The Spatial Structure of the New Economy in the Nordic Countries

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Nordic co-operation
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The Nordic Council
is a forum for co-operation between the Nordic parliaments and governments. The Council consists of 87 parliamentarians from the Nordic countries. The Nordic Council takes policy initiatives and monitors Nordic co-operation. Founded in 1952.

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is a forum for co-operation between the Nordic governments. The Nordic Council of Ministers implements Nordic co-operation. The prime ministers have the overall responsibility. Its activities are co-ordinated by the Nordic ministers for co-operation, the Nordic Committee for co-operation and portfolio ministers. Founded in 1971.

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Preface

This working paper has been made available through the Nordregio-led research programme "Future Challenges and Institutional Preconditions for Regional Development Policy," and a previous version of the working paper was presented in Stockholm on the 27th of April 2001. It presents the results of a preliminary study of the "new economy," and it explores the phrase "the new economy" and its economic importance and spatial structure in the Nordic countries.

"Future Challenges and Institutional Preconditions for Regional Development" is a research programme financed through The Nordic Senior Official's Committee for Regional Development (NERP) and led by Nordregio. The aim of the programme is to single out some of the broad societal trends that will affect regional policy in the years ahead and then to analyse the institutional capacity of regional policy to deal with these trends.

The programme runs from 2000 to 2004 and has in its initial phase focused on three thematic areas: a) The regional challenges of economic globalisation, b) The environmental changes and environmental changes that challenge regional development, c) How these challenges are taken into account by regional policy institutions.

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Stockholm, September 2001

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1. Introduction

The concept of "the new economy" is currently widely used in the mass media and in the social science literature in attempts to understand the global social and economic changes of the last quarter century, which are still ongoing at the turn of the millennium. The new economy is a part of the global social, economic, political and cultural changes that are altering the conditions for production of goods and services. The markets for many goods and services are increasingly becoming internationalized. The firms competing on these markets are to various degrees embedded in geographical space. A central process sharpening the world's urban and regional economies is that of globalization.

The globalization processes impose changes in the economy and consist of many opposing and conflicting processes. Storper (1997) identifies two central opposing processes. The first process is hypermobility. Hypermobility neutralizes the importance of geographical place because capital, commodities and information can be moved easily in space due to the deregulation of the financial markets and the introduction of information and communication technology into the economy. The second process is territorialization. Territorialization increases the importance of place (regions) because research and development (R&D) and production have become more and more dependent on national and regional knowledge bases and innovative capacity; these processes, in turn, are recognized as being socially and culturally embedded. The processes of hypermobility and territorialization transform the socioeconomic spaces and restructure places and thus create new uneven economic geographies. This indicates that globalization processes are both multi-scalar and multi-temporal and interrelated.

Technological change and product and process innovations have become central processes in the globalizing economy. The competitive advantages of regions and cities are more and more based on the regional or urban capacities to learn and innovate, to create knowledge and knowledge products in networks of user and producer interaction.

Many commentators and researchers believe that we are living in a knowledge society in which competition and economic life are based not only on the traditional factors of production, but more and more on knowledge, intangibles and the ability to learn and innovate. In other words, they are based on a turn towards the learning society, knowledge society or informational society. The new economy is becoming weightless and the end of geography and space has been declared.

Observers have argued that what we are witnessing here at the turn of the century is a revolution comparable to the Industrial Revolution of the 18^{th} and 19^{th} centuries. It is a revolution that is expected to fundamentally change the way in which our societies are organized. The same voices and the same prophecies are present in the globalization debate, which is related to the current discussions of the new economy; the hypermobility of capital and the developments in the financial markets are linked to the developments in information and communication technologies (ICT).

One major question is, what is media hype and what is not? What is the reality of the current discourse? These are not easy questions to answer but it is necessary to get

beyond the media hype and get a fundamental insight and understanding of the above-mentioned changes, especially as they relate to policy actions. Is there a new economy? The ambiguous answer to the question is the one Johnston (2000:4) gave in his Editorial: *"perhaps."*

Capitalism and its specific forms of capital accumulation have changed over the past decades, from the Golden Age in the 1960s through a phase of crisis and restructuring in the 1970s and 1980s to another period of economic growth in the 1990s. This transition may be more than just the passage from fordism to postfordism, although the flexibility characterizing the ideas of postfordism has certainly continued to develop, as has the vertical disintegration of production and the related outsourcing of non-core activities combined with the introduction and implementation of just-in-time systems.

Castells (2000) argues that in the late 1990s we started to reap the harvest from the seeds of the informational technology revolution that were planted in the 1970s. He argues that society has been transformed into an informational society. The term "informational society" indicates the attribute of a specific form of social organization in which information generation, processing, and transmission become the fundamental sources of productivity and power as a result of the new technological conditions.

In the Nordic countries these changes are significant, and in the field of wireless telecommunications, the Nordic countries have a central position on world markets. For example, Sweden's Ericsson and Finland's Nokia are two dominant firms in the Nordic economies whose strategies have significant importance for both regional and national economies. This became particularly evident after the recent restructuring and downsizing of Ericsson, which started with the announcement of a production stop of mobile phones (downsizing from 18,000 employees to 7000) and then led to the first actual downsizing, with layoffs of 1500 employees in Kumla and 600 in Linköping (Politiken January 26, 2001; Politiken Marts 27, 2001). The Nordic telecommunications sector also has regional importance; one example of this is in Northern Jutland in Denmark, where a cluster of wireless telecommunications that has significant local importance can be identified (Dalum, 1995).

The Internet is generally widespread in the Nordic countries and the Internet economy and new media are expanding industries that are changing the competitive structure of the Nordic space economies and may be dissolving the existing importance of place and creating new spatial divisions of labour. The Internet and the increasing usage of ICT have created new possibilities for organizing production of goods and services in space, thereby changing the existing patterns. Teleworking is one dimension. Another dimension is the spatial division of labour in which such services as help desk support and ticket ordering can be located far away from the consumers, even in peripheral regions.

On the other hand the development of the service industries has been tremendous since WW2, and recently new media, business services such as advertising, accounting, and a wide range of consultancy and cultural industries have experienced marked growth rates and marked increases in employment and revenue, especially in larger cities. One interesting question is, does the implementation of ICT into the

economy redefine the spatial division of labour? Can a shift of the functions between the different levels in the urban hierarchy be observed?

New ICTs have also created new forms of organization, for example, virtual organizations, and in the new media industry the exit and entry of firms into the market is significantly higher than in other industries. The flexibility is high and the untraded interdependencies have a significant influence on product and process innovations. Thus, the regional and urban labour markets have a great impact on the development of the new economy and the firms' competitive advantages. An understanding of the social, cultural and institutional embeddedness and territorialization of the new industries and their labour market is central to understanding contemporary changes in the capitalist space economy.

The main objective of this report is to discuss what the new economy is, where it is located and how it is embedded in space. This is done within the framework of the globalization processes that emphasize both hypermobility and territorialization of economic activity and by using recent insights from institutional and evolutionary economic theory. A second point of focus is the firms of the new economy and their operation in space, and the case of transnational corporations is used to underline the strategic as well as evolutionary characteristics of the spatial organization of production.

The report is divided into chapters that have a theoretical content outlining the new directions in understanding the developments of the capitalist space economy and chapters that have both empirical and theoretical content. The empirical part refers to comparative studies between the Nordic countries in order to examine the differences between the countries. Chapter 2 addresses the new economy and provides several definitions and discusses the pros and cons of the different conceptualizations of the new economy. Chapter 3 briefly introduces the globalization debate. The emergence of the new economy and the globalization processes are interrelated events in late capitalism, which is producing new forms of technical, social and spatial divisions of labour. Chapter 4 defines the importance of space and technological change and introduces the new economic geography.

Chapter 5 provides empirical evidence of the importance of the information and communication technology sector in the Nordic countries as defined below. Chapter 6 gives evidence and discusses the spatial implications of the emerging Internet economy, looking at new media and e-commerce. This chapter also discusses the new industries with respect to their location and embeddedness in space. Chapter 7 provides a case study from the Danish space economy about the spatial structure of the new economy using the data processing industry as an illustrative case. The working paper ends with a conclusion.

2. The New Economy

What is the new economy? This question is not easy to answer as the phrase "the new economy" is being used in many senses. Reading newspapers, journals and scientific papers gives the impression that the new economy is evolving around the information and communication technology (ICT) sector, wireless telecommunications and the US economic boom of the 1990s. Is the new economy synonymous with these new growth sectors alone, or does it go beyond the sectoral definition? Many commentators and social scientists think it does. The growth in these sectors and their basic technology represents a revolution of the whole economy and the way we organize and do business.[1]

Defining the new economy, Castells writes: *"The new economy emerged in a given time, the 1990s, a given space, the United States, and around/from specific industries, mainly information technology and finance, with biotechnology looming on the horizon"* (Castells, 2000:147-148). This is a fairly vague definition that includes most of the current growth industries, yet the new economy cannot be reduced to a matter of growth rates and industries but must involve some fundamental changes in the socioeconomic organization of production.

We need a more fundamental definition if we are to examine the new economy, what it is and what it is not. A popular definition of the new economy states that it denotes the changes in firms, economy and society as a whole induced by the introduction of ICT (PLS RAMBØLL, 2000a; OECD, 2000). This definition suggests that the new economy is linked to the effects of the technological developments associated with ICT.

This indicates that at least two general definitions of the new economy can be identified. One school of thought presents the new economy in terms of new growth industries. The other school focuses on the changes brought along by the introduction of new technologies, especially ICT, with a focus on the Internet and wireless telecommunications, into the economy and society as a whole. This definition has a tendency to be technologically deterministic in its efforts to understand socioeconomic changes.

In the light of these very broad and somewhat all-embracing definitions of the new economy, the OECD (2000) and Danmarks Statistik et al. (2000) have provided a definition of the new economy as the ICT sector, that is, a taxonomic definition. According to the OECD definition the ICT sector consists of a number of manufacturing industries and service industries. It is a pragmatic solution to the current attempts to conceptualize the new economy. In the manufacturing sector the products *"Must be intended to fulfil the function of information processing and communication including transmission and display" and "Must use electronic processing to detect, measure and/or record physical phenomena or to control a physical process"* (OECD, 2000: 7). In ISIC codes this includes:

[1] The phrase "the new economy" is also used as a self-promoting discourse by people in the IT sector to emphasize their own importance in economic development.

- 3000 – Office, accounting and computing machinery.
- 3130 – Insulated wire and cable.
- 3210 – Electronic valves and tubes and other electronic components.
- 3320 – Television and radio transmitters and apparatus for line telephony and line telegraphy.
- 3230 – Television and radio receivers, sound or video recording or reproducing apparatus, and associated goods.
- 3312 – Instruments and appliances for measuring, checking, testing, navigating and other purposes, except industrial process equipment.
- 3313 – Industrial process control equipment.

For the services the products *"Must be intended to enable the function of information processing and communication by electronic means."* (OECD, 2000: 7).

In ISIC codes this includes:

- 5150 – Wholesaling of machinery, equipment and supplies.
- 6420 – Telecommunications.
- 7123 – Renting of office machinery and equipment (including computers).
- 7200 – Computer and related activities.

This is a very broad, somewhat blurred, but applicable definition of the new economy. It provides an indication of the importance of the ICT sector in the economy and it points out the importance of the economic linkages and the multiplier effects that ICT generates. However, it does not provide any insight into the changes in the economy induced by ICT and thus it certainly raises several issues for discussion.

First, is manufacturing production of ICT at all representative of the new economy? In a Nordic context, are Ericsson and Nokia part of the new economy or are they just old capital adjusting? Second, is wholesale part of the new economy? The distribution of hardware is hardly anything new. Third, telecommunications is not a new industry, but wireless telecommunications is. Fourth, renting of office machinery and equipment is hardly new economy. Fifth, the whole range of service industries included in ISIC 7200 may include elements of the new economy, that is, new industries with new organizational forms. If we are to understand the dynamics of the new economy, we need a more fundamental definition of it that includes the changes induced by the introduction of ICT.

Thus, it has also been argued that the new economy isn't the ICT sector but all industries where knowledge and knowledge flows are an important competitive advantage in which the use of ICT has made significant changes in the way business is conducted and organized.

Today this includes entertainment (music, film, theme parks etc.), public relations, advertising, and business and producer services, which are taking over manufacturing's position as the engine of the national and regional economies. Further, it could be argued that this also includes manufacturing industries in which

technology, design, semiotics and aesthetics play a critical role in defining the products. These industries have different requirements than traditional industries (both manufacturing and service industries) and they are hence a challenge to the future of the Nordic economies, their labour markets and, initially, their welfare states.

Recently, several researchers have been engaged in the study of the nexus between culture and economy in regions and cities, and especially in case studies of industries and locations (Lash & Urry, 1994; Brown et al., 2000; Kong, 2000; Henriques & Thiel, 2000; Banks et al., 2000; Scott, 1996; 1997; 1998; 2000).

