowledge and autonomy – and whether that work is 'automated' or 'informed' (Zuboff, 1984). Even within the knowledge economy itself, it is those clerical workers who do the routine testing and processing of programmes and data that are the most vulnerable to exploitation, while knowledge producers are more likely to combine employee involvement with performance pay structures (Frenkel et al, 2000; Benner, 2002). For many, these concerns with the social effects of technology in the workplace and beyond have led back to questions of design – and the crucial importance of user involvement in the knowledge production process (Oudshoorn and Pinch, 2003).

The Politics of Knowledge: Intensifying Time and Space?

Ó Riain (2006) argues that the knowledge economy is characterized not by the dis-embedding of time and space but by *time-space intensification*. Interactions between exploitation and embedding *intensify time* with more rapid rates of change in technologies, product markets and organizational structures; increased turbulence, turnover and mobility in the labour market; the importance of deadlines in work organization; and a revolution in expectations of time and a shortening of time horizons. The *intensification of space* is not just a matter of the increased importance of face-to-face interaction or of competition between places but of the increasing importance of the ability to mobilize space as a resource in social relations in the face of pressures from the capitalist market. While this mobilization of space can promote competitiveness in the market, it must also be protected from the pressures of marketisation which will erode the very social relations upon which it is based. Ultimately, the intensification of space raises, over and over again in concrete social relations, the deep tension between market and society and opens up political spaces for contesting and reconfiguring capitalist social relations.

New Patterns of Social and Spatial Inequality

Academics and analysts differ both in the role they attribute to technology in the process of social change and in their assessment of the socio-spatial implications of these changes. For Castells while some people in certain countries are networked and connected, many countries are predominantly disconnected from global networks (Rantanen, 2005:145; Zook, 2005; Dodge and Kitchin, 2004). The continued dominance of developed countries and cities in the global knowledge economy is most evident in the global

governance of the internet and the location of the governing body of domain names, ICANN, and ten of the thirteen top level domain name servers in the US. The fact that this situation remained unchanged following considerable opposition at the Tunis round of the World Summit on the Information Society (WSIS) points to continuing inequalities in the global distribution of information and knowledge (Rossiter, 2005).

While the distribution and control of knowledge is unevenly distributed it appears that not all economies conform to the trajectory of development assumed by scholars from developed nations and even where there has been a shift to knowledge based industries and occupations the results are not always benign. Certain economies still exist which are largely dependant on agriculture and natural raw materials and in other places growth in information industries has been accompanied by significant growth in unemployment and underemployment (Arriaga, 1985). Indeed studies of knowledge work have found little change in the types of work or management of work carried out in these new industries despite the new labels (Kumar 2004:112). Further, studies point to the negative environmental impact of the production, consumption and dismantling of knowledge goods and highlight the fact that these goods are extremely toxic and polluting (Zehle, 2001).

Despite such inequalities in terms of the global control and distribution of knowledge the concept of the knowledge economy is widely used by corporations, policy makers and international organisations to legitimate a particular ideological agenda. From the early statistical studies the knowledge economy has been heralded as a stage of development that all countries will or should attain and knowledge itself has come to be valued only in terms of the degree to which it can be codified, measured, owned and traded. Further, it tends to place the focus on consumption and consumers rather than on citizens and users, on selling and buying rather than on informing and empowering. This is despite the fact that information networks, especially the internet, can empower receivers and decentre producers.

However, producers have been greatly favoured by the politics of the knowledge economy. Even dominant lead firms such as Microsoft and Intel were assisted by the global support of the US government in establishing Wintelism as a global standard (Hart and Kim, 2001). Shadlen et al (2005) argue that an extensive and effective international institutional regime has emerged in software where the US, WTO and other related institutions promote the protection of intellectual property rights in a wide range of countries, with uncertain and worrying consequences for innovation and deeply unequal global

effects. Ultimately, an imperialist and economic approach to knowledge production and consumption not only limits and narrows our understanding of knowledge but threatens to devalue forms of knowledge and knowledge production which do not conform.

Further Reading

- Arriaga, P. (1985). "Toward a Critique of the Information Economy." *Media, Culture and Society* 7: 271-296.
- Arthur, B. (1994) *Increasing Returns and Path Dependence in the Economy* Ann Arbor: University of Michigan Press
- Barley, S and J. Orr (1997) *Between Craft and Science* Ithaca: Cornell University Press
- Barnes, B., D. Bloor and J. Henry (1996) *Scientific Knowledge: a Sociological Analysis* Chicago: Chicago University Press.
- Bell, D. (1974). *The Coming of Postindustrial Society: A Venture in Social Forecasting.* London, Heinemann.
- Benner, C. (2002). *Work in the New Economy* Oxford: Blackwell
- Carroll, P. (2006). *Science, Culture and Modern State Formation* Berkeley: University of California Press
- Castells, M. (1997). *The Rise of the Network Society* Cambridge Mass.: Blackwell
- Dodge, M and R. Kitchin, (2004). *Atlas of Cyberspace* London: Addison Wellesley
- Evans, P. (2005). "The New Commons vs The Second Enclosure Movement" *Studies in Comparative International Development* 40, 86-94
- Freeman, C and Louca, F. (2002). *As Time Goes by: From the Industrial Revolutions to the Information Revolution* Oxford: Oxford University Press
- Frenkel, S., Korczynski, M., Shire, K., & Tam, M. (1999). *On the front line. Organization of work in the information economy.* Ithaca: Cornell University Press
- Giddens, A. (1991). *The Consequences of Modernity* Oxford: Blackwell
- Godin, B. (2004). "The New Economy: What the concept owes to the OECD" *Research Policy* 33, 679-690

