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SCATTER

Sprawling Cities And TransporT: from Evaluation to Recommendations

Annex to D2 and D3 (Work packages 2 and 3)

Monographic report
Case city Helsinki

Contract number: EVK4-CT-2001-00063

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Author: LT (FI): Kari Lautso, Virpi Pastinen

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1 OVERALL PRESENTATION OF THE CITY

1.1 Study Area

Helsinki, the capital city of Finland, forms a metropolitan area with the three other neighbouring cities, Espoo, Kauniainen and Vantaa. The study area covers not only the metropolitan area but also other parts of the Province of Southern Finland as well as the largest neighbouring towns of Lahti and Hameenlinna. This is due to the fact that the influence of the metropolitan area is expanding as an employment centre to serve the surrounding region. There are almost 50 municipalities in the study area.

The area is situated in the coastal area of the Gulf of Finland. It is some 200 km wide and extends approximately 150 km inland to the north totalling approximately 11 000 km2 of which about 95% is land and 5% covered by water. The metropolitan area itself covers 764 km2 of which 743 km2 is land and 21 km2 water (excluding sea area). Helsinki is actually a quite large region that includes both urban and rural areas.

The city has, in general, expanded in concentric rings as the population and economy have grown. However, the important transport corridors have attracted growth further away from the centre than otherwise would be expected.

By the 1960s, the radial road network was largely in place and the currently visible "Maple Leaf' form of the urban sprawl began to form supported by the second industrialisation and the resulting migration from the countryside to the cities.

The completion of the two ring roads and the current plans to build more private and public transport facilities in a circular fashion in the metropolitan area are likely to lessen the outward trend of land use away from the city centre.