One feature of contemporary capitalism is the way in which the goods and services that it produces are increasingly infused with aesthetic and semiotic content (Lash and Urry, 1994; Scott, 1997; 2000). Further, more and more elements of modern culture are being produced in the form of commodities, that is, by profit-seeking organizations operating under market conditions (Scott, 2000). The cultural economy covers a broad variety of industries that have the common identity of "symbolic goods." Scott (2000) includes the following industries in his case study on Paris: clothing, fine leather goods, books and magazines, perfumes and cosmetics, furniture, jewellery, film production, music recording, theater, multimedia and tourist services, which are industries whose outputs serve, at least in part, the purposes of personal edification, entertainment, adornment and decoration, self-affirmation and so on.

ICT service and manufacturing industries share some similarities and have some common ground with the cultural economy, for example, the new media industries; see below (Pratt, 2000). Further, both seem to be based on knowledge and information and thus are a part of the broader informational economy as Castells (2000) defines it. One feature of these similarities is the possibility that their labour markets might overlap, as both seek knowledge and information workers, and that these labour markets are located in larger urban areas.

The commercialization of culture represents some new directions in the regional and urban economies, changing the regional and urban labour markets and the spatial competitive structures. In addition, this commercialization is linked to the creative processes of invention and innovation of products, which is not important only in the cultural economy but in the economy as a whole. In this paper the cultural economy, however interesting, is not a part of the main analysis of the new economy.

The new economy has also been defined to evolve around the term "new media," a term that was primarily launched by the new media industry to distinguish itself from the traditional media industry (Bäcklund & Sandberg, 2000). Recently, definitions of new media have emerged and case studies have been conducted (Pratt, 2000). New media is often defined as the production of interactive media content for CD-ROM and for the Internet and intranets. Bäcklund & Sandberg (2000) argue that a complete new media production network also includes hardware and software developers, consultants, service providers, owners of portals, e-commerce Internet sites and electronic publishing. Pratt (2000) defines new media to refer to all multimedia systems, whether online, on disk, or related to development of older broadcast or recording technologies associated with text, sound and images. Pratt focuses on the practitioners of new media such as those who construct and maintain web pages and

those who create companies that seek to exploit the possibilities of electronic commerce (e-commerce) or business to business (B2B) activities.

Another definition of the new economy is provided by Barua et al. (1999). They define the Internet economy. This definition divides the Internet economy into four layers. Layer I is the Internet infrastructure, Layer II the application layer, Layer III the Inter Intermediary layer and Layer IV the Internet commercial layer (for details, see chapter 7). The definitions of new media and the Internet economy are often confusing as they cross several sectors, but it is difficult to label new activities in old categories. It is somewhat difficult to define the new economy, but it can be stated that new media and the Internet economy, with their backward linkages, are fundamental new industries that indicate a new economy. These industries overlap with the cultural economy and the ICT sector.

What is new about the new economy? The Internet economy, e-commerce and new media are new segments of the economy emerging around the Internet as a new communication form. This new communication form, in turn, may change the way business is organized as well as the linkage between firms and, initially, the spatial division of labour and the capitalist space economy.

Hedberg et al. (1997) provide an interesting case study of new organization forms in the new economy. GANT has made marked gains with respect to its position on the market for Swedish ready-to-wear men's clothing. From its Swedish base GANT is now growing from country to country in Europe.

The GANT clothing factory and trademark originated in the United States, but the GANT articles in Europe originate from an imaginary organization in Sweden. The centre of operation is a Swedish company, Pyramid Sportswear AB. Pyramid Sportswear AB has eight employees and the brand name. Pyramid Sportswear finds designers, identifies trends, contracts out production and cultivates a retailer network using catalogues, advertising, image creating activities and sales support.

Pyramid Sportswear AB has a systematically designed customer database and an extremely detailed and up-to-date reporting of shipments and current sales. Two central elements enable the imaginary organization to exist. The first is ICT. An organization such as this could not work without the use of ICT in the production process. GANT demonstrates that new forms of organization are emerging even in old economy industries such as the clothing industry. The case of GANT illustrates that a firm with limited resources can build around an idea and outsource most of the firm's activities, linking them in an intensive network. Hedberg et al. provide several case studies ranging from traditional manufacturing industries to business service industries and industries such as insurance and banking.

This working paper will not provide a final definition of the new economy but will use the available definitions in order to answer some fundamental issues about the spatial structure of the new economy. Specific research on the new economy will be needed in order to define it more rigidly.

The empirical part of this paper presents the ICT sector and its development in the Nordic countries. Two paths of development can be observed. Finland and Sweden

are dominated by ICT manufacturing, while Denmark, Iceland and Norway are dominated by ICT services. The Internet economy is central, and this paper provides a brief introduction to the history and developments of the Internet and the Internet economy. A focus is on electronic commerce over the Internet and the use of ICT in the Nordic firms. The paper places a greater emphasis on the new developments and directions in the new economy than on the manufacturing telecommunications sector and ICT manufacturing in general. The spatial development and locational patterns of the computing and telecommunications industries have been examined over the past decade, see for instance Cooke et al. (1992). ICT manufacturing and especially the production, development and design of mobile phones and related products share some similarities with new media and the cultural economy. This is evident in the design and technical development of mobile phones and products that relate to the Internet. The production of mobile phones is not representative of the new economy, but the innovation, development and design aspects may very well be, as they, as part of the new media and the cultural economy, seek knowledge workers and engineers.

2.1 The New Economy in Space and Place

All economic activity is located in space and develops in specific places. The new economy seems to concentrate in clusters in metropolitan areas dominated by service industries. The new media industry is a clear example of this. In the US it is located in New York, San Francisco and Washington DC; in the Netherlands, new media is to be found in the Amsterdam region (40 percent); in the UK it is located in London, the M4 corridor, Cambridge and Brighton; and in Sweden in Stockholm (47 percent) (Bäcklund & Sandberg, 2000). ICT manufacturing shows similar location patterns, and ICT services likewise. In Denmark, two thirds of the data processing industry (NACE 7200000) is located in the Copenhagen Metropolitan Area (see chapter 7). Scott (1998) showed that the multimedia industry (an industry that overlaps new media) is largely a Los Angeles phenomenon (47.3 percent of the US firms are located in the Los Angeles area).

What about the peripheral regions? This refers not only to the parts of the world that are disconnected, but to the European periphery as well; and in this case, what about the Nordic periphery? Are the new economy and its high growth rates solely a matter for the large Nordic cities (Stockholm, Copenhagen, Oslo and Helsinki)?

On the other hand, it could be argued that ICT and the Internet give small towns and peripheral regions new opportunities for economic growth as ICT changes the understanding of work and brings a revolution into the understanding of workplaces through, for instance, teleworking. Rural and peripheral areas can have back-office facilities and call centres, two facilities that present the opportunity for job creation in peripheral areas (Richardson & Gillespie, 2000). Richardson and Gillespie (2000) provide empirical evidence from the UK and France that secretarial services (back-office function) have been remotely outsourced.

Additionally, as the knowledge society grows and knowledge becomes a central commodity, peripheral regions and small town locations have, if not equal opportunities, then better opportunities for creating growth than in the past. This is the rosy picture of the future presented in relation to the concept of the weightless economy (Quah, 1997a, 1997b, 1998b). Quah (1998a) defines the weightless

economy, which has also been described as the knowledge economy, the intangible economy, the immaterial economy or simply the "new" economy. First, there is information and communications technology and the Internet. Second, it involves intellectual property, which includes not only patents and copyrights but, more broadly, brand-names, trademarks, advertising, financial and consulting services, financial exchanges, health care (medical knowledge), and education; the GANT case study is an example of this. The third element consists of electronic libraries and databases, including new media, video entertainment, and broadcasting. The fourth element comprises biotechnology, traditional libraries and databases, and pharmaceuticals. This appears to be like Castells' (2000) definition. Quah (1998a: 19) argues, *"Everything on the list contains elements of intangibility and can be regarded as knowledge."* He continues, however, that the importance of ideas and knowledge should not be over-emphasized in an effort to understand the weightless economy. Economies have always been knowledge based. During the first Industrial Revolution, deploying steam engines boosted the economic performance. Steam engines were the physical embodiment of new knowledge, but their use was bound by geographical and physical constraints. An oil supertanker is not part of the weightless economy, but computer software is (Quah, 1998a). Thus, the end or death of geography and distance has been declared (Cairncross, 1997).

A different picture is presented by those who argue that the new economy continues to be located in larger cities and that small towns and peripheral regions never get the benefits of the economic growth and jobs created in the new growth industries. First, the peripheral areas are stuck with low paying jobs in standardized back-office functions such as secretarial services. Second, if the new economy's locational pattern is different from that of past decades of changing spatial division of labour, and the traditional industries in peripheral regions move, downsize or close due to international competition, these areas may end up with high structural unemployment.

Another important issue is the larger firms in the new economy and how they use space as a strategy. Transnational firms' strategies are important in creating new spatial patterns of production and changing existing production systems. In the wireless telecommunications sector a few large suppliers dominate the market, and in the Nordic countries NOKIA and Ericsson are the giants constantly developing new products and creating new markets through strategic alliances. In a globalizing economy the strategies of TNCs are becoming more and more interesting for regional or urban economies as capital and investment can more or less flow freely in space and ownership may change overnight. This process of hypermobility, which is making decisions taken in one part of the world significant for regions on the other side of the globe, can be compensated for by the firms' varying degrees of territorialization (see below).

The new economy generates new jobs and produces new changes in the local labour markets and in the general social structure of the city. Social polarization and new social and political conflicts are coming forth as new economic activities evolve and create new social and spatial divisions of labour.

3. Globalization

"Globalization" is another buzzword of the late 1990s and early 21st century, and the developments in information and communication technology in the late 20th century have played a vital role in the economic globalization processes.

The globalization debate tries to theorize and understand the cultural, social, political and economic changes that the world is currently undergoing. The concept of globalization can seem vague, as the changes are not one-sided but are frequently contradictory and conflicting. It can be difficult to grasp the relationships and connections between the social, political and economic aspects in the world economy and everyday life. According to Giddens (2000) and Held et al. (1999), three groups of globalists can be identified. The skeptics, such as Hirst & Thompson (1999), argue that the world of today does not differ from the world of yesterday. Based on statistics and empirical observation the skeptics argue that the changes we see are not due to globalization but are the result of a continual internationalization process between the trade triad (the United States, Europe and Southeast Asia). The radicals can be divided into two groups: hyperglobalizers and transformationalists. The hyperglobalizers are familiar; Ohmae (1995) has declared the end of the nation state as capitalism, through flows of capital and the international financial markets, is no longer embedded in the nation state. Capitalism exists outside the control of the nation state, and, as the state thereby loses regulatory control of the national economy, this means that the nation state's control of the economy is eroded. Other hyperglobalizers have declared the end of capitalism, the end of work and the end of geography as a consequence of the development of ICT. Kelly (1999), for instance, argues that the new economy, which he defines as global favoring of intangibles such as ideas, information and relations interlinked through intense economic networks, will revolutionize not just capitalism, work and the economic geography but all spheres of our economic and social life.

The hyperglobalizers make an interesting contribution towards an understanding of the world of tomorrow, but often their arguments seem sensational and dramatic, following one single point of change pushed to its extreme. The transformationalists are more interesting, as their argumentation is more varied than that of the hyperglobalizers and skeptics. Transformationalists like Giddens (2000), Castells (2000) and Held et al. (1999) are of the conviction that globalization, around the millennium in late modernity and capitalism, is a central motor driving the fast social, political and economic changes, transforming capitalism and the world order. Thus, globalization is a force of transformation reshaping society and producing new forms of economic and social institutions and organizations. Globalization can be defined as "*...a process (or a set of processes) which embodies a transformation in the spatial organization of social relations and transactions - assessed in terms of their extensity, intensity, velocity and impact - generating transcontinental or interregional flows and networks of activity, interaction and the exercise of power*' (Held et al., 1999:16).

Globalization has many faces, from discussions of the territorial state and geopolitical changes to migration and cultural issues. In this context an understanding of the economic dimension of globalization is essential to understanding some of the current changes in the Nordic economies. The process of economic globalization can be seen from at least as three different interrelated processes (Held et al., 1999; Castells, 2000).

First, global trade and global markets play a vital role in the current economic globalization process. Thus, one property of economic globalization is international trade and the evolution of the global marketplaces. Trade, understood as exchange of goods and services between people over distance, has a long history, and great trading empires have arisen throughout history. But international trade between nations has by definition emerged with the rise of the modern nation state (Held et al., 1999). Trade has played an integral part in promoting postwar growth in the OECD countries. Today, global trade is an important feature of modern capitalism, and the patterns of global trade are currently changing. There is almost universal participation and a very high level of linkages between countries, and the intensity of trade is high. This is especially true in Europe, North America and Southeast Asia, but developing economies are also increasing their share of world trade. In the Nordic countries, with their relatively small open economies, trade is a key part of the economies and is increasingly important in determining income and the industrial structure.

