40th European Congress of the European Regional Science Association, Barcelona, 29th August-1st September

ICTs, E-economy and Regional Development: Is Distance Still Alive?

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Abstract
A widespread application of ICTs is thought to be beneficial for regional economies in peripherally located areas, due to what might be called “the death of distance”. This paper attempts to address a differentiated approach to the impact of ICTs and the connected e-economy. First, various viewpoints on regional and urban economic growth in relation to ICTs are discussed. This is followed by an empirical analysis of the pattern of ICT infrastructure in the Netherlands. The most advanced ICT infrastructure connects existing concentrations of economic activity, and therefore, seems to reinforce inequality between core areas and peripherally located regions. The paper then moves to two empirical case studies of actual and potential economic change in contrasting regions. The first is the region of Amsterdam, in the top of the urban hierarchy and located in the national economic core. This study deals with financial services, as typically urban services. The second case study is a region located in the northern periphery, close to the German border. This one deals with a broader range of economic sectors. The results from the case studies indicate that even in a small country like the Netherlands, distance still matters.

Key words: Information- and communication technology, Internet, e-business, physical distance, regional and urban development, learning.

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1. Introduction

The Netherlands is one of the smallest countries of the European Union. Its territory measures 41,500 km2, with a maximum north-south distance of approximately 300 km and maximum east-west distance of 200 km. There are four relatively large city regions in the Netherlands, all located in the western part, with a population size between 500.000 and 1.100.000. There are no big cities, like Paris and London; rather, the four large cities act as one network of cities, based on a certain economic specialization.

The past few years have seen the rise of widely different views about the future of cities as influenced by the rapidly converging computing, communication and media technologies (Van Geenhuizen, 2000; Graham and Marvin, 1997). One extreme scenario is that of the "death of distance" in which place and location no longer matter and, as a consequence, large industrial cities weaken their hold over economic and social life (Cairncross, 1997). Urban meeting places, markets, entertainment, etc. will give way to virtual gathering, e-business, information exchange and entertainment spots for plugged-in customers. Planners and designers will structure the electronic channels, resources, interfaces, and delivery systems without constraints of physical space and distance (Mitchell, 1995). In this situation, urban functions are allowed to spread from the city and homes - as "electronic cottages" - are (re)designed to be access nodes for households acting as labor, producers and consumers through multifaceted telecommunication.

The rationale for interest in the use of ICTs in regional policy is mainly based on an assumed positive relationship between ICT investment and economic growth (e.g. the World Bank, 1994). There are various ways in which investment in ICTs may contribute to economic growth. First, structural growth may be enhanced by an increase in productivity and a reduction of transactions costs of existing firms due to the use of ICT based innovations, such as new systems of internal and external logistics. A second impact may be the establishment of new firms based upon ICT products and services, as well as the attraction of firms (or departments) from elsewhere. An important assumption in the reasoning behind the role of ICTs is that specific shortcomings in the region can be overcome and regional comparative advantage be re-established (Gillespie and Williams, 1988). ICT networks would improve the access of remote areas and reduce the importance of physical distance and proximity. In such a situation, firms would have a much larger freedom to select their location. Certain parts of

firms - along functional lines or otherwise - would avoid a location in the economic core because of high congestion costs and enjoy a location with cheaper land prices and better living conditions for their employees. Along functional lines, one may think of order booking, direct marketing, sales promotion, as well as call center activity (e.g. Amirahmadi and Wallace, 1995).

Various observations of the role of ICTs in regional economic development have, however, dimmed excitement. The first limiting factor refers to the *seedbed conditions* in the recipient economy. There is a growing awareness that ICTs cannot simply be transplanted into a remote economy with information directly affecting this economy like a bullet hitting the target (Van Geenhuizen, 2000). ICTs need to be seen in connection with the level of complexity in the recipient economy and the complex interplay between the technologies and socio-economic forces (Graham, 1998). The impact of ICTs on regional economic growth, for example, varies according to the regional production structure, e.g. the size of local firms and their involvement in larger supplier/customer networks (Capello, 1998; Cornford and Gillespie, 1993). Further, it needs to be emphasized that a certain amount of networking between firms must exist before it can be mediated through ICTs. ICT policy cannot create networks where none existed before simply by providing an ICT infrastructure (Melody, 1991). The point made here is that the position of regions cannot be changed merely through the introduction of ICTs in a supply side approach.