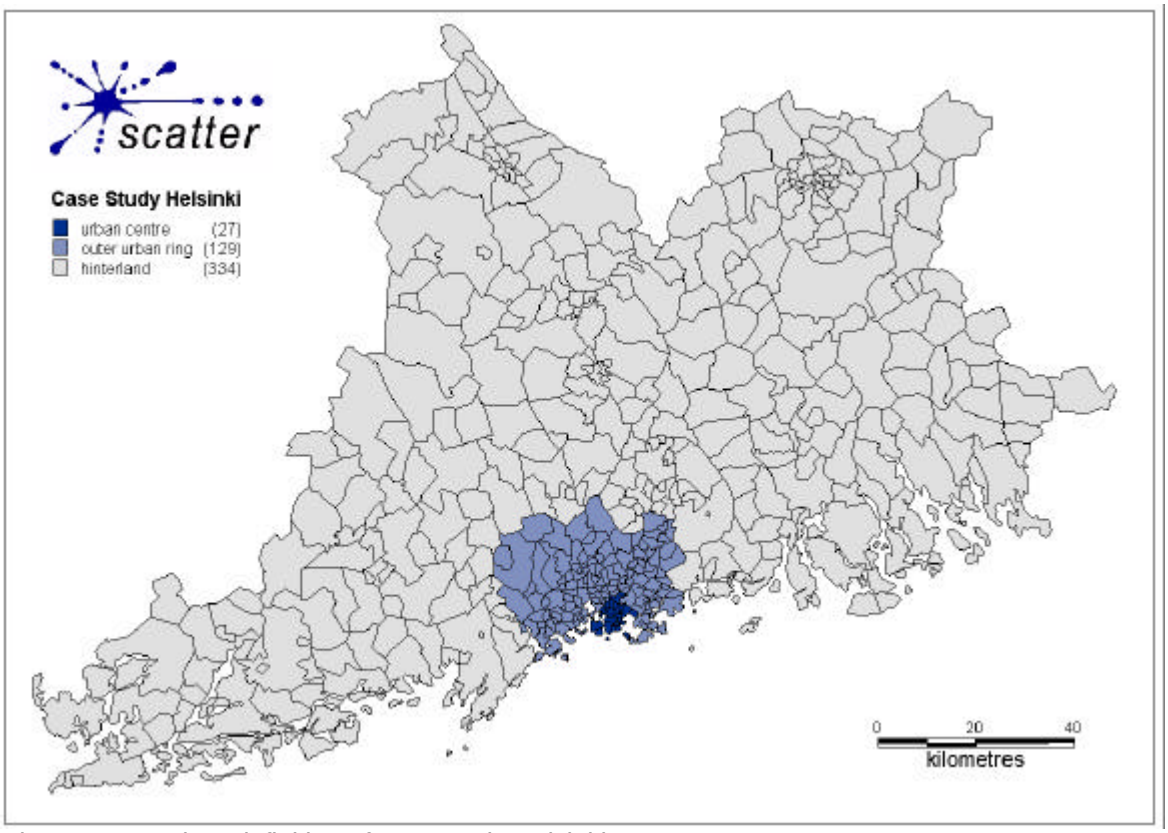


Figure 1 Urban definition of case study Helsinki

1.2 Population

The metropolitan area has the largest concentration of people in Finland. The total number of inhabitants in the study area is over 1.6 million people (out of 5.2 million in the whole country). Of this, 1 million people live in the metropolitan area. The growth has been significant especially after the Second World War and then levelling down in the seventies and eighties. In the 1990's the region was growing faster once again. The rapid growth of population is estimated to continue, with the rate slowly decreasing, to the year 2020. It is expected that in 2020 there will live 1,1 million people in the metropolitan area. This rapid population growth increases the pressure to urban sprawl as well as the use of the natural areas within the existing structure. It is expected that Helsinki can only accommodate less than one-fourth of the forecast growth, the rest being directed to the other cities of the metropolitan area.

The population is slightly younger and more educated than in the rest of the country on average. 16% of the population in the study area are aged 14 years or under and about 10 % are 65 years or over. In the metropolitan area, both these shares are approximately same.
The average size of the household has been decreasing over the decades from 2.8 in 1970 to the current 2.1 in the metropolitan area. This is significantly lower than in the rest of the country. The average of the household is 2.3 for the whole of Finland.
The average population density is 96 inhabitants/km2 in the study area, 1251 inh./km2 in the metropolitan area and 2974 inh./km2 in Helsinki. The average figure for the whole of Finland is 15 inh./km2.

1.3 Transport

On a normal working day, altogether over 3 million trips are made in the metropolitan area and 5 million trips in the study area. The mobility of the inhabitants has constantly increased, especially as measured in terms of the use of motorised modes. The urban sprawl has caused the lengthening of the trips and large increases in total vehicle kilometres. The amount of trips is much more constant over time but exhibits a shift from non-motorised to motorised travel.

The supply of transport supply provides good coverage in the area and there are, in general, no major problems. There are radial motorways originating from Helsinki to all directions as well as two main ring roads. The network of other roads is dense.

In the metropolitan area, the public transport level of service is better than in the rest of the region. There is a dense bus network, a metro line, commuter train lines and tram lines in the metropolitan area. For the rest of the area, the network consists of trains and buses.

During the last decades, the sprawl has been fought against by, for example, metro and rail investments and with an efficient bus system. As a result the decline of public transport share has stopped. But urban sprawl is still a problem. In parallel with the population growth predicted by 2020, it is predicted that mobility will increase more than the population. 1% growth in population causes 2% growth in car mileage resulting in environmental, congestion and other problems. One reason for this is the decentralising land use, but also the number of trips is expected to grow. If policies favouring public transport will be pursued, it is forecast that the share of collective transport will start slightly rising again. The speeds of vehicle traffic in the metropolitan area will continue their slight decrease unless the increase in the use of the private car can be curbed. The growing traffic will increase the noise nuisance experienced by the inhabitants. It has been estimated that the population living in areas where the daily average noise level exceeds 55 dB(A) will increase by about 15% to more than 200 000 people by 2020.

1.4 Social Features

A sign of the structural change in the 1990s is the stratification of population and regions. The spread in income[1] levels has increased along with the demand for the less educated labour force diminishing. The Helsinki Metropolitan area and its surroundings form a region that has been the most successful one in the country, but also within the region itself certain areas are prosperous while others are impoverished.

The unemployment rate in 2001 was 6 % in the study area and 9 % in the whole country. The rates rose sharply in the early 1990s because of the economic recession, which was largely due to the over-heating in the economy of 80s. During the 1980s, the rates were around or below 3 %. Male unemployment was clearly higher than for females. There have been problems in reducing the undergoing structural changes leading to lower work forces.
The average amount of floorspace per person in 2001 was 33.7 m2 in the study area and 32.6 m2 in the metropolitan area and 32 m2 in Helsinki (35 m2 in the whole country). The figure has been growing rapidly from 21 m2 in 1970 as the household sizes are getting smaller.

