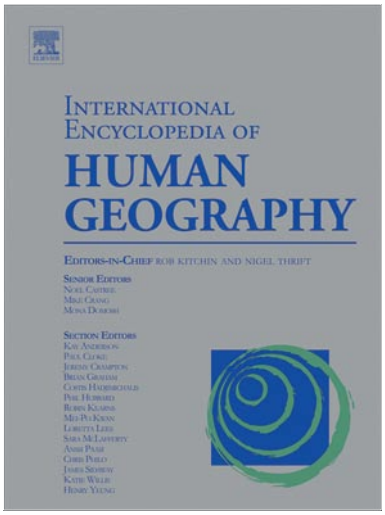


Zook M. 2009. Internet, Economic Geography. In Kitchin R, Thrift N (eds) International Encyclopedia of Human Geography, Volume 5, pp. 555–561. Oxford: Elsevier.
ISBN: 978-0-08-044911-1

Internet, Economic Geography

M. Zook, University of Kentucky, Lexington, KY, USA

Glossary

Domain Names A domain name is a unique identifier (e.g., nytimes.com or manchester.ac.uk) associated with an IP address that allows users to easily access a specific Internet resource such as a website.

E-Commerce E-commerce encompasses a wide range of technologies from placing and receiving simple email orders to inventory tracking systems which automatically place orders based on sales. All e-commerce systems share a common focus on the use, organization, and transmission of electronic data to coordinate the movement of physical objects.

EDI Electronic data interchange refers to a standardized data format that allows for the exchange of structured and complex information between and within firms.

Knowledge (Tacit and Codified) Codified knowledge is knowledge that is possible to record or transmit and therefore lends itself more easily for transmittal across distance. Tacit knowledge is knowledge acquired through observation or interaction and is often thought to be best transmitted face to face.

Point of Sale (POS) Systems POS systems are computer systems that collect data on the sale of items (generally through a bar code reader) and automatically send this data to inventory management software which can automatically place an order to restock items.

RFID Radio frequency identification (RFID) is a system by which items receive small tags which can be read at a distance by specialized RFID readers making inventory and sales easier.

The Internet Changes Everything

A popular meme during the 1990s was "the Internet changes everything." While clearly hyperbole, the idea of technologically driven change was and remains an important element in popular views of the economy. Geographers take a more measured view that strives to keep technological and geographical determinism in check. Rather than generalizable linear relationships, geographers focus on the complex collections of difference between places and are acutely cognizant that the creation and use of new technologies is embedded in larger social networks. This is not to deny the transformative power of the Internet but to recognize that this power is filtered through existing and evolving spatial, institutional, and cultural aspects of the economy. Firms, governments, workers, consumers, etc., all engage in the dynamic use of the Internet and these actions – in concert and conflict with the myriad of simultaneous and parallel actions by other actors – shape how the Internet unfolds and is deployed across the spatial economy. This process holds the potential for great change, for example, the nineteenth-century technologies of the railroad, telegraph, and telephone helped usher in the modern corporation and shifted the competitive advantage of regions, but it is prudent, to distinguish between the possible and the evitable.

Toward this goal, this article reviews the interaction between the Internet and economic geography. The term Internet is used here as a catch-all term for the use of a range of general-purpose information technologies (ITs) and software deployed across public, private, and peered networks rather than a more limited definition. This decision reflects both the diversity of implementations of IT and the Internet and the rapid change associated with it. This allows one to focus on the larger processes at work rather than the specific manifestations tied to particular technologies. This article covers three main subjects. The first examines the role of distance in the age of the Internet. In other words, to what extent has the Internet 'destroyed' distance and what type of economic frictions remain relevant? The article then considers how Internet technologies are used to organize and move the inputs and products of the economy via a range of software and hardware platforms. Encapsulated under the label of electronic commerce (e-commerce), this process can engender great change within the organization and location of production and consumption. The final topic focuses on how the uneven use of the Internet across time, place, and organization creates a differentiated geography of change and challenge. Together the review of these topics illuminates the complex economic geography of the Internet and the ways in which it has insinuated itself into the daily tasks of production and consumption.