The other extreme scenario says that large cities in the economic core strengthen their position at the expense of smaller ones. This scenario recognizes the role of large corporations in decision making in the global economic system, as well as the fact that their specialized decision making - requiring face-to-face contact - may hinder any trend for spread. Most probably there are only a few of such “global urban command centers” in which highly qualified skills and tacit knowledge are produced and circulate (see e.g. Gillespie and Williams, 1988; Graham and Marvin, 1997; Sassen, 1996). ICTs help to extend the dominance of these cities by enabling action at a distance and remote control of smaller towns and rural places.

Since decades, it is recognized that the concentration of economic activity in cities and its innovative capacity rest on so-called agglomeration economies (e.g. Carlino, 1979; Lambooy, 1998; Richerdson, 1974). Agglomeration economies are based upon positive externalities at

the level of individual firms caused by the large scale and differentiated structure of the economy and labor market in large cities, and by an efficient division of labor here. In terms of technology performance it means that adoption of new technology is easier (cheaper) in places where other firms (have) experience(d) similar learning curves (Arthur, 1996). In more recent interpretations of agglomeration economies, an emphasis is put on advantages from knowledge spillovers, i.e. the phenomenon that knowledge generates benefits for third parties. In this context a distinction needs to be made between two fundamentally different types of knowledge, i.e. codified knowledge and implicit (tacit) knowledge. The former includes for example, facts, figures, and laws, and can be transferred by documents, databases, formulas, etc. Marginal costs of transfer of codified knowledge over distance seem to decrease due to technical developments in ICTs. Thus, transactions including codified knowledge lend themselves increasingly to electronic transfer using modern telecommunication networks. By contrast, implicit knowledge cannot be easily stored and transferred because it includes "know how" and "know who" in organization-specific situations. It is often a condition enabling to work with codified knowledge and, more importantly, a condition for finding new combinations and new applications (e.g. Von Hippel, 1994; Nonaka and Takeuchi, 1996). The more important implicit (tacit) knowledge for an adequate economic performance, the more important spatial proximity, because the knowledge - as it is embodied in persons - can only be transferred in close human interaction (e.g. Audretsch, 1998).

Against the background of the above two scenario's this paper explores actual and potential economic change of regions in the Netherlands. First, the pattern of telecommunication infrastructure supply is identified (Section 2). The attention then moves to the rise of the e-economy and some speculative thoughts about its spatial impacts (Section 3). A case study of Amsterdam follows in the next part. The 1990s are subject of analysis to explore structural impacts of ICTs and the e-economy on financial services (Section 4). The paper proceeds with a case study of the region of Emmen in the Northeast of the country, including a broad analysis of structural transformation of the economy (Section 5). The paper concludes with a few policy recommendations (Section 6).

2. Spatial Patterns of Telecommunication Infrastructure

Currently, telecommunication networks are being transformed by developments under liberalization and competition (DDV, 1999; Graham, 1999, Graham and Marvin, 1999). This may change the position of cities and regions in the next future because market demand seems

more important in the rollout of grids. In this section the position of Dutch cities in the telecommunication infrastructure is explored, by using various indicators. Our first indicator is concerned with a relatively new international system of glass fiber networks connecting various northwest European city regions with each other, commercially developed and operated by Dutch American KPN-QWest. This system, named EuroRings, will be connected with QWest's glass fiber network in the United States (KPN, 2000). The city regions in the Netherlands included in this system are only the two largest, i.e. Amsterdam and Rotterdam (Table 1). A similar situation holds for the advanced grid planned by Deutsche Telekom, be-it that only Amsterdam will be included. Our second indicator – SURFnet - is a slightly different telecommunication network. SURFnet connects universities and research centers in the Netherlands with research networks abroad. Accordingly, the four largest cities are connected, aside from eight mostly university towns. This means altogether a 80% connectivity of the ten largest and a 55% connectivity of the twenty largest city regions in the Netherlands. SURFnet4 is now being replaced by SURFnet5 meaning an increase of capacity by 100 times, enabling new generations of the Internet. In addition, new applications and services are being developed by universities, research institutes and companies, such as improved three dimensional simulation, international tele-consultation and data-analysis (Gigaport, 2000). Our next indicator, interconnection nodes in the backbone of a *national* system (KPN), shows – according to the function of connecting transport and distribution networks - a relatively large coverage in the top of the city system. There is a 100% coverage for the 10 largest city regions and a 65% coverage for the 20 largest city regions. The same holds for the city-rings, offering extra capacity for transport, be-it that the coverage is larger among smaller city regions (altogether 85% of the 20 largest city regions).