1.5 Economy

Helsinki region comprises about one third of the national GDP of Finland. In addition to its administrative status as the capital city and home for industry headquarters, the economy of the region is based on retail, wholesale and private services. The region, therefore, has a surplus in its trade with the rest of the country. While the traditional manufacturing industries have been declining, the share of high-technology industries and services has been growing. The large and concentrated traditional industries such as metal and paper are not typically located in the region. Consequently, the foreign exports are not so dominant as for the rest of the country. As a big concentration of population, the level of imports is high.

1.6 Housing Prices

Housing prices are significantly higher (66 %) in the metropolitan area than in the rest of the country. The housing market has been very volatile; from the boom of late eighties and the collapse in early nineties. In late nineties housing prices was growing once again.

[1] Income includes here wages and salaries, entrepreneurial income and other income subject to state taxation

2 STATISTICAL ANALYSIS

2.1 Development of the average growth rates

In the beginning of the 1990s Finland experienced a deep recession. This resulted in, for example, a drop in both the total numbers of jobs and housing prices (Figure 2). In the latter half of the 1990s when the economic conditions turned around at a record speed to one of growth, employment began to increase again. One can also note in Figure 2 that at the end of the 1990s, the real price of housing has been increasing faster than real incomes.

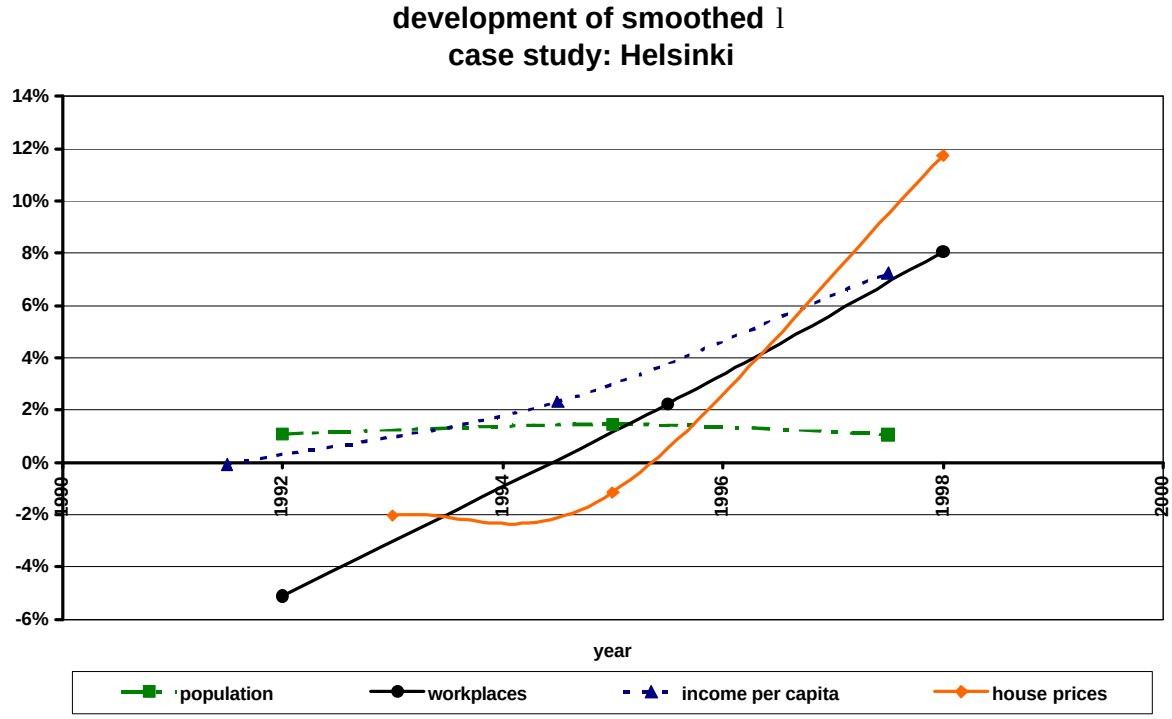


Figure 2 *Average annual growth rate of* $\tilde{l}^{population}(t)$, $\tilde{l}^{workplaces}(t)$, $\tilde{l}^{income\ per\ capita}(t)$ *and* $\tilde{l}^{house\ prices}(t)$