Calculating Distance in the Age of the Internet

Tobler's first law of geography, that is, "…everything is related to everything else, but near things are more related than distant things" is often cited as a casualty of the Internet era. Pundits of various stripes have been declaring the death of distance, for over a decade.

More recently, Thomas Friedman's bold declaration that the "world is flat" because IT has removed geographic and other barriers to competition has gripped the popular and policy imagination. Despite this prevailing rhetoric, researchers have repeatedly demonstrated the continued uneven spatial pattern of Internet infrastructure, use, and content throughout the world. As Figure 1 illustrates the countries with highest levels of per capita use of the Internet remain largely Western (with the notable exceptions of Japan, Singapore, South Korea, and Taiwan) and wealthy. Even countries within this privileged group with high numbers of Internet users per capita exhibit wide variation in the adoption of domain names – a key indicator of Internet content distribution – with countries like Taiwan, Korea, and Japan ranking far below other developed economies such as Germany, the United Kingdom, and the United States. These differences are in turn replicated at all scales as access and use of the Internet varies at the subnational and local level.

Thus, the adoption of the Internet is far from uniform and is instead shaped by an inherently messy negotiation between people, polities, and technologies. Despite its ability to organize and shift information easily across vast distances, the Internet is also fundamentally tied to physical places and the people, who create, regulate, distribute, and consume its data. Simply put, the Internet has been, is, and likely will always be clustered in particular places. Even the seemingly simple expectation that someday the Internet will be accessible everywhere is belied by the continued pace of change and innovation. Rather than there being one final and fixed goal, new technologies regularly appear so that even if all places had Internet dial-up service (a near impossibility in and of itself), better access such as high-speed broadband or wireless would appear during the rollout of dial-up service replicating the digital divide albeit at a different strata. In short, the Internet will always be differentially distributed across space and likewise, the use of the Internet or Internet-based applications will be differentially distributed across users and firms based on their cognitive and technical skills.

Nevertheless, it is important to recognize that "death of distance" discourse is compelling because it does contain elements of truth. ITs are making it easier to overcome the friction of physical distance and establish and maintain regular and meaningful contact with people around the world. There are, however, two important caveats to this. First, knowledge creation and transfer are increasingly important factors in economic fortunes and these capabilities seem to work best in physical proximity which facilitates tacit knowledge exchange. While access to raw materials and transportation remains as necessary as at the height of Fordism, knowledge embodied in skilled labor is a key input to many activities and one must be cognizant of how creation and use of knowledge takes place in the Internet era. While IT-enabled logistics systems make it easier to stretch out just-in-time supply