Table 1 Position of the 20 largest city regions in telecommunication infrastructure (selected indicators) (1999/2000)

City-regions by size	EuroRings (KPN QWest)	SURFnet 4/5	Interconnection node (KPN)	City rings (KPN)	High-Speed Internet (tv cable)	Internet access (phone)
4 largest	50%	100%	100%	100%	100%	100%
10 largest	20%	80%	100%	100%	50%	90%
20 largest	10%	55%	65%	85%	45%	85%

The analysis in this paper is concerned with impacts from ICTs mainly working through the Internet. Our next two indicators therefore, consider Internet access for users, through two different infrastructures, i.e. television cable and phone. TV cable has a relatively high

penetration rate in the Netherlands, i.e. 95%, a situation that opens up many possibilities for data transmission. TV cable grids are now being adapted to provide high-speed Internet access. There is however, a clear regional differentiation in the progress made, i.e. grids in large parts in the Southeast of the country are not yet adapted. This can be ascribed to the different pace of adaptation by cable providers which operate networks on a regional basis. Accordingly, there is full access to the high-speed Internet in 50% of the 10 largest city-regions and in 45% of the 20 largest city regions. Our last indicator, Internet access by phone, is different from the previous one in that it measures the number of local telephone access points of servers. The highest supply level of Internet access by phone is observed in all large cities, in 90% of the 10 largest city regions and in 85% of the 20 largest city regions.

As a conclusion, we can state that our six indicators illustrate a decrease of connectivity by city size, be-it differently for international grids compared with national ones, for grids serving general use compared with those serving research and development, and for backbone systems compared with end-user systems. The decrease with city size in the top of the city system is the strongest for international grids operated on a commercial basis. Taken all grids into consideration, the two largest city regions - Amsterdam and Rotterdam – in the economic core area have currently the best position in advanced international and national telecommunication infrastructure. In the peripheral regions of the Northeast only two cities qualify as relatively large, i.e. Enschede and Groningen. The connections of both can be qualified as next best (Appendix 1).

3. E-economy and Potential Impacts on Space

The use of information and communication technology has increased significantly within firms, in communication (transactions) between firms and between firms and customers, with the Internet as the major vehicle. An explanation for the popularity of the Internet and e-business can be found in “conventional” theory, mainly network externality theory (e.g. Capello, 1994; Economides, 1996; Katz and Shapiro, 1985; Shapiro and Varian, 1999). The forces behind the growing economic importance and continuous innovation of e-products and e-services can be summarized as follows: the existence of a critical mass of customers, the relevance of standards and the installed user base, the possibility of strategies at a world-wide level, and the possibility of first-mover advantage. In addition, the Internet and e-business enable to gain simultaneously economies of scale and scope in virtual networks.

Internet connectivity can be seen as an important condition for the emergence of the e-economy. Internet connectivity at the national level can be measured as number of hosts per 1,000 inhabitants, where hosts are individual computers with network access. Table 2 indicates a relatively strong presence in the Netherlands, compared with various small and large economies in Europe. There is however, a gap with the Scandinavian countries, particularly Finland. Outside Europe, the United States is clearly ahead. The penetration in terms of regular use of the Internet, shows a similar pattern.

Table 2 Internet use indicators in selected European countries and the US (1998)

Country	**Internet hosts (per 1,000 inhabitants)**	**Internet penetration (per 100 inhabitants)**
Netherlands	24.7	12.8
Belgium	8.7	n.a.
Denmark	30.5	n.a.
Sweden	36.1	29.3
Finland	88.1	30.8
Germany	12.2	8.7
France	5.7	4.8
United Kingdom	16.9	n.a.
Ireland	10.7	n.a
Italy	4.2	3.7
Spain	4.3	n.a.
Greece	2.6	n.a.
United States	78.4	36.0

Source: Adapted from van Geenhuizen and Nijkamp (2000).