A second significant economic dimension of globalization is that of finance and flows of capital. The deregulation and liberalization of the financial markets in the US and the UK during the 1980s signaled the globalization of finance, which has created new markets and new products in a global market that is open twenty-four hours a day and has thus made possible hypermobility of capital. There is a universal participation in the international financial and monetary order with unprecedented gross flows of capital, and the global markets determine interest rates and have a heavy influence upon the monetary policy.

Finally, the depth of the globalization process can be observed in the development and changing patterns of foreign direct investments (FDI) and the transnational corporations (TNC) and their global production networks. The transnational corporations (TNCs) are central to processes of economic globalization. TNCs account for two thirds of global trade, one third being intrafirm trade between branches of the same company. TNCs play a vital role in the generation and international diffusion of technology. TNCs account for around 80 percent of world trade in technology and the majority of private R&D.

These processes of globalization have a significant influence on national, regional and urban economies, changing the framework for regional competitive advantages.

3.1 Globalization and Space: The Case of Transnational Corporations

One dimension of globalization is the increasing internationalization of national and regional firms. As stated above, a significant part of the new economy is dominated by large TNCs. In manufacturing, TNCs dominate the production of hardware such as computers and, important in a Nordic context, the production of mobile phones. In the Internet economy and new media, TNCs are also present, including companies such as Microsoft, Dell, AOL Time Warner, etc. This chapter, however, focuses on manufacturing industries but, as stated above, the acquisition of a specific regional knowledge base can be applied to TNCs in the service industries as well.

Until the 1960s TNCs were generally involved in production outside the home country when the intention was to produce for a regional market. In the 1960s this changed, and new strategies of foreign production emerged. TNCs began to produce

for world markets outside their home countries using local competitive advantages. In the 1960s the organizational structures of the TNCs were mainly hierarchical. The parent companies' competences were implemented in the subsidiary companies abroad. In the 1970s the perception of the relationship between the regional economies and the TNCs was that it was conflicting (Firn, 1975; Dicken, 1976). Empirically, examinations were directed at standardized fordistic mass production in regions with low production costs. These regional economies were termed "branch plant economies," indicating that there was little interaction between the local economies and the TNCs. This perception of the relationship between the regional economy and the TNCs reflects the tayloristic view of the organization of production and the fordistic system of accumulation. In the past decades significant changes in the organization of production have occurred. These changes have modified the view of the relationship between the TNCs and the regional economies (Dicken et al., 1994). The learning turn in economic geography (Storper, 1997; Maskell et al., 1998) and the network theories in business economics (Håkansson, 1989; Håkansson & Johanson, 1992) have given a more dynamic understanding of the relationship between TNCs and regional economies.

Schoenberger (1999) has drawn attention to the fact that the exchange of technology between the parent company and the foreign affiliates is not necessarily one-way but, rather, is often interdependent. It could be argued that TNCs are involved in several processes at different geographical scales. To keep competitive the TNC must use its global reach and its ability to move goods and services, information and capital across national borders, but it must also create stable relations in nations and regions in order to get access to national and regional knowledge and innovation potential.

It has traditionally been perceived that the relationship between the parent company and the subsidiary company is one-sided, with a power structure that is asymmetrical. From this perspective, the parent company has the ultimate power, which is reflected in the capitalist space economy. The geographical implications of this are close to Massey's (1984) production hierarchies and the spatial division of labour between production plant and HQ and those of the new international division of labour (Fröbel et al., 1980).

Transaction cost theory and network theories have provided nuances into the economic geography of TNCs and have directed attention towards cooperation and trust between firms. The control and coordination in TNCs change over time away from the traditional hierarchical organizational structure towards a network-based (heterarchical) organizational structure (Hedlund & Hagström, 1986). This, however, is a slow process (Dunning, 1993; Dicken, 1998). Amin & Cohendet (1998) have suggested that TNCs have a dual organization in which knowledge and core activities are organized in a network structure while the other activities are organized in the traditional hierarchical structure. Subsidiary companies are embedded in two different but interdependent networks. The first is the company network, which includes the internal relations in the TNC. The second is an external network, which includes the relations in the subsidiary company's global and local production environment (Andersson & Forsgren, 1997). The region and nation in which the subsidiary company is located and embedded can be seen as a resource for the foreign affiliates and for the parent company and other affiliates in the TNC's network.

Territorialization is, in this context, understood as the embeddedness of the firm in the region (Hvidberg et al., 2001). Summarized briefly, it includes the physical infrastructure and the individual agents that have specific qualifications and are involved, for instance, in the local or regional labour markets. Moreover, it includes the collective agents such as firms, administrative and political organizations and institutions and other public and private organizations.

Hvidberg and Jacobsen (2000) revealed that TNCs in Denmark were seldom greenfield investments but, rather, acquisitions of existing firms. They divided the TNCs in Denmark into three groups: a) the market group, b) the production group, and c) the knowledge group. They showed that the knowledge group is far more territorialized than the market and production groups. This indicates that the economy of the knowledge society is more embedded in space than is the traditional economy.

The hypermobility that reduces the uniqueness of place by moving capital and ownership of firms globally is counteracted by the territorialization process. Hvidberg et al. (2001) conclude that the end of geography due to hypermobility is largely seen in industries in which traditional locational factors and the production costs determine competitiveness while the more knowledge-intensive production has a higher degree of territorialization.

4. New Economic Geography, Technology and Growth

What is the link between globalization and the new economy? This is an important question, which is not easily answered as processes of globalization and the emergence of the new economy are two interrelated phenomena that derive from the same cradle. Information and communication technology may be a prerequisite of some of the current social and economic changes, but technology is far from the sole engine of social and economic change: technology is embedded in the tissues of interrelated social, political and economic processes.

Since the late 1960s and early 70s there has been a transformation of the economy and economic spaces of Europe and North America – a transformation from fordism to postfordism. At the beginning of the 1990s the postfordism debate ran high in the social sciences, constituted by the French regulation school (Aglietta, 1979; Boyer, 1990, Lipietz, 1986, 1987) and its English developments on the role of the state (Jessop 1990; 1994), the neo-schumpeterian ideas of technological change (Freeman & Perez, 1988) and the view of flexible specialization and a second industrial divide (Piore & Sabel, 1984). The debate dealt with the economic crisis of the early 1970s, its origins and socioeconomic consequences, and it was based on the notion that capitalism had cast off the slough of mass production that had dominated the economic boom in the post-war years and resurrected around a new flexible form of production made possible by new advances in information and communication technologies. Transition, transformation and structural crisis were concepts used to characterize the current capitalistic development, while postfordism, neofordism, flexible accumulation, flexible specialization, and the fifth Kondratiev were designations used to describe and identify the emerging new era of capitalism.

Geographically, the economic landscapes have changed and relived a transformation. Old industrial spaces (metropolitan areas and manufacturing centres throughout

Europe and North America) have declined and are currently being restructured while new industrial spaces, as the holy trinity – the Third Italy, Baden Würtemberg, Silicon Valley – have materialized and have taken over as leading centres of economic growth with new forms of flexibility, numerical and functional, changing the organization of production and the firm structure (Scott, 1988b, Storper, 1992, 1997). This development has involved some industries' experiencing a geographical dispersal and decentralization while others are concentrated or reconcentrated in space. This fundamental process of economic geographical change has been characterized as "the inconstancy of capitalism" (Storper and Walker, 1989).

The postfordism debate has many interesting features and arguments about the changes that the world experienced from the late 1960s and onwards, and the debates and events in the world economy acted as the base for the current ideas of globalization.

In the 1990s the new economic geography emerged based on the developments in evolutionary and institutional economics, and a learning turn had begun in the understanding of economic geographical issues, bringing new insights into the analysis of the capitalist space economy. The new economic geography stresses the importance of technological change and innovation processes in understanding regional development.

Today, technology is recognized as one of the prime engines of economic growth (Storper, 1997) and new economic geography recognizes that capitalism is an *evolutionary* process driven by technical and organizational innovation (Storper & Walker, 1989, Storper, 1997). Capitalism is a process in which firms face a greater degree of uncertainty of investment and instability than admitted in neoclassical theory. Technological change understood in the broad sense as product, process and organizational innovation in the individual firm, and social and institutional innovation at the level of an industry, region and nation have had a central role in theories of economic development in the past decades.

Modern evolutionary economic theory (Dosi & Nelson, 1994; Hodgson, 1993; Nelson & Winter, 1982; Saviotti & Metcalfe, 1991) and institutional economics (Williamson, 1975; 1985; North, 1990) together with neo-schumpeterian thoughts (Freeman & Perez, 1988) and the ideas of national innovation systems (Lundvall, 1988; 1992) see innovation as an interactive process between users and producers, between firms and the basic scientific infrastructure, between the different functions within the firm, between producers and users at the interfirm level, and between firms and the wider institutional milieu. Innovation is an interactive process; it should be conceived as a process of interactive learning shaped by a variety of institutional routines and social conventions.

Institutions, understood as patterns of behavior or "settled habits of thought" (Veblen, 1898), norms, conventions and routines (Storper, 1997; Nelson & Winter, 1982) help to regulate economic life and to reduce uncertainty, but they are cultural artifacts and are far from uniform in character (Morgan, 1997). The significance of routines and conventions for innovation and economic development is often summarized in the concept of social capital (Baron et al., 2000). Social capital refers to features of social

organization such as networks, norms and trust that facilitate coordination and cooperation for mutual benefit.

Innovation and technological change are embedded in a web of traded and untraded interdependencies, and these processes are to various degrees entrenched in the local social and economic institutions (Storper, 1997). First, traded interdependencies constitute a web of localized input-output or user-producer relations that are essential to the information exchange between firms. Second, the role of untraded interdependencies (like local labour markets, regional conventions, norms, values and public and semi-public institutions and organizations) is significant in creating regional competitive advantages.

The new economy, the ICT sector, new media or the Internet economy are new sectors and industries that are generally innovative and thus depend on the national and regional knowledge bases and innovative capacity, and the untraded interdependencies seem crucial for success in the national, international or global markets.

Localized technological change in an industry or region can be understood as an evolutionary path that is irreversible and path dependent. Regions can be characterized by their variety in terms of technology and their organizational and informational characteristics (Rigby & Essletzbichler, 1997). Geographical and industrial inertia and differences in investment in capital stock, knowledge production and learning, business culture, regional institutional set-ups (including public and private organizational structures) and traded and untraded interdependencies between firms and other regional organizations and institutions result in a diversity of regional production systems (Essleztbichler & Winther, 1999; Winther, 1999).

Globalization, the new economy, the learning economy or network economy, challenges the available political spaces and, in turn, regional policy. Economic networks, although embedded in place, cross borders that surround political spaces, and industrial innovation systems can be global, embedded in national and regional systems of innovation (Edquist, 1997). The individual firm or cluster of firms can be local but their markets global; as well, the subcontractor structures are not necessarily local but often international. Maskell (1998) gave the low technology example of the Danish furniture industry, and Kirkeskov (2000) examined the high technology case of the measurement equipment industry in Copenhagen. Both industries have high export rates and compete globally, and both industries have international networks. In both cases it was shown that local and regional institutions play a vital role in the competitive advantages of the industries.

5. The Nordic Information and Communication Technology Sector

To illustrate the importance of these new industries in the economy, Figure 1 shows the development of gross capital formation in Denmark since 1966. The development follows the general pattern of economic booms and recessions. The oil crises in 1973 and 1979 are notable, as is the global recession in the early 1990s, followed by a recovery. Figure 1 also reveals the gross capital formation in software from 1966 and onwards.[2] Software investment growth is almost exponential and there is no sign that it was affected by the general economic recessions.