The average length of commuting trips has increased significantly during the past two decades. It is interesting to note, that the population growth has been about one percentage as the increase in average length of commuting trips has increased 2 percentage per year (Figure 2 and Figure 3). The growth in commuting trip lengths is fast, but has been slowing down during the second half of 1990s**.**

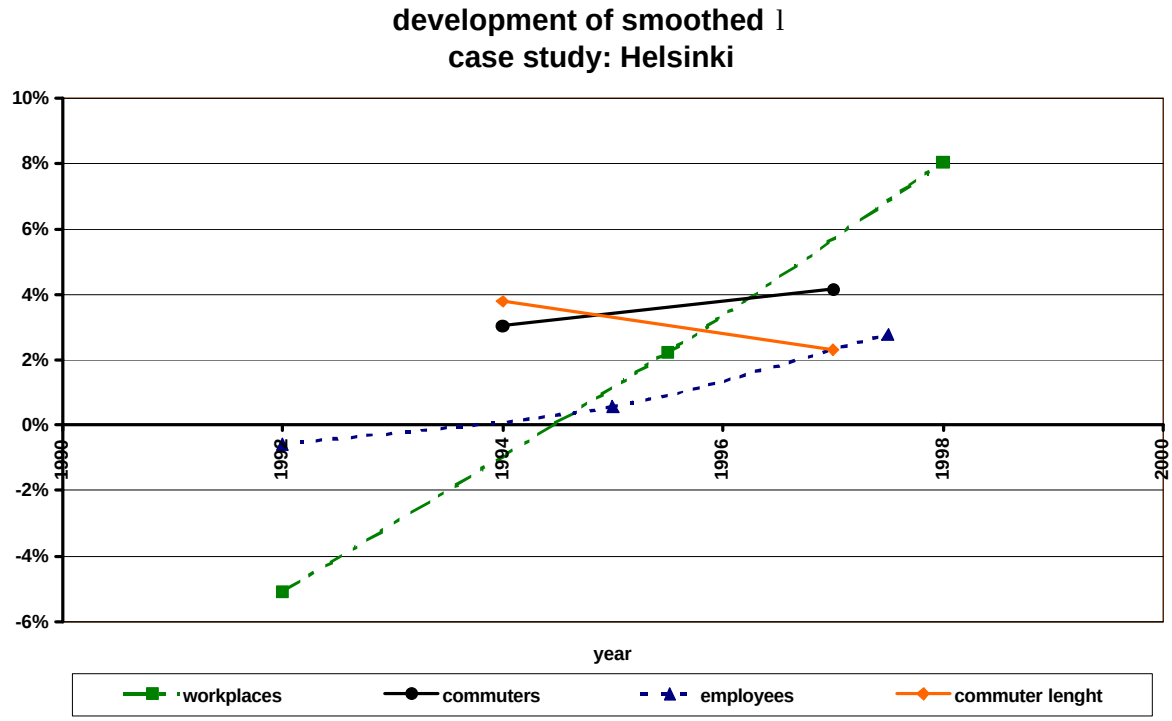


Figure 3 *Average annual growth rate of* $\tilde{l}^{workplaces}(t)$, $\tilde{l}^{employees}(t)$, $\tilde{l}^{commuters}(t)$ *and* $\tilde{l}^{commuter\ length}(t)$

2.2 Development of the deviations from the average growth rates

The population growth has been stronger within the capital region than in surrounding areas. With hardly anymore space in the city core for new housing, the growth in the centre (5,7% during the study period) has been slower than in other areas (Figure 4).

Real earnings in the entire study area have grown during the 1990s. The growth, however, has been slower in the capital region's outer areas than close to the centre. The metropolitan area's commuter-shed has shaped itself in such a manner that the high-income areas are close to the centre while the lower income areas are situated in the outer areas. The housing prices are also higher in the vicinity of the centre and decrease, with a few exceptions, as one moves further away from the centre. The region is also typified by the fact in that housing in the central area retains its value while in the outlying area prices are highly volatile (Figure 4).

During the 1990s the Helsinki Metropolitan Area, excluding the city core, has proved to be a significantly growing employment area. The growth in the outlying areas (Figure 4) has been slower.