Nowadays, a far bigger and more important transformation is going on than growth of the Internet alone, i.e. the dawn of the e-economy. Although the transformation is not yet known in detail, various important lines are becoming apparent today (ABN-AMRO, 1999; Shapiro and Varian, 1999; Westland and Clark, 1999). Five of them – often related - are considered in this section, including some speculative thoughts about their impact on cities and regions:

- customer control over the value chain
- shortening of the value chain (desintermediation)
- redesign of the value chain due to electronic auctions
- rise of virtual intermediaries (re-intermediation)
- diminishing influence of entry barriers

First, a basic change in the e-economy is the customer-driven approach and a concomitant

change of control over the value chain (Van Geenhuizen and Nijkamp, 2000; Saanen et al., 1999). The Internet has allowed the work of powerful search agents saving customers' time and money. These new intermediaries search for the cheapest price or offering that satisfies a bottom-line set by the customer. In addition, through special interest community sites, the Internet enables the exchange of experience between customers about particular products and services. These developments accelerate the transfer of control to the customer (a reversal of chain control) and cause a concomitant pressure on prices. An important strategy to answer this increased customer power by firms, is customer management. A necessary step to be taken in this strategy is customer segmentation, the latter requiring the following conditions: a large customer base, a stockpile of customer data, long-term relationships with customers and a trusted brand. It is not clear whether customer management can take place entirely in an e-way or needs to include face-face-contact with customers (The Banker, September 1997). If the former is the case, cities will lose some of their role as a meeting and trading place. Secondly, a related phenomenon is the shortening of particular value chains. By offering consumers the possibility to select or design their own products on the Internet and delivering these goods at home, manufacturers can easily surpass wholesale and retail segments in the chain. The withdrawal from (often physical) chain segments is named desintermediation. This process may lead to an erosion of urban wholesale and retail functions. Thirdly, particular value chains are redesigned by the rapid increasing number and volumes of Internet auctions (Westland and Clark, 1999). Internet auctions serve to buy globally at the lowest price (reversed auctions). For example, there are groups of firms that establish vertically oriented buying sites, such as for automotive parts by GM together with Ford, and for aircraft parts by Boeing. The growth of electronic auctions may again contribute to an erosion of urban trading functions, whereas global outsourcing may contribute to a further spread of routine production to remote regions.

A fourth change is re-intermediation by virtual actors dealing with electronic information, including the above indicated virtual search engines. This change is based upon the need of customers for structured information through the Internet. There is an enormous supply of information causing difficulty for customers to find the right information and to find connections with the right firm. This situation has led to the emergence of an entirely new role, i.e. that of "infomediary" or information intermediary, providing access, information and connections through portals, web sites, hyperlinks, banners, etc. (Saanen et al., 1999). The activity of information intermediaries may replace face-to-face contact to a certain extent and, therefore, threatens the role of urban meeting places. A final change to be mentioned here, is the

diminishing influence of entry barriers for new firms. Newly founded, virtual firms can avoid the establishment and maintenance of expensive networks of shops and offices, and they can operate electronically from remote regions. In addition, highly specialized firms are not hampered by physical distance in reaching a sufficient number of customers. This means of course, an increased competition for established firms.

The previous developments indicate the rise of new e-firms and the necessity for established firms to adjust to the e-economy, the latter in terms of customer management, use of the Internet for particular functions such as communication, intermediation and trade, restructuring of physical networks, human resource management for e-skills, etc.

4. Financial Services in Amsterdam

This section explores whether financial services in Amsterdam are subject to change under the influence of ICT use and e-business. We base our analysis on three often used indicators, i.e. change of employment in the sector, change of presence of head-quarters and change in exchange activity (e.g. Leyshon and Thrift, 1997; Porteous, 1999).

With regard to employment, there is a slight downfall in Amsterdam in the mid 1990s followed by a recovery (Table 3). One can observe an increase in the numbers of jobs between 1991 and 1998 by 15.5%, but the share in the regional economy is almost the same for 1991 and 1998 (around 8.0%). The reference value (national) and the share of Amsterdam in national financial services are also on the same level for 1991 and 1998. These patterns indicate the absence of a structural change, although the downfall in the mid 1990s suggests a certain instability in the position of Amsterdam as a financial center.