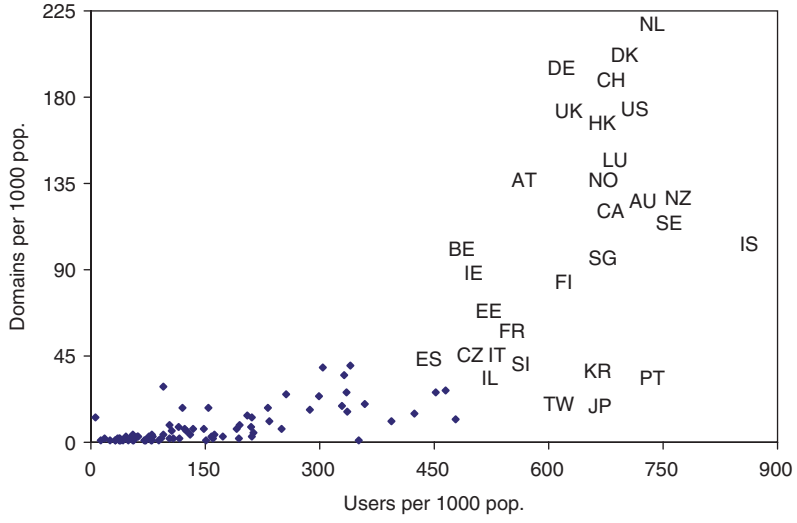


Figure 1 Domains and users per 1000 people, June 2007. Codes based on Internet Assigned Numbers Authority (IANA) top-level domain (TLD) assignments; codes for selected countries: AU = Australia; AT = Austria; BE = Belgium; CA = Canada; CZ = Czech Republic; DK = Denmark; EE = Estonia; FI = Finland; FR = France; DE = Germany; HK = Hong Kong; IS = Iceland; IE = Ireland; IL = Israel; IT = Italy; JP = Japan; KR = South Korea; LU = Luxembourg; NL = Netherlands; NZ = New Zealand; NO = Norway; PT = Portugal; SG = Singapore; SI = Slovenia; ES = Spain; SE = Sweden; CH = Switzerland; TW = Taiwan; UK = United Kingdom; US = United States. Due to legibility issues, countries with lower levels of users and domains are simply represented by diamonds. From http://internetworldstats.com (users); http://www.zooknic.com (domains); includes registrations of biz, com, info, mobi, net, org and ccTLD domains.

chains it remains difficult to replace all the advantages of physical proximity, for example, face to face communication, chance meetings, access to 'buzz' or gossip, etc. There are numerous attempts to use the Internet to increase the quality of knowledge transfer across physical distance, for example, voice over internet protocol (VOIP), email, thread discussion groups, instant messaging, as well as more complex knowledge management systems, but these remain imperfect substitutes. In short, the more complex an interaction is, the more difficult it is to overcome the friction associated with physical distance (see Figure 2).

The second caveat is that there are additional dimensions to economic friction beyond simple distance that can impede the flow of knowledge and forestall a successful economic interaction such as those listed in Figure 2. These frictions are increasingly coming to the fore as the task of moving objects has become easier. Although the idea of industrial districts where "the mysteries of the trade…were in the air" have been around for over a century, scholars have reinvigorated this field over the past three decades, partially to answer the question of why clusters persist in the Internet age, particularly in the very IT industries that are providing the means to transcend space. Pointing to the advantages of shared culture, networks of social relations, common behavioral norms and expectations, etc., researchers have constructed theoretical justifications backed by empirical evidence as to why this clustering occurs. One particularly relevant example to this article was the clustering of dot-com companies during the 1990s, that is, companies developing and using the very technology that was reputed to destroy geography. Given the high complexity of the activities of these companies, combined with the relational, organizational, and labor need frictions of venture-funded startups, it is not surprising that these firms clustered despite the popular rhetorical expectations to the contrary. As Leamer and Storper note (p. 653) "…the exchange of uncodifiable ambiguous information that depends on a high level of trust and shared context is likely to continue to require a significant amount of co-presence."

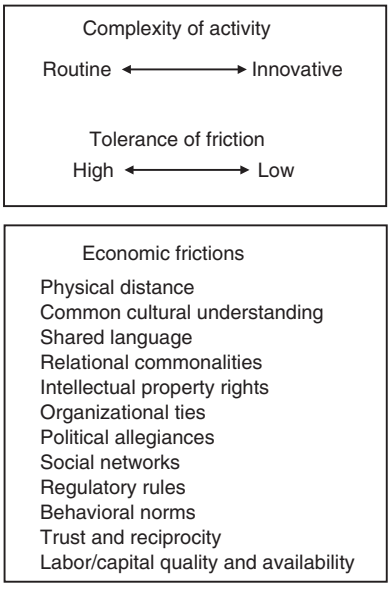


Figure 2 Complexity and frictions.

In short, the Internet does not make Tobler's law obsolete, but it vastly complicates the types and definition of distance that economic geography must consider. Near things do matter more than distance things but measures of close and far are no longer a one-dimensional variable of physical proximity but a composite measure encompassing relational, cultural, technological, and linguistic components in addition to Euclidian distance. Moreover, the component that rises to the top as most crucial varies depending on the frequency, nature, and complication of an interaction. The economy in the Internet era is increasingly structured in complicated networks which connect some places and leave others – even those physically proximate to key nodes – cut off. In a very real sense, people and places may be more closely tied economically with the other side of the planet than what is right down the road. This, however, represents a complication of distance rather than its simple destruction.

