

# Promoting Sustainable Spatial Development by ICT

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## 1 INTRODUCTION

The development of the information / knowledge / network society has had and will have fundamental changes in economic and social life. It will also have spatial consequences by means of affecting the future of regional, urban and rural areas (e.g. Mitchell, 1999). The information and communication technology, ICT, is seen to be the main driving force in the formation of the information society (e.g. Bell, 1974; Masuda, 1981).

The spatial dimension has not been a common theme on the agenda in discussions about the development of the information society. The main interest has focused on the promotion of this development. This is understandable because the information society is still emerging. Its main driving force, ICT, is all the time evolving and the pace of the development of new products and applications is intense. The diffusion of the new important tools of ICT, like the Internet and mobile phone, among the large number of people and businesses in the developed world, has taken place during the last 15 years. It is thus natural that all possible spatial implications of these developments have not yet seen the light of day. There are some empirical evidences about new location tendencies, like the establishments of "back offices and call centres". Many scientists have described a vision of the future (e.g. Castells, 2001; Graham and Marvin, 2001; Kotkin, 2000; Mitchell, 1999; Moss and Townsend, 2000). Without any doubt one can predict that new spatial applications will be implemented when businesses and people have recognised new opportunities.

Spatial change is always both an opportunity and a threat for urban and regional planning. The emergence of the information society gives thus possibilities to guide spatial development according to the objectives of the planning area concerned, presuming that planners are aware about the impact of this development and especially ICT will have on the location factors of different businesses and on the behaviour of people.

This article will discuss possibilities to promote sustainable development in spatial planning by using the opportunities offered by the ICT applications. The findings and ideas are based on observations made in literature, on the results of my dissertation "Information and Communication Technology: A New Aspect in Urban and Regional Planning" (Talvitie, 2003a, published only in Finnish) and on the article "The Impact of the Information and Communication Technology on Urban and Regional Planning" I have written on the basis of the study (Talvitie, 2003b).

## 2 ICT AND SPATIAL DEVELOPMENT

In order to get a firm basis for the evaluation of the possibilities of ICT in the promotion of sustainable spatial development it is important to discuss at first the impact of ICT on spatial change in general terms. (More detailed analysis in my article.)

### 2.1 Principal characteristics of ICT affecting spatial change

The impact of ICT on spatial change can not be dealt with in isolation but as a part of the development of the information society and forces behind it. Webster (2002) distinguishes five definitions from the presented theories of the information society depending on their main criterion. These criteria are: technological, economic, occupational, spatial and cultural. The technological criterion refers to the development of information and communication technology and its effects on social development. The economic criterion refers to the development of new products and effects on industrial structures. The occupational criterion refers to the development of new types of work places and occupational restructuring. The spatial criterion refers to the development of different types of networks and effects on the organisation of time and space. The cultural criterion refers to the rapid increase in the information in social circulation. Webster's analysis indicates well the different aspects in the development of the information society, which in real life all relevant and in all cases ICT plays a crucial role.

By simplifying and summarising the represented theories about the information society from the point of view of the impact of ICT on spatial change it is important to distinguish the following aspects:

- The information and communication technology enables the creation of new ways of working and reorganisation of the industrial, public and personal activities and structures. Globalisation will play an increasing role in these processes,
- the change in the meaning of space, place, distance and time as the determinants of location factors. (Probably the best known
- concept of the changing role of space, place, distance and time in the information age is suggested by Castells (1996/2002)
- when he introduces the concepts of "space of flows, space of places and timeless time"). As a result we will have a virtual
- world functioning at the same time with the conventional physical settings.

### 2.2 The changing meaning of space, place, time and distance as the determinants of location factors

Observations made about the changing meaning of space, place, distance and time mean that in many cases distance will no longer be a problem when one can transmit information via telecommunications networks. The same applies to time. All transmissions will take place at once. Wireless communications will allow the making of connections at any place at any time where the service is offered. In principle space and place are thus not any more affected by distance and time factors in the same way than before. At least in theory this could mean more freedom in the location of activities. This question has interested many scientists.