Table 3 Employment in financial services in the city region of Amsterdam (a)

	1991	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**
Number of jobs (x 1.000)	44,6	44,6	44,7	41,3	41,7	45,1	48,4	51,5
Share in regional economy (%)	8.2	8.1	8.2	7.5	7.4	7.7	7.9	8.0
National reference value (%)	3.7	3.6	3.7	3.6	3.6	3.5	3.6	3.7
Share in national sector	22.6	22.6	21.9	20.4	20.4	21.8	22.1	22.3

a. In 1994 a new system of Standard Industrial Classification was introduced. Despite a selection of classes as much as identical for 1993 and 1994 small differences may occur.

Source: National Dutch Statistical Office: Survey on Employment and Incomes.

We now move to the second indicator, head-quarter activity. Head-quarters in banking are traditionally in Amsterdam. This situation is the end-result of a long-lasting and systematic acquisition and merging activity by large banks in Amsterdam (Van Geenhuizen, 1999). The entry of foreign banks in the Dutch market has reinforced the concomitant process of spatial concentration. As a result, 61.5% of the head-quarters of the 40 largest banks were in Amsterdam by the end of the 1980s (Table 4). The relatively high concentration quotient for Amsterdam (615) underlines the asymmetry in the location pattern.

Table 4 Location of bank head-quarters (HQ) in the Netherlands (a)

City-size (inhabitants) (b)	**1988**		**1998**	
	% share of HQ	**CQ**	**% share of HQ**	**CQ**
< 50.000	0	-	2.5	0.1
50.000-100.000	5.1	1	7.5	2
100.000-150.000	0	-	5.0	4
150.000-200.000	2.6	7	2.5	6
200.000-300.000	12.8	128	7.5	75
400.000-600.000	17.9	90	20.0	100
> 600.000	61.5	615	55.0	550
TOTALS	100.0	-	100.0	-

a. 40 largest banks; CQ = concentration quotients (Note 1).
b. Municipal level for 1988.
Source: Van Geenhuizen and Nijkamp (2000).

The data for 1998 indicate a small move downward in the city-system. This is most clearly evident in the share of head-quarters in smaller towns (< 150.000 inhabitants), i.e. an increase from 5 to 15% (Table 4). It needs to be mentioned that it is difficult to disentangle the role of ICTs and e-business in this particular development. At best we can argue that ICTs and the Internet enable new head-offices of certain types of banks to operate at a distance from Amsterdam. In fact, this matches with the nature of some newcomer banks in smaller cities which emerged from domestic insurance and savings. These banks serve the domestic retail and business market, which may imply mainly routine contacts with services in Amsterdam. The relative move of financial head-quarters from Amsterdam can also be ascribed to developments which seem not clearly connected with ICTs, i.e. a rapid integration of banks in Amsterdam based upon previous mergers and acquisitions, and a withdrawal of some foreign banks from the Netherlands (mainly Japanese banks) caused by reorganization of the mother bank.

Our third indicator is the position of Amsterdam as a national and international exchange, compared with other European cities. It needs to be mentioned that comparing stock exchange activity in different cities is difficult because figures are increasingly presented for a set of national exchanges that co-operate, instead of exchanges in single cities. In addition, we have excluded value of shares and bonds trading because there are different systems of counting and there are no data available for a number of cities. Given these limitations, one can observe a fourth position of Amsterdam in 1990 in terms of companies listed (Table 5). However, Amsterdam has lost position in the 1990s particularly compared with German Exchanges (mainly Frankfurt). At the same time, an increasing number of small exchanges are running up, such as Swiss Exchanges (mainly Zurich) and Madrid. What is hidden in the data is that Amsterdam has substantially lost to London at the time that a fully automated screen based trade system was introduced there (1986). In fact, Dutch investors could avoid paying commission to intermediaries in Amsterdam by trading Dutch shares via the London Exchange. What this development illustrates is that particular financial firms do not feel the necessity to be in Amsterdam because they run their *routine* exchange activity by screen in alternative places, i.e. the cheapest ones. Amsterdam has responded by a significant move towards *specialization*, i.e. trade in options and futures. Nowadays, Amsterdam is the second largest exchange in this segment in Europe (Table 5). It stands to reason that the previous patterns may change substantially after the current merging of exchanges in Europe.