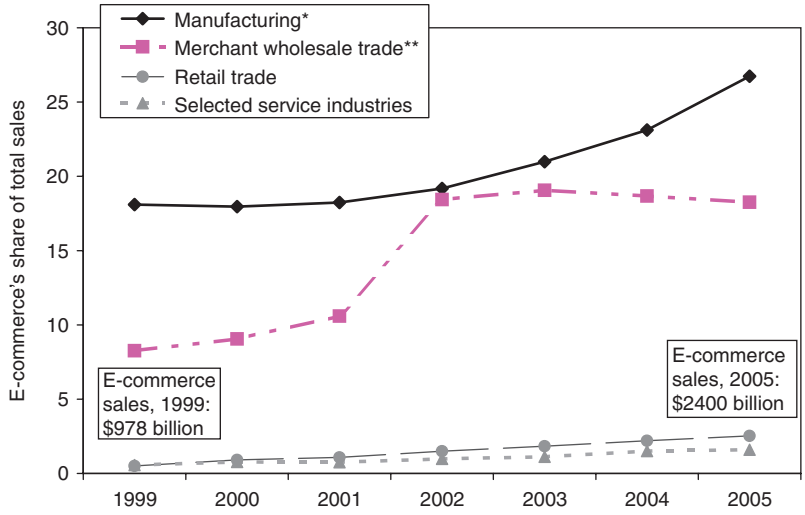
Moving Stuff: Atoms versus Information

Despite the complex definition of distance and friction operating in the Internet era, it is easy to become overly focused on the movement of information and knowledge versus the movement of atoms (physical products). The fact that information and content can be easily and widely distributed is often mistakenly extended to the movement of things. Instead, particular places are connected in highly specified ways, for example, low-cost labor, financial resources, markets, etc., to global networks resulting in a system of production that is both place rooted and networked at the same time. In actuality, there is a small range of informational products and services that are open for instantaneous shipment, for example, music or video downloads, data services, etc., and even these purely informational products still rely upon material reality, that is, recording studies, musical venues, for their production. Moreover, their ease of shipment has made it simple for consumers to redistribute the product for free much to the chagrin of copyright holders. As a result, many dominant powers in these industries, for example, the Recording Industry Association of America (RIAA) are attempting to reinvigorate another friction, that is, copyright law, to maintain their sales.

Nevertheless, the more important role of the Internet in the space economy is the movement of atoms via e-commerce. E-commerce has existed for some time, for example, electronic data interchange systems (EDI) date back to the 1970s but greatly expanded during the 1990s as the Internet made it feasible for businesses of all sizes; not just large corporations. Although e-commerce encompasses a wide range of technologies from placing and receiving simple email orders to inventory tracking systems which automatically place orders based on sales, all systems share a common focus on the use, organization, and transmission of electronic data to coordinate the movement of physical objects. Because of this variety, many analysts including the U.S. Census (2007) define e-commerce quite broadly on the basis of the use, organization, and transmission of electronic data to sell goods and services. This definition focuses on the economic activity, that is, sales, rather than a specific technological platform. Based on this definition it is possible to track the growth of e-commerce over time and across sectors via the U.S. Census data.

Figure 3 shows the size and industrial distribution of e-commerce within the US economy. Despite the Internet bubble of the late 1990s and early 2000s, e-commerce has steadily expanded to US$2.4 trillion worth of transactions in 2005. More importantly, these data highlight the concentration of e-commerce in manufacturing and wholesale activities, that is, business to business (B2B) transactions, and the very low level of e-commerce use within the retail and service sectors, that is, business to consumer (B2C). Thus, despite the visibility of online retailers, the bulk of e-commerce takes place between businesses with an ever-increasing share of these transactions conducted via Internet-based platforms rather than EDI. More intriguing, however, than the simple size of e-commerce activity is how it allows business and industries to reorganize themselves. Simply installing e-commerce software need not create value for a company in some predestined and linear fashion (a fact aptly illustrated by the dot-com bust). Instead, firms can use e-commerce to change the organization and geographies of their production systems and in so doing create value (through the reduction in inefficiencies or the rise of new types of interactions) and blend the world of atoms and the world of information.