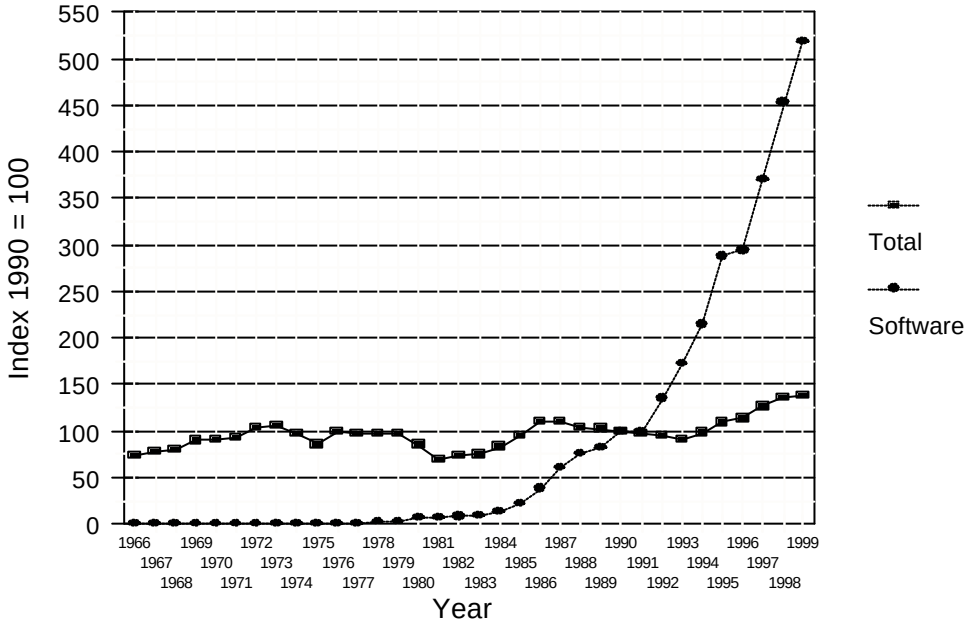

Figure 1. Gross Capital Formation in Denmark 1966-1999 in fixed 1995-prices.
Source: Danmarks Statistik

Twenty years ago the investment in software was insignificant in the Danish economy – a mere 0.219 percent of the total gross capital formation in 1980. Ten years later its share had increased to close to 3 percent, and in 1999 its share was above 11 percent (see Table 1). This indicates that ICT has become very important in the economy as a whole and that every sector in the economy has been influenced by the developments in ICT.

The ICT sector[3] in the OECD countries was estimated to have 12,800,000 million persons employed in 1997 (OECD, 2000). North American countries contributed with 39 percent, the EU countries 35 percent and the Nordic countries with 3.4 percent. Although the United States has the majority of the ICT sector in absolute terms, the Nordic countries have above EU and OECD average employment in the ICT sector as a share of the business sector employment while the US has below EU average and

[2] Gross capital formation in software is defined as a significant investment in or development of software.

[3] As defined by OECD, see chapter 2.

just above OECD average. Japan has the second-largest ICT sector among the OECD countries in absolute

Table 1. Software's Share of Gross Capital Formation in Denmark, Millions of DKR. in fixed 1995 prices.

Year	**1970**	**1980**	**1990**	**1999**
Total	157168	147381	173145	238543
Software	3	322	5209	26989
Software's share %	0,002%	0,219%	3,009%	11,314%

Source: Danmarks Statistik 50-års oversigten

terms but has below both EU and OECD average share of private sector employment. Among the Nordic countries, Sweden and Finland are listed as high ICT-intensive countries by the OECD (2000), while Denmark, Iceland and Norway are categorized as medium ICT intensity countries.

Danmarks Statistik et al. (2000) provide an excellent statistical review of the ICT sector in the Nordic countries. The definition of the ICT sector follows that of the OECD, which divides it into manufacturing industries and service industries (see chapter 2). The ICT service industries are divided into three groups: wholesale, telecommunications and consultancy services. This grouping of the ICT sector is meaningful, but, as discussed above, whether or not manufacturing and distribution of hardware and a relatively large share of the telecommunications sector are representative of the new economy can be debated; however, it shows that there are strong linkages between the ICT sector and the rest of the economy.

5.1 Employment

The ICT sector employed 448,000 employees in 1998 in the Nordic countries, which amounts to 7.9 percent of the total private sector employment. ICT manufacturing accounted for 30 percent of the ICT sector, while wholesale and telecommunications accounted for 22 percent and 18 percent respectively. ICT consultancy had 30 percent of the total ICT employment.

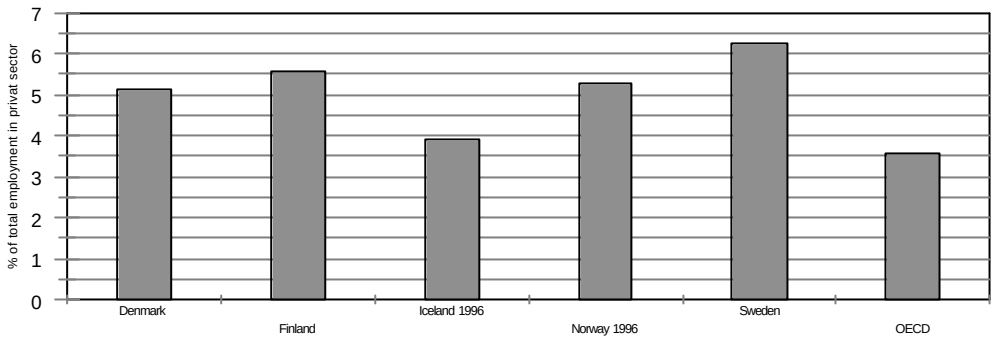

Figure 2. The ICT Sector Employment's Share of Total Private Employment 1998.
Source: OECD (2000).

Figure 2 reveals the importance of the ICT sector in the Nordic countries in terms of employment. The ICT sector's share of total private sector employment is above the OECD average in all five Nordic countries. The ICT sector has the highest share of private sector employment in Sweden, more than 6 percent. In Denmark, Finland and Norway the sector's share is around 5 percent, and in Iceland the sector accounts for close to 4 percent of total private employment.

Figure 3 shows the Nordic countries' share of the ICT sector and the private sector in 1998. Denmark and Finland have approximately 20 percent each of the Nordic ICT sector, which equals their shares of the total private sector employment (both countries have very little over-representation of the ICT sector). Iceland has below 1 percent of the Nordic ICT sector, but above 1 percent of the total private sector employment. Thus, the ICT sector is under-represented in Iceland. This is also the case for Norway. Norway has almost 16 percent of the Nordic ICT sector but close to 25 percent of the total private sector employment. Sweden is the Nordic country that has the largest share of the sector, and the ICT sector is over-represented in Sweden. The sector in Sweden accounts for more than 42 percent of the Nordic ICT sector while the Swedish economy accounts for only 34 percent of the total private sector employment.

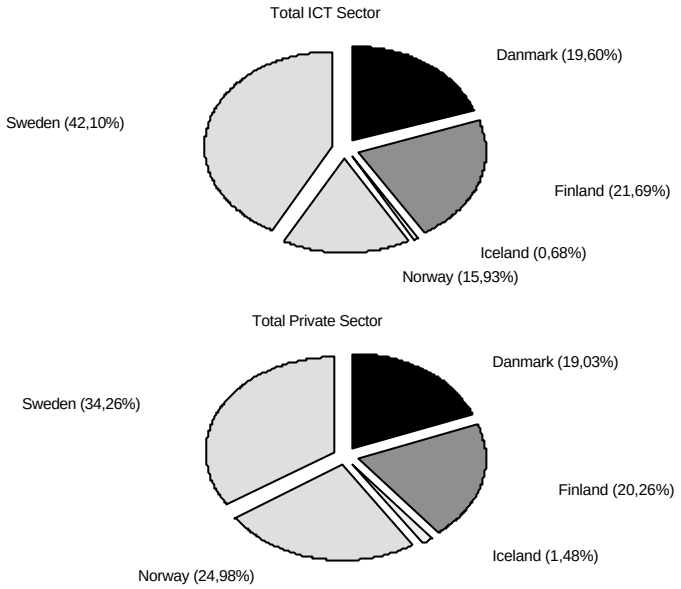

Figure 3. The Nordic Countries' Share of Total Nordic Employment in the ICT Sector and the Total Private Sector in 1998.
Source: Danmarks Statistik et al. (2000).

5.2 The Industrial Structure

The structure of the ICT sector varies significantly between the Nordic countries. Finland and Sweden are dominated by the manufacturing industries, while Denmark, Norway and, especially, Iceland are dominated by the service industries (see Figure 4). In Finland the manufacturing industries account for 40 percent of the ICT employment, in Sweden close to 35 percent, in Denmark just above 20 percent, and in Norway just below 20 percent, while manufacturing is insignificant in Iceland (104 employees only). Thus, the ICT service industries' importance in the Nordic economies varies considerably. In Denmark, Norway and Iceland the service industries account for more than 80 percent of the employment, and in Denmark and Norway the structure of the ICT sector is almost identical, although the telecommunications sector has a larger share in Denmark while consultancy has a larger share in Norway. In Finland and Sweden the share of telecommunications and consultancy equals that of Denmark, but wholesale's share of the ICT employment is relatively low.

Sweden and Finland are producers of ICT hardware, while Denmark, Norway and Iceland are ICT services countries, with Denmark being dominated by wholesale and Norway by consultancy. This pattern is even more evident when one looks at turnover and value added (Danmarks Statistik et al. 2000). In Finland and Sweden the ICT manufacturing is of major importance, accounting for almost 10 percent of total percent of total manufacturing employment, 13-15 percent of turnover and value added in 1998.

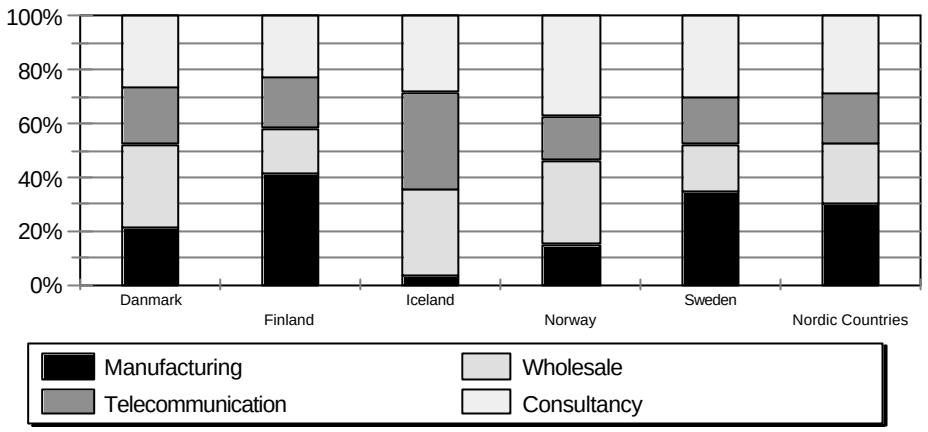

Figure 4. The Structure of the Nordic ICT Sector in 1998.
Source: Danmarks Statistik et al. (2000).

The national importance of the ICT service sector reveals a different pattern as the differences between the Nordic countries are less significant. In Denmark and Sweden the sector is of considerable importance, representing more than 10 percent of total service employment in 1998. In Finland the sector represents 9 percent of the service employees. In Norway and Iceland the sector's importance is not as provable as in Denmark and Sweden, with close to 6 percent only (Danmarks Statistik et al., 2000:16).

5.3 Growth

During the 1990s employment in the ICT sector has had growth rates significantly higher than those in the private sector economy in general. This is displayed in Table 2, which shows the growth of employment in the Nordic countries (excluding Iceland, for which no data are available) divided by sector. The high growth rates of the ICT sector are evident in the service industries, while the growth in the ICT manufacturing sector, with the exception of Finland, is either below private sector growth or just above it. Consultancy services have experienced marked growth rates, especially in the late 1990s, when it was well above average. It increased with 73 percent in Norway from 1995 to 1998, with 53 percent in Sweden, 43 percent in Finland and 35 percent in Denmark. Telecommunications had minor increases with the exception of Denmark, together with wholesale; employment in wholesale even declined in Norway.

The growth in manufacturing was marked in Finland, more moderate, but above the economy as a whole in Sweden, just around average growth in Norway and relatively stable in Denmark.

Table 2. Employment Growth in the ICT Sector 1995 – 1998

	ICT manu-facturing	Wholesale	Tele-communi-cation	Consultancy services	Total ICT services	Total private sector
Denmark	-1%	14%	27%	35%	24%	6%
Finland	30%	22%	15%	43%	27%	13%
Norway	11%	-1%	7%	73%	24%	10%
Sweden	19%	22%	6%	53%	29%	12%

Source: Danmarks Statistik et al. (2000).

In conclusion, ICT manufacturing and ICT consultancy services seem to be the two most interesting sub-sectors in a Nordic context. The consultancy service industries are interesting because of their high growth rates in the late 1990s and thus their growing economic importance. Further, consultancy services, including hardware consultancy and software consultancy and supply, are central in forming an understanding of the new economy as discussed above. ICT manufacturing is interesting because of its economic importance in Finland and Sweden (Nokia and Ericsson) and its local importance in regional economies such as Northern Jutland in Denmark. Moreover, the international trade of ICT products is substantial for the Nordic economies, especially Finland and Sweden.