Mitchell (1999) argues that suggestions of the death of distance, the end of space and the virtualisation of everything will obscure the issue. He suggests it is more useful to recognise the opportunity to organise the inhabited space for multifarious human purposes. Kotkin (2000) suggests that when the freedom to choose the location will increase, companies and people will locate to places where they will. Thus the peculiar attributes of locations will play an increasingly important role.

The way how the Finnish planners see the expected changing roles of the determinants of these location factors is shown in Figure 1.

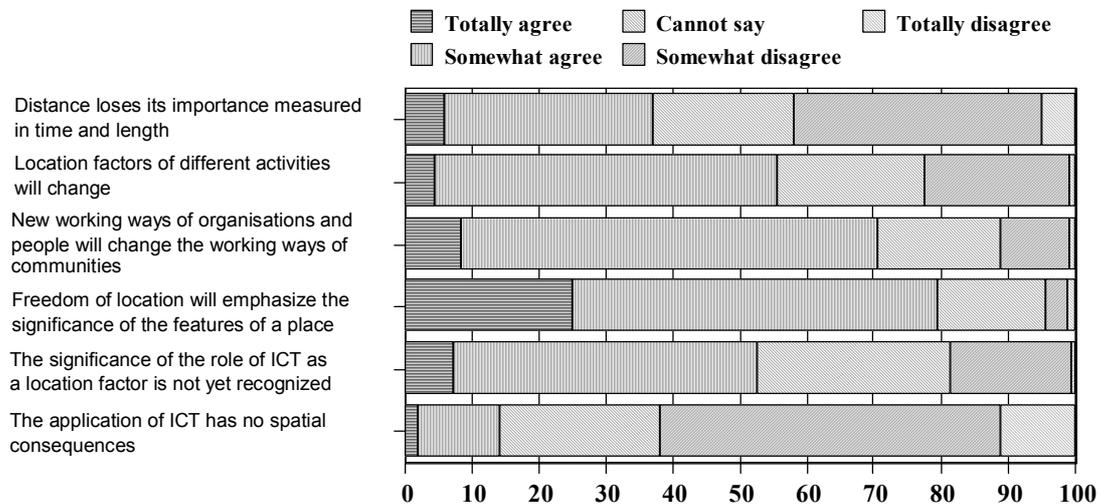


Figure 1. The opinions of Finnish planners on the statements about the impact of ICT on some principal location factors. (n=306-308). Sources: Talvitie, 2003a and 2003b.

We can notice that the majority of Finnish planners agree with most of the suggestions presented about the principal spatial effects of ICT. Opinions are split regarding the changing importance of distance as this is also the case among many scientists. Although some 55 % of the planners accept the statement that the location factors of different activities will change, there exists an interesting phenomenon in the opinions among planners of different planning tasks. The support for this statement grows when moving from the opinions of detailed land use planners (39 % totally and somewhat agree) to the opinions of master (71 %) and regional (82 %) planners. This result indicates, that the impact of ICT is easier to understand in overall than detailed planning. Over 50 % of the planners accept the statement that the role of ICT as a location factor is not yet recognised. Nearly 30 % hesitate to take stand on this statement. There were only a few who accepted the statement that the application of ICT has no spatial consequences.

### 2.3 New ways of working and reorganisation of activities

As mentioned earlier the consequences of the application of ICT in production and services will change the traditional ways of running businesses in industry, services and other organisations as well as in everyday life (e.g. Toffler, 1980; Mitchell, 1999; Castells, 2001 and 1996/2002). These developments form the basic driving force on spatial change and have been discussed by many scientists and futurologists.

The restructuring of industries when knowledge and skilled people are becoming the most important factors in production leads to new ways of working and reorganisation of activities. ICT has been used in the structural reforms of production. Mass production has often been replaced by customised production and enterprises are restructured into network companies ( e.g. Castells, 1996/2002). This has led to the relocation of production to cheaper places. However, new technology has also provided new opportunities for old and small industries to compete by networking with other companies thus strengthening their positions. Marketing of products has also benefited from this new tool and in this sense a remote location is not a big problem.

The spatial impact of ICT on services is very diversified and developing fast. Electronic banking is a good example. Electronic commerce is mostly used by businesses. It is also becoming more common for ordinary people especially as regards buying and selling intangible products, like flight tickets, music, insurance etc (e.g. Mitchell, 1999). When buying goods you need to have a good delivery system.