This promise, however, remains a work in progress as the Organisation for Economic Co-operation and Development (OECD) notes that few firms (with the notable exception of larger corporations) have used e-commerce to reorganize their production chains and tightly integrate themselves with suppliers and/or customers. This is not surprising as it mirrors the decade-long process by which earlier technologies were used to transform existing business systems. A key issue for economic geography is how this process plays out over space. Although the spatial contours of e-commerce use is firm and industry specific, there are fault lines emerging such as urban/rural differences, large/small firm size, etc. Although rural firms are arguably positioned to accrue the greatest benefits from e-commerce adoption they are often at a disadvantage because of lower education levels and other capabilities. Additionally, because of the uncertainty around how best to implement e-commerce, it is likely that firms located in cities with better human resources and access to knowledge will be earlier adopters. This divide (again based on resources



* 1998 figures for manufacturing are not available
** Beginning in 2003 sales by manufacturers' sales branches and offices are included

Figure 3 Size and industrial distribution of e-commerce (US data), 1998–2005. E-commerce figures are based on data from the U.S. Census E-stats Program (http://www.census.gov/eos/www/ebusiness614.htm).

and knowledge) is also likely to be evident between large and small firms and independent and branch plants.

Aoyama provides a particularly compelling example of how the variation in e-commerce implementation with her study of how consumer-based e-commerce in Japan took a radically different path than that of the US. Rather than relying upon desktop computers and shipping to one's home, Japan developed a system of convenience store kiosks that acted as site of sales and service. Moreover, a firm's placement and power within an industry has considerable impact on how e-commerce is implemented and which firms are at an advantage given a particular design. Wal-Mart is well known for the considerable pressure it is able to bring to suppliers to adopt certain technologies and procedures and the US auto industry witnessed the imposition of the Covisint system on auto suppliers by the big three assembly firms. Yet again this shows the complexity and wide range of variables that shape the use of the Internet in the space economy.

An Uneven Geography of Change and Challenge

The combination of new definitions of distance and the reorganization of industries engendered by e-commerce brings up important questions of how this evolving geography impacts people and places. Although it is easy to view the Internet as yet another means by which capital can be mobilized to the disadvantage of labor and place, this is an overly simplistic reading. Firms remain constrained by various economic frictions (See **Figure 2**) and some workers (generally the higher skilled) can take advantage of new spatial and temporal flexibility that the Internet offers. Mirroring the trajectory of earlier technologies, the Internet will continue the historical uneven process of economic development, albeit via networks that stretch across vast distances and in configurations that are complex and bewildering. The effect of these changes depends upon the position (both spatial and organizational) one holds in the economy. Leamer and Storper note that technologies like the Internet will "…increase product differentiation in the economy and create new forms of complex transactions, even as it simplifies others and permits further spreading out of routinized behaviors."

Figure 3 illustrates that there is high e-commerce use within manufacturing and relatively low use in retailing and services. Indeed many personal services such as hairdressers and medical care and industries such as construction simply require that labor be physically present. On the other hand, information and communication technology (ICT) enabled e-commerce has allowed for significant changes within a number of retail jobs. Powerful point of sale (POS) technologies within large retailers increase distribution and stocking efficiency; self-check-out kiosks and automated toll booths have lowered the number of needed cashiers; and fast food restaurants are using IT to relocate the workers who take drive-through orders to centralized back office locations. This shifting of customer service activities has a significant effect in shaping the form and geography of work for these job but it is not the Internet *per se* that changes working conditions. Rather it is the manner in which the Internet is used that reshapes the spatial conditions of workers.

Moreover e-commerce systems are helping to de-skill or eliminate some jobs, for example, bar scanners and radio frequency identification (RFID) tags lowering the amount of labor needed for inventory taking. This, however, is clearly not a linear process as new jobs related to the creation and maintenance of these IT systems are also created. Although this provides cold comfort to workers who lose their jobs, especially since the location and skills required for this new work need not be anywhere near them, it demonstrates that it is not a linear process but one mediated through layers of economic friction. For example, the standoff between the longshoremen union and the port of Long Beach in the fall of 2002 was less about the introduction of IT *per se* and more about the wish of mangers to use the Internet to spatially shift work inland to sites with nonunion labor. In other words, jobs that had been confined to the port for practical reasons were suddenly open to a spatial shift because of the technology. The decision to do so as well as the resistance to it shows the larger societal and political dimensions to what at first might seem to be a simple technocratic decision.