5.4 Trade

ICT products are defined as manufactured products only, thus excluding trade of services. Figure 5 shows the Nordic countries' import and export of ICT products in millions of US dollars in 1998 and the ICT balance of trade. Finland and Sweden have positive ICT balances of trade, while Iceland, Denmark and, especially, Norway has deficits. In US dollars, Sweden's export of ICT products is close to four times the size of ICT exports from Denmark and seven times the size of Norwegian exports. Finland exports two thirds of the Swedish export of ICT. Sweden's import of ICT products is approximately twice the amount of that of Denmark and Finland.

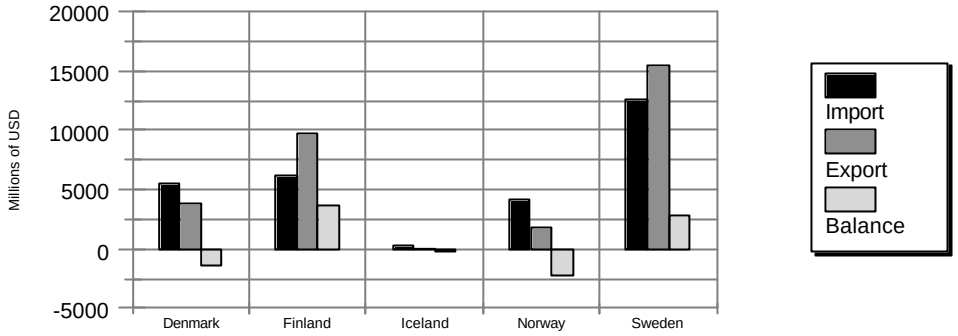

Figure 5. ICT Trade in Nordic Countries in 1998.
Source: Danmarks Statistik et al (2000)

Figure 6 shows the relative importance of the import and export of ICT products, displaying the ICT import and export as a share of total import and export. Among the Nordic countries Finland is the one in which the ICT sector is of greatest importance. In Finland, ICT export accounts for close to 20 percent of total export; this percentage is fifteen in Sweden, eight in Denmark, four in Norway and one in Iceland. Imports are relatively higher than exports in Denmark, Iceland and Norway but are below the OECD level, while import and export are higher than the OECD average in Finland and Sweden, emphasizing the countries' strong position and specialization as producers of ICT hardware.

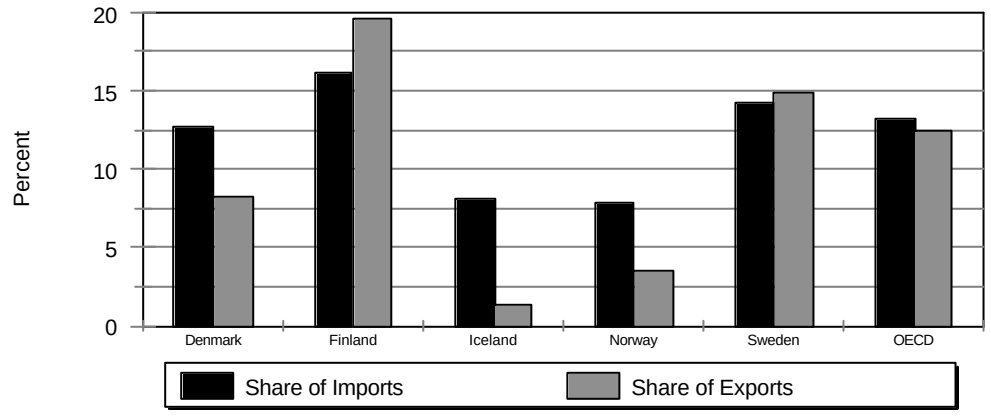

Figure 6. The ICT sector's share of import and export in 1998.
Source: Danmarks Statistik et al. (2000).

5.5 Linkages and R&D

Manufacturing has traditionally had strong economic linkages throughout the economy, and the growth in service is not necessarily in contrast to the development of manufacturing, but is often complementary to it. For instance, outsourcing has become an increasingly important economic strategy, enhancing the significance of

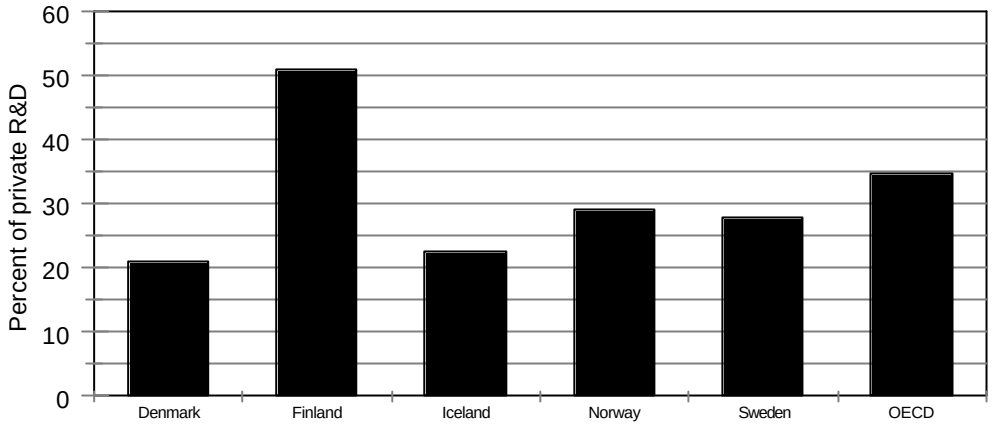

Figure 7. The ICT Sector´s Share of Private

production networks and specialized firms in the service sector.

An indication of the ICT sector's importance in national economies of the Nordic countries is revealed in Figure 7. The Figure shows the ICT sector's share of private R&D. All Nordic countries except Finland have a share below the OECD average, but the R&D expenditures are impressive. In Denmark and Iceland the ICT sector accounts for more than 20 percent of private R&D, while the shares in Norway and Sweden are close to 30 percent. In Finland the R&D expenditures in the ICT sector account for more than 50 percent of private R&D, significantly above the OECD average.

5.6 Value Added

The ICT sector is also interesting as an innovative and job creating sector. R&D expenditures indicate innovative potential, and the job creation is linked to the sector's competitiveness and its innovative potential. Another important economic measure is value added, and Figure 8 shows the ICT sector's share of the private sector's value added (excluding Denmark and Iceland). Finland and Sweden are above the OECD average, representing the ICT manufacturing countries, while Norway, representing the ICT service countries, is just below. The ICT sector's share of value added is higher than its share of employment, indicating that productivity levels are above the private sector average in the three countries.

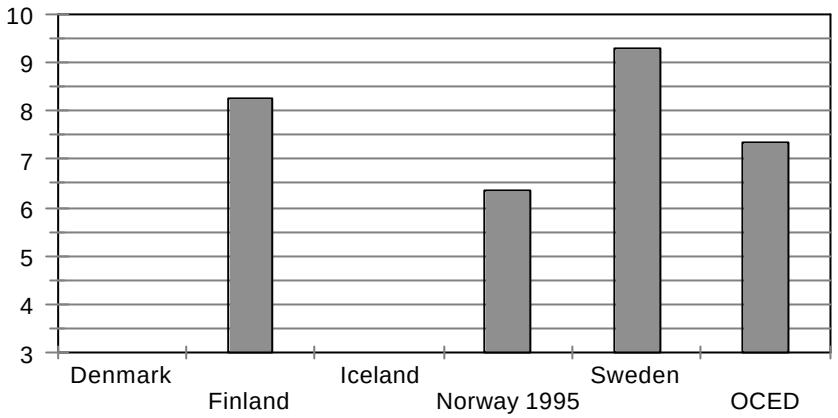

Figure 8. The ICT Sector's Share of Value Added in Percentage, 1998.
Source: OECD (2000)

5.7 Productivity

Table 3 shows the productivity levels in the three countries and the OECD average. The three Nordic countries have below OECD average productivity levels, but in Sweden and Finland the productivity levels are significantly higher than in Norway.

Table 3. Productivity Levels in 1997. Value Added/Employment in PPP USD.

Country	ICT Sector
Denmark	n.a.
Finland	69761
Iceland	n.a.
Norway 1995	49640
Sweden	67588
OCED	93010

Source: OECD (2000)

Table 4 provides an explanation showing productivity levels in all five Nordic countries using turnover per person employed. Denmark, Finland and Sweden have above Nordic average productivity, twice the level of Iceland and Norway. Finland and Sweden have above average productivity in ICT manufacturing and in ICT services, while Denmark's high level of productivity is driven solely by the ICT services. Iceland and Norway have generally low productivity levels in all ICT sub-sectors.

Table 4. Productivity Levels in the OECD and the Nordic Countries in 1997, Turnover per Person Employed PPP USD.

Country	ICT Manufacturing	Telecommuni-cations	ICT services	ICT sector
Denmark	108.577	139.187	286.066	216.541
Finland	238.949	148.377	231.109	218.082
Iceland	105.769	66.779	140.684	99.281
Norway	145.725	127.506	73.954	97.346
Sweden	247.295	156.188	218.986	215.516
Nordic	212.955	143.352	206.996	195.102

Source: Danmarks Statistik et al. (2000)

5.8 Two Nordic ICT Profiles

The above presentation of the ICT sector's economic importance in the Nordic countries reveals an important heterogeneity among the five countries. The ICT profiles of Sweden and Finland differ from the Danish, Icelandic and Norwegian profiles. Sweden and Finland are dominated by the production of hardware, while Denmark, Iceland and Norway are ICT services countries. This has implications for an analysis of the Nordic ICT sector and for the ICT sector's embeddedness and spatial structure as the locational patterns differ among the different ICT industries.

6. The Internet Economy

The Internet economy is a part of what has been called new media (see above). This section focuses on the use of ICT and the Internet in the economy and on the spatial implications and embeddedness of the economy. This chapter focuses directly on the economic dimension of the Internet and not on the many issues that the Internet raises such as questions of democratic involvement, ethics, juridical and cross-border problems, regulation and censorship of the Internet and the associated debates on freedom of speech, and perceptions of a movement towards new notions of community and other changes in forms of human association. See Slevin (2000) for an elaborate discussion of the Internet and society. Further, the widespread use of computers has created a feeling of living in a digital environment, and terms such as cyberspace, chatroom, domain, virtual places and net cafes involve an environment that echoes familiar geographical concepts. There is an immense debate on these issues, and recently the spatial and geographical dimensions of political action, changing identity, new organization forms etc. have been explored scientifically from economic, social, political and cultural perspectives; see for instance Crang (2000), Gibson (1999), Pritchard (1999), Adams (1997), Jackson & Purcell (1997). A cybergeography has emerged (Dodge, 2001; www.cybergeography.com/atlas/atlas.-html), at the heart of which is a belief that cyberspace is changing geography, distorting space, shrinking distance and modifying our sense of place (Dodge, 2001).

The new media industry is a young industry and the e-economy, including e-commerce, is a child of the world wide web (WWW) (see the historical development below). This means that an examination of the industry is difficult as we are in the middle of a running stream with ongoing changes. It is difficult to examine the

structure and the location of the emerging industries because the object is constantly changing, and new products, markets and niches appear and disappear on a daily basis.

Research on new media is less common than journalistic accounts. Pratt (2000) identifies two broad groups doing academic work on the subject. The first group are those who are concerned with the online world, and the second group are those who are concerned with the off-line world. The former can be divided into two sub-groups. The first includes those with an interest in sociological and cultural aspects of the Internet, who are exploring the formation of online identity and community (see above). In the second group are those who are interested in e-commerce. A significant part of the research by this group involves theorizing about the "weightless economy." The off-line group are characterized by researchers interested in the physical location and the economic, social and cultural settings of the new media activity.

There exists an emergent literature on the conception of the weightless economy, especially among economists (Quah, 1997a; 1997b; 1998a; 1998b; Gorman, 2001). The argument of a weightless economy points to the radical possibilities of cost-free reproduction and distribution of e-goods such as software. An infinite number of copies (originals) can be made instantaneously. Consequently, the role of physical location and transport are no longer relevant. Producers will be free to locate where they wish. Pratt (2000) takes the argument further and argues that an extension of this free cost argument is that cities will decline as centres of economic activity and will be replaced by dispersed teleworkers – the end of geography as a location factor in relation to new media has been built and the death of cities has been declared (Gorman, 2001).

Pratt (2000) goes on to challenge the argument of the end of geography, emphasizing that the weightless economy is embedded in regional and local socioeconomic networks and institutions. First, in new media, few goods are actually weightless; even software products are often attached to material objects such as brochures and boxes. Second, weightless products still have to be conceived and created. The production of new media products, including software, is a process involving intensive use of human resources. Production involves teams of designers and managers who create and update the products and, further, there is a need for a sales force, advertising and a growing help staff (back-office functions?). Third, the different teams of designers, managers, sales and support need to be coordinated, and therefore workers are still gathered in one location, for example, at the Microsoft campus, Media Alley in New York, Sydhavnen in Copenhagen and so on.