The length of commuter trips has increased but the fastest growing area has been the city centre. The volume of work trips once again has grown relatively more in the outer urban ring. The average length of work trips originated from this area has, however, grown the least (Figure 5). Possibly, most of the trips to the outer urban ring also originated within the metropolitan area. More detailed analysis is required to confirm this.

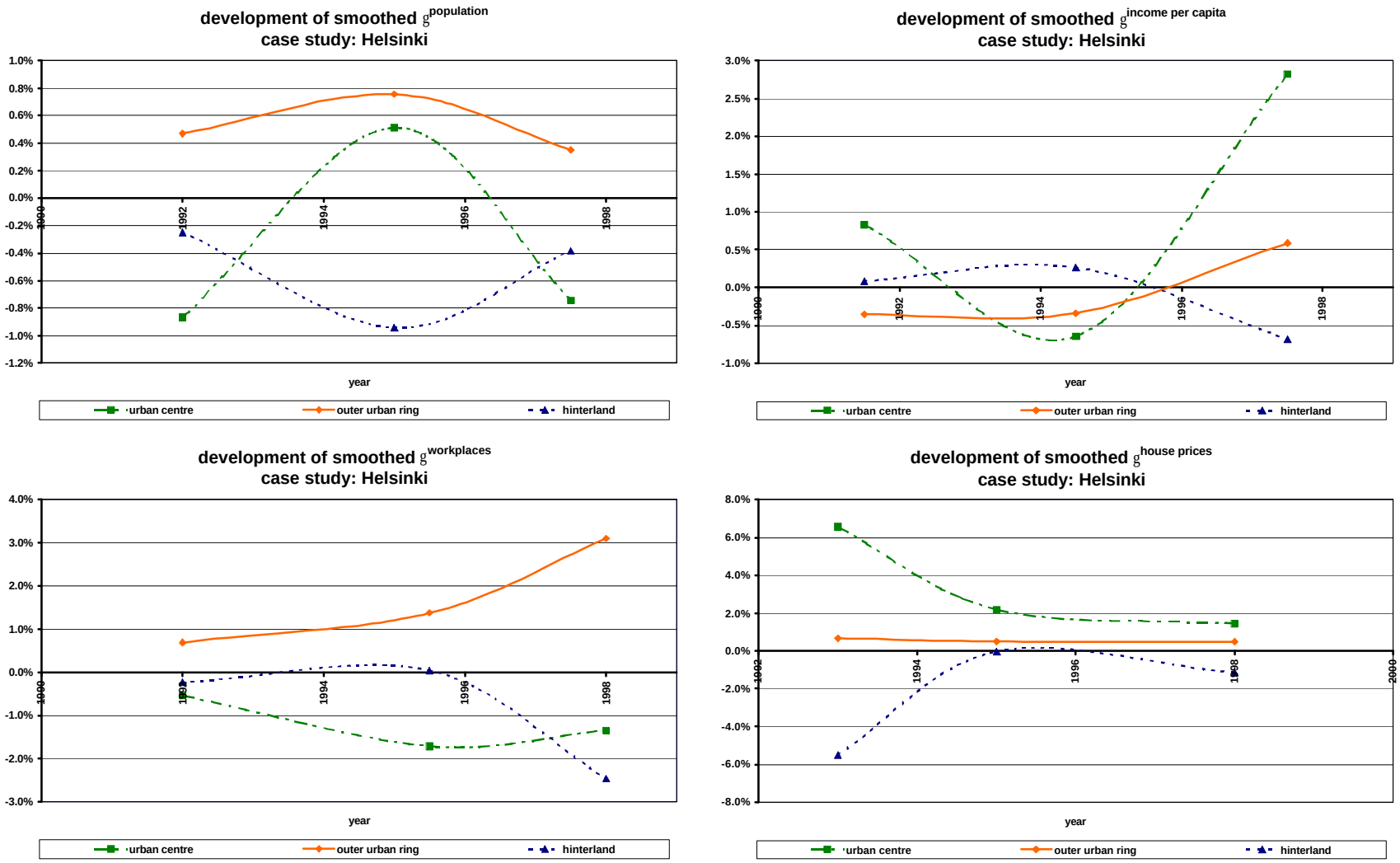


Figure 4 Annual deviations from the average growth rate $\tilde{g}^{\text{population}}(t)$, $\tilde{g}^{\text{workplaces}}(t)$, $\tilde{g}^{\text{income per capita}}(t)$ *and* $\tilde{g}^{\text{house prices}}(t)$