An important concern, of course, is the extent to which the potential of the Internet and relative power differential between firms versus people and places will lead to the offshoring work or a "flat world." While clearly taking place, for example, the OECD estimates that 20% of jobs in OECD countries could potentially be done from any geographic location, offshoring is tempered by a number of issues (**Figure 2**) ranging from the use of tacit knowledge in production to concerns about privacy and the ability to access skilled labor. In short, the Internet does not lead ineluctably to offshoring, but it has allowed firms to pursue a variety of location strategies that are sometimes contradictory, sometimes complementary, and whose logics vary across space. This means that the Internet alone does not determine the fortune of people and places. Rather, the outcomes will result from sustained political contestations. While there is ready evidence of jobs being eliminated or relocated, there are also a number of factors which will keep work tied to particular locations.

Change Is Real but Geography Remains Relevant

Since its conception as a military communications system during the Cold War, the Internet has permeated across the globe and into many aspects of daily life and business. Indeed, the Internet has enabled a wide range of economic activities that hitherto would not have been possible, for example, eBay's enabling small-scale sales between people separated by any number of economic frictions including distance. Moreover, the possibilities are tremendous as users and firms experiment with and innovate around the Internet.

As a result there are a number of promising avenues for future research. At the core is the fundamental task of extending our understanding of how e-commerce (based on Internet-related technologies) changes the spatial organization of production and consumption. This article sketched the basic contours of existing research but there remains much to do. For example, has e-commerce led firms to rely more upon externalized market transactions rather than keeping functions internal? In which areas have firms achieved more efficiency (profit) through the use of e-commerce? How have these changes impacted the number and type of jobs within firms? How do changes in structure and efficiency affect a firm's interaction with near and distant markets and suppliers? Has e-commerce made certain channels to final and intermediate consumers possible at lower volumes? And most importantly, what are the geographies of these transformations in production, distribution, and consumption?

A related issue is the evolving relationship between the creation, manipulation, and utilization of information in the economy, for example, the entertainment and media industries. The rise of web 2.0 applications – the use of the Internet by online communities and social networking sites to create and collaborate – blurs the division between (and the geographies of) producers and consumers. The applications of web 2.0 include wikis (user-generated resources open to anyone to edit), folksonomies (the aggregation of users' annotations of online resources into classifications and indices), and mash-ups (user created hybridizations of two or more online services). The growth of web 2.0 means that users are increasing co-producers of the information and entertainment resources they consume and gives rise to a number of possible research topics. How will the cooperative spirit of online communities fare in the face of efforts to commercialize aspects of web 2.0? How will geographically defined regulatory regimes such as copyright interact with this alternative (and network defined) paradigm? How will the delineation between the public and private spheres evolve? Will web 2.0 applications live up to their collaborative/democratic ideal or be captured by narrow commercial or geographically defined interests?

Another important trend in the relationship between the Internet and economic geography is the growing ubiquity of mobile devices alongside the increasing availability and use of spatial data. Websites such as Google Maps and Microsoft Live Search Maps allow anyone to access and easily search street maps and satellite imagery. Meanwhile web 2.0 functionality (such as Google's My Maps) is allowing these same people to make and share spatial annotations to anywhere on the globe. As a result, users of the Internet are increasingly able to inhabit physical environments while simultaneously moving through a dynamic information cloud (accessed and edited through mobile devices) that is indexed to their spatial location. This prompts a number of questions. How will physical proximity interact with prominence within the information cloud? How will this impact the visibility of local businesses, particularly retail locations? What new information services will emerge to take advantage of this spatialized data (particularly user-generated data)?