Table 5 Activity of European Exchanges

Exchange	**Companies listed (stock exchange) (a)**		**Options and futures contracts (x 1,000) (b)**
	1990	**1998**	**1998**
London	2,559	2,423	14,912
Paris	804	1,097	53,843
German Exchanges	647	3,525	68,455
Amsterdam	498	432 (c)	64,230
Swiss Exchanges	422	425	37,945
Madrid	429	484	6,058
Brussels	341	268	2,008
Stockholm	132	276	34,802
Copenhagen	284	254	298
Italian Exchanges	220	243	8,850

a. Main and Parallel Market, excluding investment funds.
b. Except for London and Amsterdam: the national system of exchanges.
c. 1995 (figures from 1996 onwards cannot be compared with previous ones).
Source: International Federation of Stock Exchanges.

The previous analysis has revealed that the position of Amsterdam as a financial center has not structurally changed in the 1990s, except for exchange activity. However, there are signs for general instability and a slight downfall. The remaining section will be devoted to implications of the e-economy for financial services in Amsterdam, as they manifest themselves nowadays. The connected changes in strategy of established banks can be described as follows (The Banker, July 1999; Radecki et al., 1997; Westland and Clark, 1999):

- "brick and mortar banks" transform into multi-channel banks, including mobile phone, cash dispensers, the Internet, etc., to support different customer segments
- banks define new roles for themselves in the new customer driven value chain, including simple information supply and connecting customers' demand with selected supply
- banks become involved in a "web" of alliances and newly established firms to secure the roles they want to play in the e-economy, such as with Internet firms (providers, portals, etc.), online banks and specialized suppliers
- banks remain involved in mergers and acquisition (increasingly cross-border ones) in order to create sufficient scale for investment in e-transformation.

Based on the above strategies one may foresee a "selective" erosion of the position of Amsterdam. First, various e-banks eat into the retail market shares of established banks because the former can offer better services for certain products and charge less commission. In addition, established banks themselves move to e-banking. These developments have already caused a wave of closing downs at the base of retail organizations (Van Geenhuizen and Nijkamp, 2000). Consequently, activity at the top of the domestic retail organizations is forced to contract. Secondly, there is heavy competition in the division of new roles in the emerging online markets, such as the role of infomediary, roles in e-commerce and e-auctions. Established banks which cannot adapt themselves in a timely manner are forced to a merger or disappear. In addition, a substantial part of routine exchange trade will move based upon preference for the cheapest trading place. What will remain in Amsterdam, however, is advanced, specialized activity for which the accumulated experience, tacit knowledge and skills are a *conditio sine qua non*.

5. The Region of Emmen

The region of Emmen is located in the North of the Netherlands adjacent to the German border (Figure 1). The town of Emmen is at a distance of approximately 200 km from Amsterdam and 270 km from Rotterdam. Such distances are generally not a disadvantage but according to the *perception* in a small country like the Netherlands these are quite substantial. In addition, the town is offside the major transport corridors running from Amsterdam and Rotterdam to Germany. The position in the telecommunication infrastructure is also relatively weak (Appendix 1). By considering the production structure of the region, three important 'anomalies' come to light (Van Geenhuizen, 2000; Van Geenhuizen and Jacquet, 1999). First, there is a large size for mining and related administrative activity (16% of value added). Secondly, the regional economy faces a less developed service sector, particularly regarding value added (18% versus a national average of 26%). A third characteristic is the relatively large manufacturing sector, particularly in terms of employment (25% against a national average of 17%). The latter complies with the presence of various large routine manufacturing subsidiaries in the region. The concomitant economic structure can be qualified as weak with regard to the dependency on manufacturing subsidiaries with head-quarters somewhere and strong price competition in the markets involved. In the "industrial district" literature the presence of large numbers of production subsidiaries is regarded as a major influence on industrial relations and the underlying institutions. In particular there is a connection with a weak development of local entrepreneurship and flexible co-operation between regional firms (e.g. Grabher, 1993).