The weightless economy is only one part of the new media industries and the new economy. Where e-commerce involves regular and weighty goods, then production of these goods must take place and the role of the labour processes and the transport system must be taken into account. Pratt argues that it could be better to think of e-commerce firms as a new technical division of labour, which seems a reasonable argument in, for instance, the GANT case.

As discussed above, economic activity is embedded in the national, regional and local socioeconomic webs of traded and untraded interdependencies and regional institutions and organizations. It could be argued that some of the untraded

interdependencies could be managed at a distance with telephone, e-mail and web cameras, but research suggests that this is far from the case; for example, Scott's (1997; 2000) research on the cultural industries emphasizes the importance of proximity, and Pratt (2000) provides empirical evidence from the new media industry in New York.

New media and new economy, for example, business to business e-commerce, the production of software etc., could become weightless and obtain a degree of locational freedom and eventually become footloose, that is, the traded interdependencies may be independent of space and place. The untraded interdependencies, however, are located in space and they evolve in specific places. In new media, Pratt (2000) points to the need for formal and informal face-to-face communication and the planned and chance nature of the untraded interdependencies as very important to the underlying practice of the development of the industry in New York. The untraded interdependencies facilitate the traded, and physical proximity seems to make interaction easier.

Further, Bäcklund and Sandberg (2000) have pointed to the importance of the presence of the traditional media industry; the presence of other information-based industries, for example, advertising (cultural industries could easily be added); the presence of a well-qualified flexible labour pool and R&D institutions and universities. Moreover, inter-firm information flows could be enhanced and the knowledge spillovers are often localized and depend on proximity (Storper, 1997).

The few reported studies of the new media industries and of the new economy emphasize the importance of the untraded interdependencies, and especially the local labour market, new forms of organization of labour in the production process, the increasingly interactive learning process between users and producers, intrafirm networks, and networks of firms and other organizations such as universities. Case studies, statistical analysis, empirical and theoretical research of the spatial implications of the new economy are still relatively preliminary and are often pilot projects, but there is an emerging literature of the evolving economic geography of the Internet and e-business (Gorman, 2001).

This chapter gives a brief history of the Internet followed by empirical evidence of the Internet economy. Electronic commerce over the Internet is a fast-growing industry and is in the top layer of the Internet economy, and it is a significant part of the new media industries. The chapter provides some empirical evidence of e-commerce. As stated above, e-commerce is not confined to virtual firms; the "old economy" uses e-commerce as well, and it may be seen as a wider phenomenon in the economy and as a new technical division of labour changing the spatial organization of production of goods and services. The chapter also provides an indication of the use of the Internet in the Nordic firms. As pointed out above, the labour markets seem to be an essential structure in the new economy (whether ICT manufacturing, e-commerce or new media in general). The final section of this chapter looks at the labour structure in the new economy.

6.1 A Brief History of the Internet

The Internet has developed rapidly in the past ten years. The technical developments behind the growth are many, but Adams & Warf (1997) point out four crucial developments: more computers; more computer power, increased processor speed, graphical capabilities and memory; an increasing interconnection of computers into networks that make communication, data acquisition, software sharing, information processing and remote storage possible; and an interface that lets users command iconic and graphic representations.

The history of the Internet is the history of our own times. Although the first Internet dates back to 1969, it was not until the 1990s that the use of the Internet accelerated and the idea of, for instance, e-commerce (electronic commerce over the Internet) boomed (Castells, 2000; Slevin, 2000; Starrs, 1997;www.cybergeography.org-/atlas/atlas.html; www.internetvalley.com/intval.html; http://www.nua.net/). In 1969 there were four nodes on the US Department of Defense network, ARPANET – UCLA, Stanford Research Institute (SRI), UC Santa Barbara (UCSB), and the University of Utah in Salt Lake City. With the development of the data-moving protocol, TCP/IP,[4] in 1982, 550 hosts existed on the emerging Internet. The coming of the world wide web (WWW) in 1990 and, later, the arrival of Internet browsers created the technical backbone for the fast growth of the Internet in the 1990s. Figure 9 provides an illustration of the rise of the Internet since the early 1980s. The Figure shows the worldwide growth in Internet hosts[5] from 1981 to 1999. The growth in the number of hosts has been an exponential process pointing out the sudden and rapid emergence of the Internet in the 1990s. These data are impressive; in the past few years many myths about the growth have appeared and Odlyzko (2000) goes behind the headlines and concludes, "*The story of the Internet traffic doubling every three months is a fable that seems to have arisen from a rather brief spurt of traffic growth in 1995-1996. The astronomical growth rates of the popular fable can be dangerously misleading...When seen over the decade of the 1990s, traffic appears to be doubling about once a year*" (Odlyzko, 2000:7).

The growth is not evenly distributed around the world. The growth of the Internet is a geographically uneven process and there is a digital divide between developed economies and developing and undeveloped economies (OECD, 2001). The Nordic countries are among the leading connected countries in the world (Starrs, 1997). Table 5 displays the number of hosts (these data are of course outdated by now in this fast growing cyberspaced world, but the data may indicate the rank between the countries).

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[4] TCP/IP (transmission control protocol/Internet protocol) is a technique known as packet switching, in which large amounts of data can be reduced to smaller units each travelling independently through the Internet (Starrs & Anderson, 1997).

[5] The host is one computer, linked to the Internet with a unique address (usually its TCP/IP number). Many people may use the same computer, but it remains a single host (Starrs & Anderson, 1997). This is a conservative measure (Starrs, 1997). Slevin (2000) reports that the number of users worldwide was estimated to be between 150 and 180 million in 1999 and is estimated to reach one billion in 2005 (http://www.nua.net).

Finland is the country where the Internet is most dense, far ahead of Iceland and Norway. Those three countries have more hosts per thousand inhabitants than the United States and Canada, which are followed by Sweden, Switzerland and then Denmark. Further down the list we find economic heavyweight nations such as the UK and Germany. In 1997 the Internet was confined to North America, the countries in the European Union and the economically strong countries in Southeast Asia, the OECD countries (OECD, 2001), while Eastern European was far behind (Russia had only 0.481 hosts per thousand inhabitants) together with Africa. In 1997 a significant number of countries, including, for example, Afghanistan, Chad, Gabon, Iraq, Libya and Sudan, were defined as nonparticipants on the Internet (Starr, 1997). Today (July 2000) the US is the OECD country with most hosts per inhabitants, followed by Finland, Iceland, Canada, Norway and Sweden, all with above the OECD average, while Denmark is just below the OECD average (OECD, 2001).

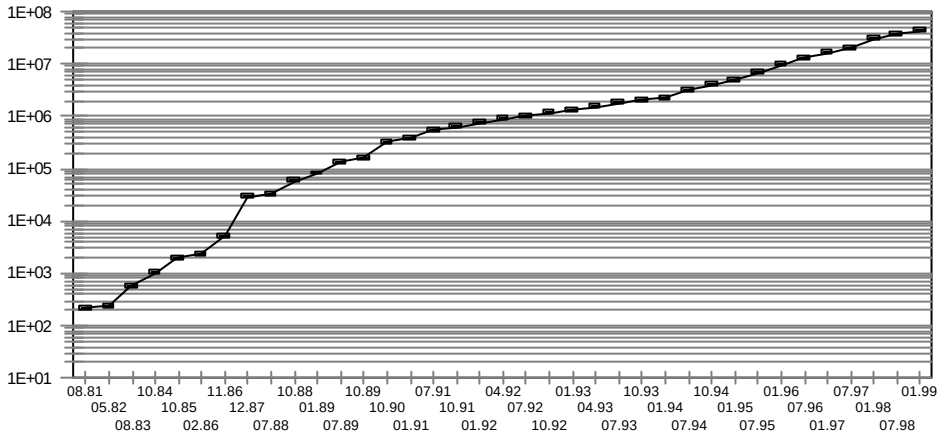

Figure 9. Worldwide Growth in Internet Hosts, 1981-1999
Source: Network Wizards Internet Domain Survey, http://nw.com/zone/host-count-history

The digital divide is evident in the size and growth of the Internet access. Moreover, the price of access to the Internet is one reason for the digital divide. There seems to be a notion that the Internet is freely accessible, but being connected is not cost free. Internet access prices are declining but are far from free, and household or individual income is an important determinant of PC penetration and Internet access (OECD, 2001). Table 6 shows PC penetration and Internet access in selected countries. The figures show that the PC penetration and Internet access in the OECD countries vary markedly. The Nordic countries are high on the list, especially concerning household Internet access.

Table 5. European Internet Hosts, by Rank, Compared with the United States and Canada. Number per 1000 Population, January 1997.

Finland	63,5
Iceland	43,6
Norway	41,1
United States	35,0
Canada	30,5
Sweden	29,2
Switzerland	22,3
Denmark	21,5
The Netherlands	19,9
San Marino	18,8
Monaco	15,7
Austria	12,9
UK	11,9
Germay	9,3

Source: Starrs (1997:201-203)

The digital divide is also evident in the use of electronic commerce, and there are divides by gender, education, family structure and ethnicity within each country; see below (OECD, 2001).

The geographical unevenness of Internet growth and accessibility is not just a phenomenon between developed and less developed countries but can be observed within the leading nations (Starr, 1997; Zook, 2000). The digital divide has a clear urban-rural component. The urban regions have better Internet access than rural areas (OECD, 2001). This pattern is also evident for the Internet economy. Zook (2000) shows that three regions – San Francisco, New York and Los Angeles – were the leading centres for commercial Internet content in the United States in 1998 with very high location quotients. Castells (2000:378-381) shows similar patterns of concentration in large urban agglomerations around the world.

Table 6. Internet Access and PC Penetration in OECD Households

Country	PC penetration percent of households	Country	Internet access percent of households
The Netherlands	55,0	**Denmark**	50,1
Australia	54,0	**United States**	41,5
United States	51,0	**Norway**	36,0
Denmark	45,0	**Australia**	34,0
Finland	43.4	**Canada**	28,7
Japan	38.5	**The Netherlands**	25,5
New Zealand	37.5	**UK**	25,0
Canada	36.4	**Finland**	27,8
UK	33,0	**Japan**	19,1
France	27,0	**France**	12,0
Italy	20,0	**Germany**	8,1

Source: OECD (2001).

6. 2 The Internet Economy

The Internet economy is a part of the new economy and the new media industry and the rapid advances in Internet technologies accelerate the economic activity of the Internet; currently, electronic commerce (e-commerce) is one of the fastest growing economic activities although the Internet economy has had a crisis at the end of the year 2000 and into 2001. This part of the new economy relies on high-speed networks based on Internet Protocol, Internet applications, and new forms of marketing and business tools. Barua et al. (1999) divide the Internet economy into four layers, which differ significantly from the way that OECD (2000) and Danmarks Statistik et al. (2000) defined the ICT sector above.

*Layer I: The Internet Infrastructure Layer***:** This layer includes firms with products and services that create the IP (Internet Protocol) based network infrastructure that is a prerequisite for e-commerce. It includes Internet backbone providers and Internet service providers, networking hardware and software companies, PC and server manufacturers, security vendors, fiber optics producers and so on.

Layer II: The Internet Application Layer: This layer provides products and services that build upon the layer I infrastructure and make it technologically feasible to do business activities online. This layer includes Internet consultants, Internet commerce applications, multimedia applications, web software and so on.

Layer III: The Internet Intermediary Layer: The Internet intermediaries increase the efficiency of electronic markets by facilitating the meeting and interaction of buyers

and sellers over the Internet. This layer includes market makers, online services such as travel agents and brokerages and online advertising.

Layer IV: The Internet Commerce Layer: Internet commerce involves the sales of products and services to consumers (business to consumer B2C) or businesses (business to business, B2B) over the Internet. This includes e-tailers, manufacturers selling online, subscription-based firms, ticket sales and online entertainment and professional services.

This definition provides a good view of the backward linkages of e-commerce and shows that the total effect of e-commerce is far greater than just the sales on the Internet.

Table 7. The Internet Economy Generated by United States Based Firms.

	Estimated Internet Revenues	**Internet Jobs**
Layer I	$ 114,982 million (34.65%)	372,462 (27.85%)
Layer II	$ 56,277 million (17%)	230,629 (17.2%)
Layer III	$ 58,240 million (17.6%)	252,473 (18.9%)
Layer IV	$ 101,893 million (30.75%)	481,990 (36.05%)
The Internet Economy	$ 331,392 million (100%)	1.337,554

Source: Barua et al. (1999)

Barua et al. (1999) made a survey in an attempt to measure the Internet economy following the above definition. Table 7 shows the result of their estimates of the worldwide sales of Internet related products and services by United States based companies in 1998, divided by layer. The results reveal that the backward linkages are significant. The figures are estimates and an interpretation of absolute values must be done with caution, but the relative relations among the four layers indicate the economic linkages. Layer IV, the Internet commerce layer, accounts for 30 percent of the estimated revenues and 36 percent of the Internet jobs. Layers II and III, providing applications and marketing services, account for another third of the Internet economy, while the first layer accounts for approximately the last third of the Internet economy.