Public services is an area where ICT provides limitless possibilities. In many countries central, regional and local authorities are now offering a lot of information about their services, and often online two-way communications are made available for citizens. Libraries offer online services, virtual education and telemedicine are developing fast etc. In many cases services provided via ICT will improve the service standard, especially in small communities and rural areas. It will also save time and travelling costs. The location of all services will not be as important as before.

How Finnish planners see some of the possible spatial consequences of these development trends is shown in Figure 2.

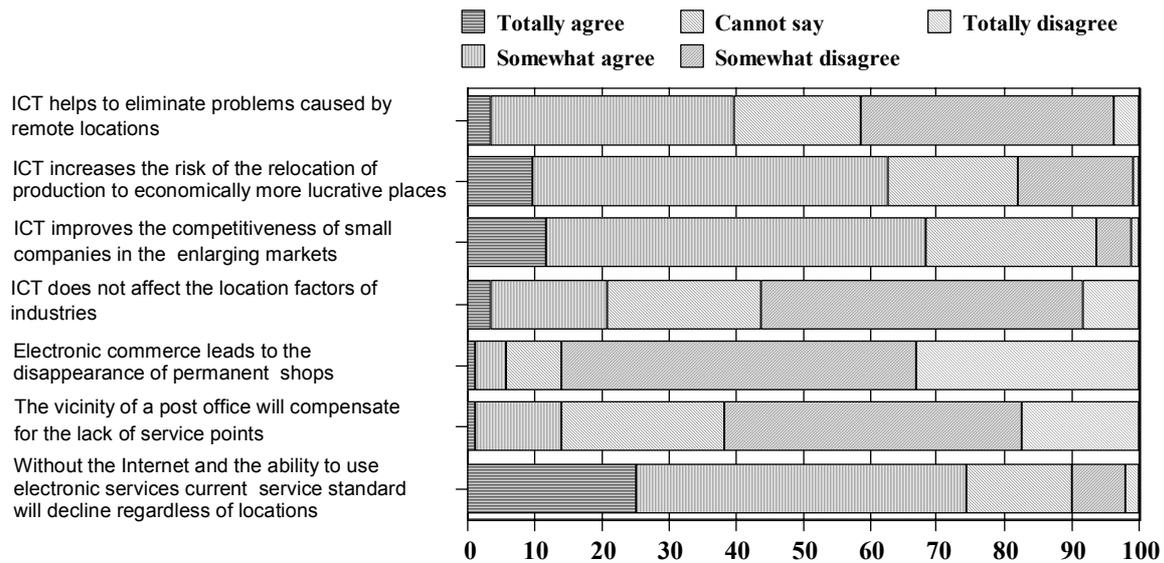


Figure 2. The opinions of Finnish planners on some proposed spatial impacts of ICT on industries and services. (n=302-307).  
Sources: Talvitie, 2003a and 2003b.

The opinions of Finnish planners are split on the statement that ICT could help in eliminating the problems caused by distance. The result reflects the uncertainty we have about this matter. The majority agrees that there is the risk that ICT may cause the relocation of firms to cheaper places and with that, that ICT may help small companies to survive in a global world. Thus it is understandable that the majority rejects the statement that ICT does not affect the location of industries. The statements about the effects of electronic commerce on shops and the role of post offices as a delivery point of goods are rejected. Probably one reason for these opinions is that currently electronic shopping by ordinary people is still low in Finland, although growing.

The opinions about the importance of the Internet as a service provider indicate clearly that this possibility is essential in all places, not only in remote areas. This result is easy to understand at least in Finland, because a growing number of services are offered in the net and some service providers, like banks, are forcing customers to use the Internet; desk services are available, but more expensive.

The spatial dimension of new working practices is probably one of the most discussed topics in the evaluations of the spatial impact of the applications of ICT. Teleworking is now applied in different forms depending on the content and quality of work and naturally on the preferences of employees.

Traditionally employment has had a great impact on the decision of the housing area. Now the situation can change. People who can work by using telecommunications systems can locate anywhere. Pleasant climate and environment, sufficient service standard and others could be some criteria for good location. Naturally also a good service standard of ICT should be available. There are examples of these types of solutions and in most cases these places are famous resorts (e.g. Mitchell, 1999). Also other types of locations could be possible, depending on people's preferences.