In this section we focus on the development of the service sector in the region of Emmen in the 1990s. Table 6 indicates a discontinuity between the figures for 1993 and 1994 becomes apparent, which may be ascribed to the use of a new classification in the statistics. What may have happened is that - due to privatization - various important classes of services have moved from non-commercial to commercial services in 1994. Given this limitation, one can observe an increase of the number of jobs in commercial services by 54.3%. There is also an increase in the share of these services in the regional economy, but the difference between 1991 and 1998 is only slightly larger than that in the national economy, i.e. 10.7 and 7.3% respectively. It can thus be concluded that ICTs have not led to a substantial improvement of the position of commercial service activity in the region of Emmen. A number of locational constraints to commercial services may have remained here.

Table 6 Employment in the commercial service sector in the region of Emmen (a)

	1991	1992	1993	1994	1995	1996	1997	1998
Number of jobs (x 1,000)	12,9	12,7	12,9	15,8	16,2	17,0	18,7	19,9
Share in regional economy (%)	27.8	27.5	28.5	34.1	34.8	36.0	38.3	38.5
National reference value (%)	39.0	39.5	40.0	43.7	44.7	45.3	45.9	46.3

a. In 1994 a new system of Standard Industrial Classification has been introduced. Despite a selection of classes as much as identical for 1993 and 1994 a slight difference might occur.

Source: National Dutch Statistical Office: Survey on Employment and Incomes.

In order to reveal constraints as well as enhancing factors, the results of various expert interviews carried out among regional and local actors are used (Table 7). One can observe various remarkable points here. There is a creation of skills and there is knowledge production at the higher educational institute and in large firms, but the knowledge is not sufficiently matching the specific needs of local SME whereas ICT skills created in the area leave the area (brain drain). A second and important point is the negative self image of regional actors. Regional actors put an emphasis on persistent disadvantages of the physical distance to the economic core area (not perceiving a "shrinking of distance"). This situation can, of course, partially be explained by the lack of connections with major telecommunications infrastructure and the limited availability of ICT services. A third point to be mentioned are the institutional constraints in the area. There is a lack of entrepreneurial spirit among the local population in terms of starting new ICT-related firms and other risk-taking projects, and there is a low propensity among regional actors to co-operate in supportive socio-economic networks.

Various local initiatives were taken in the recent past to stimulate ICT activities (Van Geenhuizen and Jacquet, 1999). To date, however, these initiatives have not led to many successful actions (Note 2). A number of reasons can be advanced in explanation. First, there is no clear vision in local policy about the potentials of ICT use, such as the link with economic development (e.g. economic sectors and type of firms involved). A second factor is the way in which initiatives come into being and evolve. Initiatives often emerge as a result of brainstorm sessions with follow-up elaboration only upon optional action. A further reason is that ICT initiatives are derived from other existing policy fields, leading to a fragmented approach and (sometimes) overlap. What is missing is a coherent policy vision that underpins the initiatives and guarantees a systematic follow-up. It needs to be realized, however, that the

absence of a formalized ICT policy on the local level is far from unique. A study in the United Kingdom (Gibbs and Tanner, 1997) shows that only one third of local authorities have a current or planned ICT policy as a part of economic development measures. Initiatives often develop in an *ad hoc* fashion, rather than based on systematic strategic objectives.

Table 7 Strengths and weaknesses for ICTs based development in the Emmen Region and Province of Drenthe

Category	Weak Points	Strong Points
Education, skills in the labor market; knowledge production and use	Absence of ICT education and ICT schools. Shortage of knowledge in firms about the potentials of ICT use. Limited availability of employees matching ICT requirements. Under-use of available knowledge.	Knowledge production at the Hogeschool Drenthe and in large firms. Availability of native speakers of Dutch and German (bilangualism).
Self image and perceptions	A negative image of a routine manufacturing area. Persistent disadvantages of distance to the economic core.	A good region to live.
Locally available services and physical infrastructure	Lack of connections with major telecommunication networks. Limited availability of ICT services in the region.	Availability of premises (favorable price-quality ratio). An good living climate.
Institutional forces	Lack of entrepreneurial (risk-taking) mentality among locals. A shortage of co-operation between regional actors.	Positive mentality of labor force: strong loyalty with employer and strong orientation to customer services.
Policy	A shortage of pro-active and integrated policy on the local level. A shortage of enhancing policies by the national government.	-
Market	-	Presence of large firms as customers in the region. A critical mass of altogether 250.000 inhabitants (Emmen and region).