Recently the new economy has been in a disruptive period with turbulence in the stock markets resulting in falling prices, indicated by the rapidly falling NASDAQ index in the United States (Børsen December 1, 2000; Børsen Marts 14, 2001). This has been followed by closures and downsizing in relatively well-established Internet firms such as Dell (layer I, hardware, downsizing), AOL Time Warner (layer I, Internet services, downsizing) and the two famous e-tailers Amazon.com (Layer IV, downsizing) and eToys.com (Layer IV, downsizing and closing) (Information February 16, 2001). Børsen (November 21, 2000) showed that the Internet economy,

Internet providers and web designers had the lowest rate of return (primary result/return * 100) among all industries in Denmark (-6.7). (This is an even more aggravated rate of return than that of the Danish professional football clubs, which is generally a bad investment).

The recession is not confined to the Internet economy but extends to the whole ICT sector. Motorola and Lucent Technologies have downsized, and recently Ericsson restricted itself to what it sees as its core activities, although it seems that old economy companies are doing better in the new economy arena than new economy companies (Information December 6, 2000).

PLS RAMBØLL (2000b) has made a survey of the Danish Internet economy using a definition that resembles that of Barua et al. (1999) dividing the Internet economy into four layers. PLS RAMBØLL (2000b) has identified around 5000 Danish Internet firms and made a survey that included 1382 of them. The Danish Internet economy accounts for close to 60,000 employees and a turnover that represents one-tenth of Danish manufacturing and close to 25 percent of Danish retail turnover. The survey includes many interesting observations and discussions about myths and realities in the Internet economy, and it emphasizes the importance of e-commerce as the engine of the Internet economy.

6.3 E-commerce

Electronic commerce (e-commerce) over the Internet is a relatively new form of conducting business that emerged with the Internet browsers in the mid-1990s. E-commerce is a growing phenomenon and an important layer in the Internet economy involving high expectations for future development (Johannesen, 2000; Ugebrevet Mandag Morgen, 1999). In 1995, Dell, Cisco and Amazon.com began to use the Internet for commercial transactions, and since then e-commerce has been a growing sector in the economy. It must be made clear that, at present, e-commerce only accounts for less than 1 percent of total sales in Denmark, and probably the Danish picture does not differ significantly from that in the other Nordic countries. Thus, e-commerce is still in its early youth and the juvenile markets are very turbulent, as discussed above. E-tailers such as eToys.com and Amazon.com have had severe problems generating an economic surplus, which has led to downsizing and closure in the business in general.

Today, a wide range of firms is exploring and developing the opportunities of Internet technology. E-commerce is an increasing business on the Internet and the virtual economy can influence the way the production is organized and can change the space economy. E-commerce transforms the marketplaces. Traditional intermediary functions will be replaced, new products and markets will be developed, new forms of interaction between users and producers, businesses and customers will appear. Moreover, e-commerce will accelerate and emphasize changes that are already occurring in the economy such as the establishment of electronic links between businesses (EDI – Electronic Data Interchange) and changing the patterns and linkages between firms, altering the organization of production and the forms of networks involved. Box 1 provides an example of this. The vertical disintegration of the production systems and the introduction of just in time, which is a feature of the postfordistic era, have emphasized the importance of coordination between firms in

order to minimize turnover time. E-commerce can reduce the importance of time by speeding up the production cycles through the use of intranets, extranets and EDI.

Box 1. The Internet and the Organization of Production

A Danish producer of a wooden door coating has introduced EDI and the Internet actively in the production process. The firm's customers include several producers of wooden doors in Poland, and it used to produce the coatings in Denmark, transporting the end product to Poland. Today, the Danish firm delivers the input to factories in Poland, a blending machine is linked to a computer in Copenhagen, getting the recipe (which is the "whole secret" of the coatings), and the machine is mixing the coatings at the Polish factory. This has meant that the factories are not dependent on the transport of final costs from Denmark.

Further, e-commerce will contribute to the changes in the organization of work as new channels of knowledge diffusion and human interactivity in the workplace are formed. More flexibility, adaptability and higher skills will be needed and the labour process and labour force's skills will be redefined, changing the structures of the labour market. The electronic marketplace is extremely complex and Internet use exerts influence upon all aspects of it. E-commerce is defined as an Internet based firm offering a product or service to the market. E-commerce is usually divided into business to consumers (B2C) e-commerce and business to business (B2B) e-commerce. It might also refer to the market for business information services, for example, services that capture customers' information and sell it to others for marketing purposes. Sometimes e-commerce even refers to the advertising we see on web pages and search engines. A growing number of firms belong to a group that uses their web sites as virtual stores and virtual shopping malls, for example, web-based retailing such as Amazon.com, eToys.com (and wholesale). Another group is exiting firms that would like to strengthen an established reputation by offering sales over the Internet, such as Blackwell's Online Bookshop.

Johannessen (2000) defines four levels of e-commerce. The first level has a low degree of investment and low user-producer interaction and involves mainly the publishing of static or dynamic information. The firm communicates one-way, from producer to user/customer. The second level implies an increasing interaction between user and producer. The customers can get help and online services. The third level involves transactions, for example, the buying and selling of goods and services over the Internet. The fourth level is complete integration; that is, the Internet solution is integrated into the firm's main system and the firm's ICT systems and processes are integrated with the customers.

Sales over the Internet in Denmark were approximately twelve billion DKR. in 2000, which is below 1 percent of total sales in Denmark (Danmarks Statistik, 2001). Around 10 percent of the Danish firms offered sales on the Internet in 2000.

E-commerce is not confined to virtual Internet companies but is widespread in the old economy's firms. B2B is by far the largest part of the market, which is relatively small compared to the traditional markets. For the firms that had sales on the Internet, the Internet sales accounted for an average of 7 percent of total sales. Thirteen percent of the Internet sales were B2C, while B2B accounted for 87 percent of the Internet

sales in 2000. Export is relatively insignificant and accounted for only 19 percent of total sales, and 12 percent was exported to the EU. Thus, E-commerce in Denmark is a home market phenomenon, and the changes in the spatial organization of production and the structure of the firms seem to be national, regional and local phenomena rather than a global phenomenon.

Danmarks Statistik et al. (2001) made a survey of the use ICT in the Nordic firms (Denmark, Finland, Norway and Sweden); for details see below. E-commerce was defined as receiving orders through the Internet home page, and all firms were asked whether they had a home page they used to receive orders from customers. Table 8 displays the result of the survey. Close to one out of five firms in Denmark and Finland had a home page with e-commerce as a possibility, while 14 percent of Swedish firms and 12 percent of Norwegian firms had the possibility. This geography is generally seen in most industries, with a few deviations.

Table 8. Percentage of Firms that Could Receive Orders Through their Home Page in 1999.

Denmark	Finland	Norway	Sweden
19	17	12	14

Source: Danmarks Statistik et al. (2001:18).

The turnover of e-commerce in the Nordic economies is still modest, but 5-8 percent of the Nordic firms get at least 2 percent of their turnover from e-commerce (this includes solely e-commerce firms).

6.4 The Use of the Internet in the Nordic Firms

The new economy and e-commerce are not restricted to web firms; the Internet is widely used in the whole economy (OECD, 2000; 2001). In the Nordic firms, excluding Iceland in this survey, there is a widespread use of ICT. Data from Danmarks Statistik et al. (2001) indicates the use of ICT by showing the share of firms having access to the Internet and the share of firms having a home page. Approximately half of the Nordic firms had a home page in 1999, and around 80 percent had access to the Internet. In Denmark, Finland and Sweden the use of ICT is more evident than in Norway. Finland is the country with the highest access to the Internet (85 percent of the enterprises have access) followed closely by Denmark and Sweden (78 percent). The use of ICT in Norwegian firms is not as high (66 percent only). The same pattern can be observed when it comes to the share of enterprises having a home page, although in this case Sweden is the dominant country (57 percent).

Table. 9 Share of All Enterprises with Internet Access Divided by Industry, 1999.

	Denmark	*Finland*	*Norway*	*Sweden*
Business service	94	92	79	93
Wholesale trade	86	87	78	81
Motor vehicles/ fuels	85	n.a.	72	73
Manufacturing	79	85	74	82
Construction	64	85	71	71
Transport	84	83	59	71
Retail trade	64	67	38	n.a.
Hotel/- restaurants	63	n.a.	53	n.a.
Total	78	85	66	78

Source: Danmarks Statistik et al. (2001)

Another important indicator of the use of ICT in the economy is the share of firms that are able to receive orders via home pages, that is, those involved in e-commerce. Table 8 shows that the share of firms able to receive orders via their home pages is 19 percent in Denmark, seventeen in Finland, fourteen in Sweden and twelve in Norway. Danmarks Statistik et al. (2001) show that the share of firms with Internet access increases with firm size, although the share of firms with ten to nineteen employees has a relatively high share of firms with Internet access, with Finland topping the Nordic countries with 80 percent, followed by Sweden and Denmark with 72 and 71 percent respectively, and the list ends, again, with Norway at 58 percent.

Table 9 shows the Internet access divided by industry in 1999. The Table shows that the Internet is most widespread in business services and wholesale trade, followed by the transport sector in Denmark and Finland. Manufacturing is generally above the average, while construction, retail trade and hotels and restaurants are below the average.

The use of the Internet in the Nordic countries looks relatively similar, with some minor differences. Table 10 reveals that general information search was the main task on the Internet, followed by financial transactions (e-commerce) and competitor analysis. One quarter of the firms with access to the Internet use the Internet to recruit personnel, which shows that the recruitment of labour is changing.

Since the mid-1990s the development of the Internet took a new turn as a growing number of large and medium-sized organizations started running the TCP/IP on their intra-organizational communication networks. These private Internets are called "intranets." Smaller intranets may be confined to connecting computers in a single building; larger ones may connect computers into a system that spans the globe. A group of organizations can also use the TCP/IP protocols on their interorganizational networks. These private networks are referred to as "extranets," and they allow

organizations to exchange data with each other. Table 11 shows the share of firms with Intranet and Extranet.

Table 10. Internet Usage. Share of Firms with Internet, 1999.

	Denmark	*Finland*	*Norway*	*Sweden*
A general information search	92	87	78	91
Financial transactions	61	59	41	44
Competitor analysis	47	59	37	46
Dealing with public authorities	51	36	47	n.a.
Recruitment of personnel	29	21	24	30

Source: Danmarks Statistik et al. (2001:14).

Table 11. Share of Firms with Intranets and Extranets in 1999

	Denmark	**Finland**	**Norway**	**Sweden**
Intranet	27	30	22	32
Extranet	8	11	6	10

Source: Danmarks Statistik et al. (2001:10-11).

Another form of data exchange between firms is Electronic Data Interchange (EDI). EDI is electronic transmission of data in a structured form between a firm's own computer system and a remote computer system based on a defined standard.

Table 12 shows the use of EDI in the Nordic firms in 1999 divided by sector. Denmark is the leading country using EDI with an above average use in business service, hotels, restaurants and catering and wholesale. Denmark is followed by Norway, while Finland and Sweden close the list.

This comparative study of the use of ICT in the Nordic firms indicates that the Internet is widely used by the Nordic firms and that the use is not confined solely to the Internet economy.

Table 12. Share of Firms with EDI

Denmark	Finland	Norway	Sweden
28	17	19	11

Source: Danmarks Statistik et al. (2001:11).

6. 5 Labour Structure of the New Economy – The ICT Sector

It has been observed that flexibility is one of the main aspects of the new media workforce, along with the requirements for specialized knowledge workers and people with university degrees.

Danmarks Statistik et al. (2000) provide comparable data for the Nordic countries on the labour structure in the ICT sector. The data provided by Danmarks Statistik et al. (2000) contribute to an understanding of the skill requirements and the job creation process within the ICT sector. It gives an indication of the importance of the regional labour market.

Table 13 displays the gender division of labour in the ICT sector compared to the private sector, total manufacturing and total service. The general pattern is that ICT services are dominated by men; consultancy and wholesale in particular have an above average share of men employed, while telecommunications has an over-representation of women.

It is often said that new media and the ICT sector, especially consultancy, is a young business in the sense that a relatively large share of the employees is young. Danmarks Statistik et al. (2000) define young as less than 35 years of age. From a Nordic perspective the ICT sector is generally younger than the total private sector, but there are large differences between the Nordic countries and between the industries; ICT manufacturing is especially dominated by young employees in Finland (close to 60 percent).