Those entrepreneurs whose customers are spread in a wide area could also have a great freedom in choosing their place of residence. An interesting aspect is the impact of the availability of skilled people on the locations of enterprises who need qualified labour. Kotkin (2000) expects that if enterprises want to safeguard this, they will have to locate to the vicinity of places where the well educated people like to live. Kotkin and DeVol (2001) have noticed that also the prices of houses and the changes in life styles have, in the USA, had an impact on the choice of residence. This development has also affected the location of enterprises.

It should be mentioned, as Mitchell (1999) argues, that digital revolution will bring home and work back together. Homes have to be planned to enable both housing and working functions (e.g. Mitchell 1999; Moss and Townsend 2000). The impact of ICT on housing is in many cases indirect. ICT enables people to implement some of their objectives which earlier has not been possible.

#### 2.4 General overview of spatial development perspectives

Possible consequences caused by ICT in spatial development do indicate clear expected changes. The role of big cities and metropolitan areas is expected to remain important and even grow. On the other hand decentralisation within these areas is seen to take place. Activities will thus spread and form larger entities.

The future of small towns and rural areas has not been discussed very much. In principle these communities can also benefit from new development trends. New lifestyles and cheaper costs of living together with a pleasant environment could form a good combination as a driving force to promote the development of small communities and rural areas.

It is natural that we still have little empirical evidence about the development trends caused by the emergence of the information society and impact of ICT on spatial change. Only during the last 10 - 15 years has this technology been widely used in the developed world. Most of the expected changes are ahead. The pace of these spatial developments depends on the time people and organisations need to recognise new possibilities for locations of their activities. Remarkable changes in physical structures will also take place slowly, although the relocations of enterprises may happen nearly overnight. Therefore these findings discussed above are not the final word but just the beginning.

### 3 POSSIBILITIES TO PROMOTE SUSTAINABLE DEVELOPMENT IN SPATIAL PLANNING

Despite the uncertainties about the future of spatial development, the expected spatial consequences of the emergence of the information society and the impact of ICT should be taken into account in all spatial planning (e.g. Talvitie, 2003b). Spatial planning is also a powerful tool in promoting sustainable development. An interesting item for discussion is now how in practical planning the objectives of sustainable development could be taken into account. Before discussing closer some of these possibilities it is important to make some general observations.

By simplification, the concept of sustainable development requires that all decisions are reconciled from the point of view of social, economic and environmental/ecological values and objectives. This means that there is no one common truth in solving a planning problem. Instead there might be different alternatives depending on the values and objectives of different actors involved in the planning process (e.g. Talvitie, 1994). Secondly it should be noted, as Barker (2001) has argued, that the same innovation and technology can be applied to different places in different ways depending on the goals of the target area. The impacts of these observations can only be dealt with in cases of practical planning situations are therefore not discussed in the following when dealing with some possible planning solutions.

#### 3.1 ICT- infrastructure to be included in planning and plans

In order to promote sustainable development by ICT it is required that in a planning area there are possibilities to use ICT services. This need is general because for the future of all regions and communities including rural areas the most crucial thing is the kind of telecommunications infrastructure and service standard the area has. Most activities are nowadays dependent on these two factors. The ICT- infrastructure should be seen in regional and urban planning and in the content of plans as an equally important element as highways, streets, railways, airports and harbours. Good infrastructure with good services is an opportunity and the lack of them a big threat for an area.

#### 3.2 Possibilities to diminish conventional traffic

Possibility to eliminate the need to travel is probably the best example to promote sustainable development by using ICT. Teleworking, e-commerce, services provided in the Internet, e-mail, changes in life style etc. are examples of new types of activities which will have impact on traffic.

Teleworking is applied in different forms. A common practice is to telework only a few days a week and keep contacts regularly to main office. The mixing of home and workplace has also lead to a situation when all work is done from home. If commuting between home and office will diminish by teleworking this practice may increase other type of traffic.

The use of electronic services will diminish the need to travel. Many things can be done at home, like banking, buying and selling intangible products, like flight tickets etc. Also to use of wireless communication tools can diminish the need to travel. These tools increase freedom in work and leisure. One can get many services when needed and on the road.