- Hart, J. and S. Kim. (2001). "The Global Political Economy of Wintelism: A New Mode of Power and Governance in the Global Computer Industry," in James N. Rosenau and J.P. Singh (eds.) *Information Technologies and Global Politics: The Changing Scope of Power and Governance* Albany, N.Y.: SUNY Press.
- Harvey, D. (1989) *The Condition of Postmodernity* Oxford: Blackwell
- Jessop, B. (2000). "The State and the Contradictions of the Knowledge Driven Economy" in JR Bryson, PW Daniels, ND Henry and J Pollard, eds. *Knowledge, Space, Economy* London: Routledge
- Kerr, A. (2006). *The Business and Culture of Digital Games* London: Sage
- Kumar, K. (2004). "From post-industrial to post-modern society" In F. Webster (ed) *The Information Society Reader*. London, Routledge: 103-120.
- Machlup, F. (1962). *The Production and Distribution of Knowledge in the United States* Princeton: Princeton University Press
- McChesney, R., E Meiksins Wood and JB Foster, eds. (1997). *Capitalism and the Information Age* New York: Monthly Review Press
- North, D. (2005). "Capitalism and Economic Growth" pp. 41- 52 in V. Nee and R. Swedberg (eds) *The Economic Sociology of Capitalism* Princeton: Princeton University Press
- Ó Riain, S. (2004). *The Politics of High Tech Growth* Cambridge: Cambridge University Press
- Ó Riain, S. (2000). 'Net-Working for a Living: Irish Software Developers in the Global Workplace' in M.Burawoy et al. *Global Ethnography* Berkeley: University of California Press.
- Ó Riain, S. (2006). "Time Space Intensification" *Theory and Society*
- Oudshoorn, N and T Pinch (2003) *Users Matter* Cambridge, MA: MIT Press
- Perez, C. (2002). *Technological revolutions and financial capital : the dynamics of bubbles and golden ages* Cheltenham, UK: Edward Elgar

- Porat, M. U. (1977). *The Information Economy: Definition and Measurement*. Washington DC.
- Powell, W. and K. Snellman (2004). "The Knowledge Economy." *Annual Review of Sociology* **30**: 199-220.
- Preston, P. (2001). *Reshaping Communications* London: Sage
- Rossiter, N. (2005). The World Summit on the Information Society and Organised Networks as New Civil Society Movements. *Towards a Sustainable Information Society*. J. Servaes and N. Carpentier (Eds) Bristol, Intellect. **2006**: 97-116.
- Rantanen, T. (2005). "The message is the medium. An interview with Manuel Castells." *Global Media and Communication*₁(2): 135-147.
- Reich, R. (1991). *The Work of Nations*, New York: Vintage Books.
- Saxenian, A. (2006). *The New Argonauts* Cambridge, MA: Harvard University Press.
- Saxenian, A. (1994). *Regional Advantage: Culture and Competition in Silicon Valley and Route 128*, Cambridge, MA: Harvard University Press.
- Shadlen, K., A. Schrank and M. Kurtz (2005) "The Political Economy of Intellectual Property Protection: The Case of Software." *International Studies Quarterly*
- Storper, M. (1997). *The Regional World: Territorial Development in a Global Economy* London: Guilford Press
- Weber, S and J Bussell, (2005). "Will Information Technology Reshape the North-South Asymmetry of Power in the Global Political Economy?" *Studies in Comparative International Development* 40, 62-84
- Webster, F. (1995). *Theories of the Information Society*. London, Routledge
- Zook, M. (2005). *The Geography of the Internet Industry* Oxford: Blackwell

Zehle, S. (2001). "Virtual Water: On the Hydropolitics of IT Development." *A/S 160* (Fall/Winter). See also <http://lists.brunny.com/pipermail/fibreulture/2005-January/004335.html>

Zuboff, S. (1984). *In the Age of the Smart Machine* New York: Basic Books

Websites:

ICANN - www.icann.org

World Summit on the Information Society - <http://www.itu.int/wsis/>

Incommunicado (Information Technology for Everyone Else) - <http://incommunicado.info/>