Another important issue is the educational structure of the ICT sector and the new economy, and the demand for qualified labour with a high-level education is one of the main challenges for the ICT sector and the new media industries. The national nomenclature for educational levels varies significantly between countries, which complicates the comparability across the Nordic countries. It is also important to note that qualifications obtained by post-graduate education, courses, on-the-job-training or simply learning by doing or using is not captured in the official statistics. In the ICT sector, the Internet economy and new media industries this might lead to an underestimation of the actual level of qualifications as many of the programmers, designers and knowledge works might be self-trained or might never have finished their university degree.

Table 14 provides an overview of the educational level in the Nordic countries, excluding Denmark. The ICT sector is generally dominated by a high share of employees with a third-level education compared to the total private sector. This is evident in manufacturing and in the service industries and in all the Nordic countries. In the ICT service industries it is especially ICT consultancy that has a large share of

employees with a third-level education. Thus the location of the ICT sector depends on the labour force educational level, which again points out the importance of the regional and local labour markets.

In conclusion, the new economy, especially consultancy, is dominated by young men with a higher education compared to the rest of the economy. This conclusion points again to the labour markets' importance in the new economy.

Table 13. Share of Women and Men Employed in the ICT Sector in Percentage.

	Denmark	1998	Finland	1998	Iceland	1999	Norway	1999	Sweden	1998
	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male
ICT Manufacturing	42	58	37	63	50	50	27	73	33	67
ICT Services	30	70	33	67	34	66	26	74	29	71
Wholesale	26	74	27	73	25	75	25	75	27	73
Telecommunications	41	59	41	59	42	50	29	71	37	63
Consultancy	26	74	31	69	22	78	26	74	27	73
Total Manufacturing	32	68	30	70	34	66	25	75	26	74
Total Services	42	58	47	53	51	49	44	56	42	58
Total Private Sector	36	64	39	61	44	56	n.a.	n.a.	34	66

Source: Danmarks Statistik et al. (2000)

Table 14. Share of Persons Employed with a Third-Level Education in Percentage.

	Finland 1998	**Iceland 1999**	**Norway 1999**	**Sweden 1998**
ICT Manufacturing	44	n.a.	38	37
Total Manufacturing	23	21	24	18
ICT services	52	43	43	48
Total Services	31	28	22	23
ICT Wholesale	50	30	28	35
Telecommunications	43	25	40	28
ICT Consultancy	59	59	56	61

Source: Danmarks Statistik et al. (2000)

7. The New Economy in Space

Economic activity, firms, industries and production networks are located in space, intertwined into places and local, national and international traded and untraded networks. The new economy is no different from other forms of economic activity; it is located in space and rooted in places by traded and especially untraded interdependencies, bounded to the local place through, for instance, labour markets, institutions and public and private organizations. Globalization and new forms of spatial organization of production of goods and services changes the economic spaces and the spatial division of labour, creating new forms of territorialization.

As discuss above, the Internet, the ICTs and the new economy may be the end of distance as we know it, but not the end of geography. Even the weightless economy is located in space, unpinned by the untraded interdependencies, the positive externalities and knowledge spillovers. The learning turn in economic geography, the conceptualization of the cultural economy, the discussion of the creative cities, the interpreting of the informational society, the formulation of the new media industries, the Internet economy and the ICT sector have a tendency to focus on competition and competitiveness of regions and cities. The conceptualization of the untraded interdependencies needs to be developed and made more sophisticated.

7.1 The Case of the Data Processing Industry in Denmark

The OECD (2000) and Danmarks Statistik et al. (2000; 2001) have provided some interesting data on the ICT sector and the new economy, but these data do not give an understanding of the new economy's location in space and its dependency of place. The general perception of the new economy is that it is an urban phenomenon situated in metropolitan areas by the specificness of the urban labour markets as the industries required labour qualifications that are specific and knowledge intensive. Case studies of industries in the new economy such as Pratt (2000) on the new media in New York support the general notion of a relatively centralized location pattern, but more fundamental statistical data are needed. Further, the new economy is spatial as it connects the nodes of the metropolitan areas of the world and follows the urban hierarchy and space out into the peripheral areas.

To illustrate the location pattern of the new economy this section provides empirical evidence from Denmark using NACE 720000 as an illustrative case. NACE 720000 includes hardware and software consultancy, software supply, data processing, database activities and maintenance and repair of office machinery, and it will be defined as a consultancy service in this section. Unlike Danmarks Statistik (2000), the definition used in this section excludes NACE 713300 "Renting of office machinery and equipment, including computers."

The decline and restructuring of the manufacturing sector since the 1960s in the CMA has been accompanied by an increase in service employment, and today service industries account for close to 80-90 percent of the employment in Copenhagen (Jensen-Butler, 1992; Winther, 2001)

Consultancy services are fast-growing industries in the Nordic countries, as the above analysis and data have revealed. In Denmark, employment in NACE 720000 grew

with more than 50 percent from 1980 to 1992 and with another 50 percent from 1992 to 1997 (see Table 16). Throughout the 1980s and 1990s the industry has mainly been located in the Copenhagen Metropolitan Area (CMA) - the CMA consists of the municipalities of Copenhagen and Frederiksberg and the counties of Copenhagen, Roskilde and Frederiksborg. Table 15 shows the regional shares of total employment and consultancy services' employment from 1980 to 1997.

In 1980 more than 64 percent of the industry was located in the CMA; in 1997 it was more than 66 percent of the industry and thus consultancy services exhibit one of the highest concentration patterns in Denmark and is clearly an urban phenomenon there. The sector is almost nonexistent in the peripheral parts of the Danish space economy; in Viborg it is less than 1 percent and in Ringkoebing less than 2 percent.

Table 15. Regional Shares of NACE 720000 ICT Consultancy

	1980	**1992**	**1997**
Copenhagen	230,00	18,88	16,41
Frederiksberg	7,74	1,49	1,85
Copenhagen County	26,02	29,03	35,53
Fredriksborg	4,04	11,68	9,43
Roskilde	4,39	3,67	2,83
Western Zealand	0,52	0,77	1,00
Storstroem	0,72	0,62	0,74
Bornholm	0,01	0,11	0,05
Funen	4,59	4,70	3,77
Southern Jutland	0,05	1,28	1,31
Ribe	0,71	0,69	0,56
Vejle	5,19	5,72	4,50
Ringkoebing	1,75	1,49	1,86
Aarhus	13,37	13,08	13,55
Viborg	0,31	0,77	0,83
Northern Jutland	8,27	6,01	5,78
Denmark	100,00	100,00	100,00
The CMA	64,49	64,75	6606,00

Source: Danmarks Statistik.

This indicates that a significant part of the new economy in terms of jobs is an urban phenomenon and that there is little evidence of a current spread of the industry in more peripheral areas.

An interesting observation is that there seems to have been a spread of the industry within the CMA away from the central city municipalities towards the counties of Copenhagen and Frederiksborg. Thus, the industry has experienced a change in the intra urban spatial division of labour - a similar pattern has been observed in the manufacturing industries (Winther, 2001).

Table 16. The Regional Growth in NACE 720000, Index 1992 = 100

	1980	1992	1997
Copenhagen	56	100	131
Frederiksberg	248	100	186
Copenhagen County	43	100	184
Fredriksborg	16	100	121
Roskilde	57	100	116
Western Zealand	32	100	194
Storstroem	55	100	179
Bornholm	5	100	70
Funen	46	100	120
Southern Jutland	2	100	154
Ribe	49	100	123
Vejle	43	100	118
Ringkoebing	56	100	187
Aarhus	49	100	155
Viborg	19	100	160
Northern Jutland	66	100	144
Denmark	48	100	150
The CMA	47	100	153

Source: Danmarks Statistik

One of the interesting aspects of the above analysis of the new economy and the ideas of a knowledge society is that the industry requires a highly educated and skilled labour force. Table 17 shows the educational levels of the employees in the data processing industry divided into five levels of education. The educational level of the employees in the data processing industry is compared to the educational level in the whole industry.

In Denmark, 6 percent of the employees in the economy had a university degree in 1997. In the data processing industry more than 16 percent had a university degree. These figures exhibit profound spatial variation. Every fifth employee in the Municipality of Copenhagen has a university degree, while the number of employees with a university degree is relatively low outside the main urban areas in Denmark (Aarhus – the city of Aarhus; Northern Jutland – the city of Aalborg). In these areas the percentage of skilled and unskilled labour is high, although a few regions have a high percentage of third-level education.

This indicates that there is a spatial division of labour within the data processing industry and that the labour markets play a significant role in the locational patterns in Denmark. But what, precisely, is the role of the regional labour markets in generating the spatial division of labour, and what is the spatial division of labour in the Danish space economy? What role do the urban system and its labour markets have in the dynamics of the new economy? What about the other Nordic countries? Can similar spatial developments be observed? What are the differences?

Table 17. The Labour Force's Level of Education in NACE 720000 and the Whole Economy by Region in 1997.

		Unskilled	Skilled	Third level, first stage, non university	Third level, second stage	University degree
Copenhagen M	Consultancy	34	26	6	13	21
	Whole economy	40	30	7	10	13
Frederiksberg M	Consultancy	40	21	9	12	18
	Whole economy	40	31	7	11	11
Copenhagen C	Consultancy	30	33	6	15	16
	Whole economy	39	36	7	11	7
Frederiksborg	Consultancy	29	28	5	17	21
	Whole economy	41	36	7	11	6
Roskilde	Consultancy	31	43	6	11	9
	Whole economy	41	38	6	9	5
Western Zealand	Consultancy	45	31	7	11	6
	Whole economy	43	39	6	9	3
Storstrøms	Consultancy	43	38	5	10	3
	Whole economy	45	39	6	8	3
Bornholm	Consultancy	50	29	14	0	7
	Whole economy	46	38	5	8	3
Funen	Consultancy	28	39	7	14	11
	Whole economy	43	37	6	10	4
Southern Jutland	Consultancy	20	36	16	19	9
	Whole economy	44	39	6	9	3
Ribe	Consultancy	26	48	3	14	8
	Whole economy	45	37	6	9	3
Vejle	Consultancy	23	45	11	13	8
	Whole economy	44	37	6	9	3
Ringkoebing	Consultancy	21	40	12	16	10
	Whole economy	47	36	5	8	3
Aarhus	Consultancy	25	33	8	13	21
	Whole economy	41	36	7	10	6
Viborg	Consultancy	25	37	12	19	8
	Whole economy	46	37	5	8	3
Northern Jutland	Consultancy	23	41	7	11	19
	Whole economy	44	37	6	9	5
Denmark	Consultancy	29	33	7	14	17
	Whole economy	42	36	6	10	6

Source: Danmarks Statistik.

8. Conclusion

"The new economy" is a widely used phrase in contemporary attempts to understand the new industries, the new forms of organization and the general changes in the economy and the economic landscapes that have emerged in past decade as a result of the introduction of information and communication technologies such as the Internet and wireless telecommunications.

We are living in a knowledge or an informational society with a learning economy in which competition is not based on the traditional factors of production alone, but rather is based more and more on knowledge, intangibles and the ability to learn and innovate. Technological change and innovation have become central processes in an increasingly globalizing economy. The competitive advantages of regions and cities are more and more based on the regional capacities to learn and innovate, to create knowledge and knowledge products in networks of close user and producer interaction. Innovation and technological changes are embedded in a web of traded and untraded interdependencies and these processes are to various degrees entrenched in the local social and economic institutions.

The objective of this report was to identify the new economy, where it is located and how it is embedded in space. This was done within the framework of the globalization processes of hypermobility and territorialization. In the debate, the new economy is conceptualized as being many different things, but two main schools of thought can be identified. One group defines the new economy with a background in a conceptualization of the emerging growth industries, for example, ICT, finance and biotechnology; this is a pragmatic definition. The other group suggests that the new economy is the changes in firms, economy and society induced by new technology, that is, ICT; theirs is a more process-oriented definition. The new economy has been defined as the new media industries and the Internet economy, including the provision of the hardware infrastructure. These industries have been defined as weightless and it has been argued that new economy portends the end of geography.

The Internet economy, e-commerce and new media industries are segments that signify new communication forms that, in turn, may change the way business is conducted and change the linkages between firms and, initially, the spatial division of labour and the capitalist space economy.

On the other hand, the new economy is located in space and is embedded in places. The new economy is an urban phenomenon localized in metropolitan areas of the world. Although ICT has created new possibilities for peripheral and rural areas, the main growth industries, however defined, are located in the metropolitan areas.

The Internet, the ICTs and the new economy may be the end of distance as we know it, but not the end of geography. Even the weightless economy is located in space unpinned by the untraded interdependencies, the positive externalities and knowledge spillovers. The learning turn in economic geography, the conceptualization of the cultural economy, the discussion of the creative cities, the interpreting of the informational society, the formulation of the new media industries, the Internet economy and the ICT sector have a tendency to focus on competition and competitiveness of regions and cities. The conceptualization of the untraded

interdependencies needs to be developed and to be made more sophisticated if we are to better understand the embeddedness and territorialization of the new economy.

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