A final direction for future research lies within the virtual games/worlds such as Worlds of Warcraft or Second Life in which millions of people spend hours a day using. Most relevant for economic geography are the worlds with tradeable currencies and active economies. Enterprising individuals within these worlds are successfully constructing professions and businesses dedicated to the creation and sale of virtual items, for example, a custom designed house that ones computer self can occupy and enjoy or other consumer goods ranging from a sports car to a customized private island. There are even sweatshops in China where workers conduct repetitive and mind-numbing actions in the online worlds for hours on end to collect virtual gold pieces that are in turn sold to US players who covet digital items such as a magic sword and do not want to take the time necessary to earn the gold on their own. Key questions to be explored include, will these synthetic worlds become important economic sites in their own right or remain academic curiosities? How successfully do virtual worlds overcome the economic frictions highlighted in **Figure 2**? For example, can virtual world teleconferencing provide enough of a simulacra of co-presence that it will ease the transfer of uncodifiable knowledge?

This short review of but a few possible research agendas highlights the exciting potential of the Internet and illustrates that no particular use or implementation is inevitable. Moreover, it argues against characterizations that the "world is flat" or "everything is changed." The various drags of economic frictions are still present, and are only partially and selectively being overcome. In fact, one of the great ironies of the twenty-first century is that as economies and firms become more reliant upon the Internet to transcend space, the particularities and

abilities of places are increasingly key points of differentiation. In short, the Internet doesn't reduce the relevance of geography. It simply adjusts which aspects of geography and which types of economic friction are most relevant for analysis.

See also: Agglomeration; Cultural Economy; e-Business and e-Commerce; Embeddedness; Information Technology; Internet/Web Mapping; Knowledge Economy; Mapping, Cyberspace.

Further Reading

Aoyama, Y. (2001). The information society, Japanese style: Corner stores as hubs for e-commerce access. In Leinbach, T. & Brunn, S. (eds.) *Worlds of Electronic Commerce*, pp 109–128. New York: John Wiley.

Cairncross, F. (1997). *The Death of Distance: How the Communications Revolution Will Change Our Lives*. Boston, MA: Harvard Business School Press.

Castronova, E. (2005). *Synthetic Worlds: The Business and Culture of Online Games*. Chicago, IL: University of Chicago Press.

David, P. A. (1990). The dynamo and the computer: An historical perspective on the modern productivity paradox. *American Economic Review* 80(2), 355–361.

Freidman, T. (2005). *The World Is Flat: A Brief History of the Twenty-First Century*. New York: Farrar, Straus and Giroux.

French, S., Crewe, L., Leyshon, A., Webb, P. and Thrift, N. (2004). 'Putting e-commerce in its place: Reflections on the impact of the Internet on the cultural industries'. In Power, D. & Scott, A. J. (eds.) *Cultural Industries and the Production of Culture*, pp 54–71. London: Routledge.

Leamer, E. and Storper, M. (2001). The economic geography of the Internet age. *Journal of International Business Studies* 32(4), 641–665.

Leinbach, T. (2001). Emergence of the digital economy and e-commerce. In Leinbach, T. & Brunn, S. (eds.) *Worlds of E-Commerce*, pp 3–26. New York: John Wiley.

Leyshon, A. (2003). 'Scary Monsters? Software formats, peer-to-peer networks and the spectre of the gift'. *Environment and Planning D: Society and Space* 21, 533–558.

OECD (2006). *Information Technology Outlook*. Paris: OECD.

Porter, M. (2001). "Strategy and the Internet". *Harvard Business Review* March, 63–78.

Townsend, A. M. (2001). The Internet and the rise of the new network cities, 1969–1999. *Environment and Planning B: Planning & Design* 28(1), 39–58.

Zook, M. (2000). The web of production: The economic geography of commercial Internet content production in the United States. *Environment & Planning A* 32(3), 411–426.

Zook, M. (2001). Old hierarchies or new networks of centrality? The global geography of the Internet content market. *American Behavioral Scientist* 44(10), 1679.

Zook, M. (2005). *The Geography of the Internet Industry: Venture Capital, Dot-Coms and Local Knowledge*. Oxford: Blackwell Publishers.

Relevant Websites

http://internetworldstats.com
Internet Usage World Stats.

http://www.oecd.org
OECD's Directorate for Science, Technology and Industry.

http://www.census.gov
U.S. Census Bureau E-stats Program.

http://www.zooknic.com
Zooknic Internet Geography Project.