Source: Adapted from Van Geenhuizen (2000).

6. Policy Implications

Aside from an infrastructure-led approach, there is now a wide recognition of the necessity of an *institutional* approach to regional economic growth (e.g. Maskell et al., 1997; Morgan, 1997). The latter addresses the importance of building and rebuilding institutions, i.e.

coherent sets of expectations, built into conventions, enabling actors involved to develop and co-ordinate necessary resources. Improving the learning capability of actors in a bottom-up and interactive way is a major aim in this approach, using proximity between actors as a basic condition (e.g. Camagni, 1992; Knight, 1995). It is clear that an infrastructure approach as well as an institutional approach mean something different in the region of Amsterdam compared to the region of Emmen. In the case of Amsterdam, this study has revealed a (potential) downfall of mostly routine financial services, with specialization as an important "weapon" to regain growth. In terms of infrastructure policy this means to enhance access to the most advanced global telecommunication grids. Distance matters because only a few spots in Europe can be connected. More importantly there is a need to improve the local capability to create and circulate highly specialized knowledge and skills in networks that underpin innovative activity. What remains to be seen is whether the institutions that produce the "glue" in present networks remain the same in the e-economy. In the case of the region of Emmen, this study has brought to light the absence of a structural move of the economy to commercial services. In terms of telecommunication infrastructure, improving access to national telecommunications grids is an important condition for change. Distance and "mass" matter here because under the new demand-driven conditions only selected cities can be connected. Equally important is a policy for institution building that underpins change in an array of intangible assets necessary to advance organizational innovation and improve seedbed conditions for ICTs. One may think of co-operative networks, arrangements matching knowledge (skills) production with needs, and positive images of entrepreneurship and organizations as learning organizations.

Notes

Note 1. The concentration quotient indicates the level of concentration in the urban hierarchy. A quotient value of 1 indicates a perfectly even distribution, i.e. each city-size class locates a share of offices at a given tier (national head-office, regional office) equal to its share in all cities. The concentration quotient is defined as: O_{is}/C_s , where

O_i = Offices (as a share) at a given tier $_i$
C_s = Cities (as a share) in a given size class $_s$

Note 2. There is one successful initiative, based on co-operation between the municipality of Emmen together with the higher educational institute, a private actor and an intermediary organization (named “learning paths”). It intends to improve the supply-side of the labor market and to increase availability of innovative software products.

Figure 1 The Netherlands

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Appendix 1

Position of the 20 largest city-regions in telecommunication networks (1999/2000)

City	EuroRings (KPN-QWest)	SURFnet4/5 (a)	Interconnec-tion node (KPN)	City-rings (KPN)	High-Speed Internet (tv cable)	Internet access nodes (phone) (b)
Amsterdam	**X**	**X**	**X**	**X**	**X**	**High**
Rotterdam	X	X	X	X	X	High
The Hague	-	X	X	X	X	High
Utrecht	-	X	X	X	X	High
Eindhoven	-	X	X	X	-	High
Arnhem	-	-	X	X	-	High
Heerlen (a)	-	-	X	X	-	Medium
Nijmegen	-	X	X	X	-	High
Enschede (b)	-	X	X	X	X	High/ Medium
Tilburg	-	X	X	X	Partially	High
Dordrecht	-	-	-	-	X	Medium
Haarlem	-	-	X	X	X	High
Groningen	-	X	X	X	X	High
Leiden	-	X	-	X	X	High
Den Bosch	-	-	X	X	-	High
Geleen	-	-	-	-	-	Medium
Maastricht	-	X	-	X	-	High
Breda	-	-	-	X	-	High
Zaanstreek	-	-	-	-	Partially	High
Apeldoorn	-	-	-	X	-	High
Emmen	**-**	**-**	**-**	**-**	**X**	**Medium**

a. Amsterdam, Delft, Enschede and Eindhoven are “cluster leaders”, whereas the other cities are connected with one of them (points of presence).