One possibility to diminish commuting is to locate workplaces closer to housing areas. Cheaper solutions, competition and activities with improved functionality are issues that may affect the relocation of current activities or decisions on new locations ( e.g. Talvitie, 2003b). Call centres are examples of these types of solutions.

Changes in transport demand due to the use of ICT are difficult to predict. Very much will depend on how well people and businesses learn to benefit from the opportunities ICT offers. Spatial planning offers a tool to promote more sustainable solutions in these regards.

#### 3.3 Possibilities to promote the development of the areas suffering from economic decline

Many small and remote communities and rural areas suffer from population decline and outflow of people. As a consequence service standard is decreasing and in general the future seems to be uncertain. In all cases this type of development is not sustainable. Abandoned buildings, underused infrastructure and high unemployment describe the situation very often. The use of ICT applications could at least soften the transition period and in some cases even give the future of these areas new opportunities. Some development means are listed below:

- the ability to use the growing number of services offered in the net will even improve the current service standard. Possible
- obstacles are related to the ICT service standard and people's ability to use new technology,
- good ICT services offer possibilities to some businesses to be located in the area, like call centres and firms who could use the local workforce,
- existing businesses can benefit from good ICT services and thus have better possibilities to compete even in enlarged markets,
- good ICT services provide better possibilities for the reuse of abandoned buildings, like for call centres or new businesses.

Small and remote locations suffer very often from the lack of broadband connections. There are examples when local and regional authorities have addressed this problem and agreed to pay some of the costs for the service provider.

#### 3.4 Development of new types of communities

The mixing of the home and workplaces and the location of firms and public and private organisations close to each others offer possibilities to create new types of communities, like old small towns when housing, working and services formed a close combination of different functions.

The idea may be seen as an illusion but there are facts which indicate that this type of sustainable development could be possible, at least in small scale. Many studies also argue that the development of new life styles emphasise quality of life factors where a good housing environment is playing a central role. The outcome depends on the will of local and regional authorities to develop these types of communities. It is possible that the competition among authorities will support the development of new types of living and working environments.

### 3.5 Urban and regional planning in general

As mentioned earlier many scientists (e.g. Castells, 2001) argues that the development of the information society will emphasise the development of big metropolises and large urban areas. Also smaller communities and rural areas will face changes. From the point of view of sustainable development it is thus important to understand how this development will be guided by spatial planning.

It is not possible to give a single piece of advice how to go about it. I have suggested (Talvitie, 2003b) that a systematic approach is needed to incorporate the impact of ICT into urban and regional planning and respective plans. It requires purposeful actions by those who are responsible for practical planning and who regulate and support the planning.

I would suggest at least the following actions to be taken by those who prepare the plans:

- a study of spatial impact of ICT should be included in the planning process,
- the development of ICT-infrastructure should be included as an essential part of the planning and the content of plans,
- the current planning principles should be updated and opportunities for gaining new insights into planning should be seen as a challenge for the planners.

To the support organisations I would recommend at least the following actions:

- the programmes of planning education and training should be updated,
- the research on spatial consequences of the development of the information society and the impact of ICT on this development
- should be intensified and new spatial and urban theories and planning methods and models developed,
- the content of planning legislation and guidelines should be updated.

The aspect of sustainable development should be natural part of all these processes.

## 4 CONCLUSION

Despite difficulties to see the future spatial development trends clearly, all indicators and also some empirical findings support the conclusion that in the developed world all urban and rural areas are facing big changes. Spatial structures will be restructured and the functions of all areas will have new forms. This is a big challenge for spatial development and planning activities. This challenge should be highlighted since until now the topic has been very seldom on the agenda of discussions about the development of the information society.

Sustainable development is a widely accepted common goal and the promotion of this development is also included in the planning legislation of many countries. It is always a danger that this aspect is neglected in decision making when the economic future of an area is threatened. Other things have more weight in the evaluations of different alternatives. In order to avoid this prospect it is important that in the development of new planning methods and models the needs of sustainable development are well taken into account. As the quality of life factors are becoming more important in the human values, the promotion living and working areas, where the aspects of sustainable development are well implemented, will be a good asset in the competition for inhabitants and businesses.

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