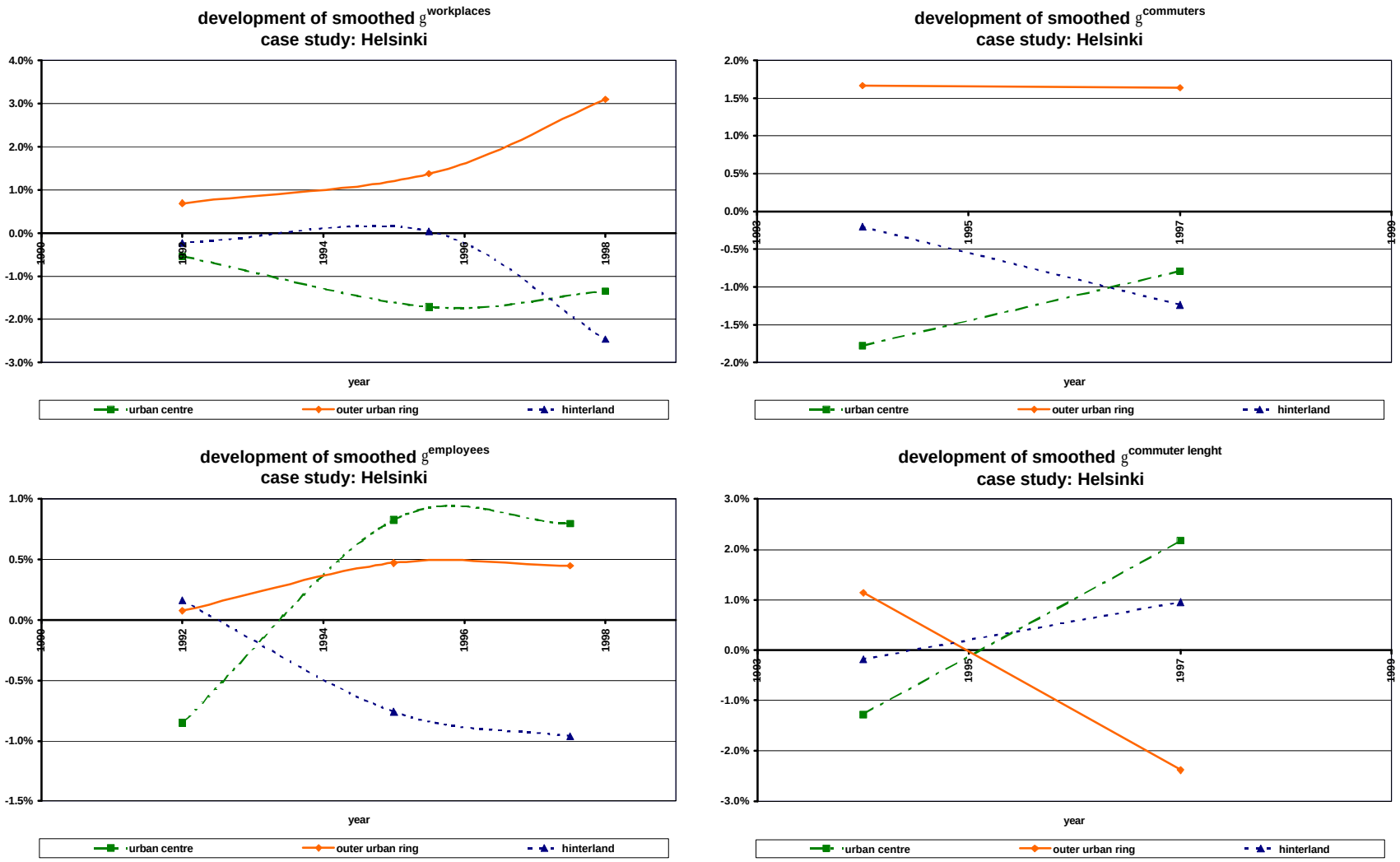


Figure 5 Annual deviations from the average growth rate $\tilde{g}^{\text{workplaces}}(t)$, $\tilde{g}^{\text{employees}}(t)$, $\tilde{g}^{\text{commuters}}(t)$ *and* $\tilde{g}^{\text{commuter length}}(t)$

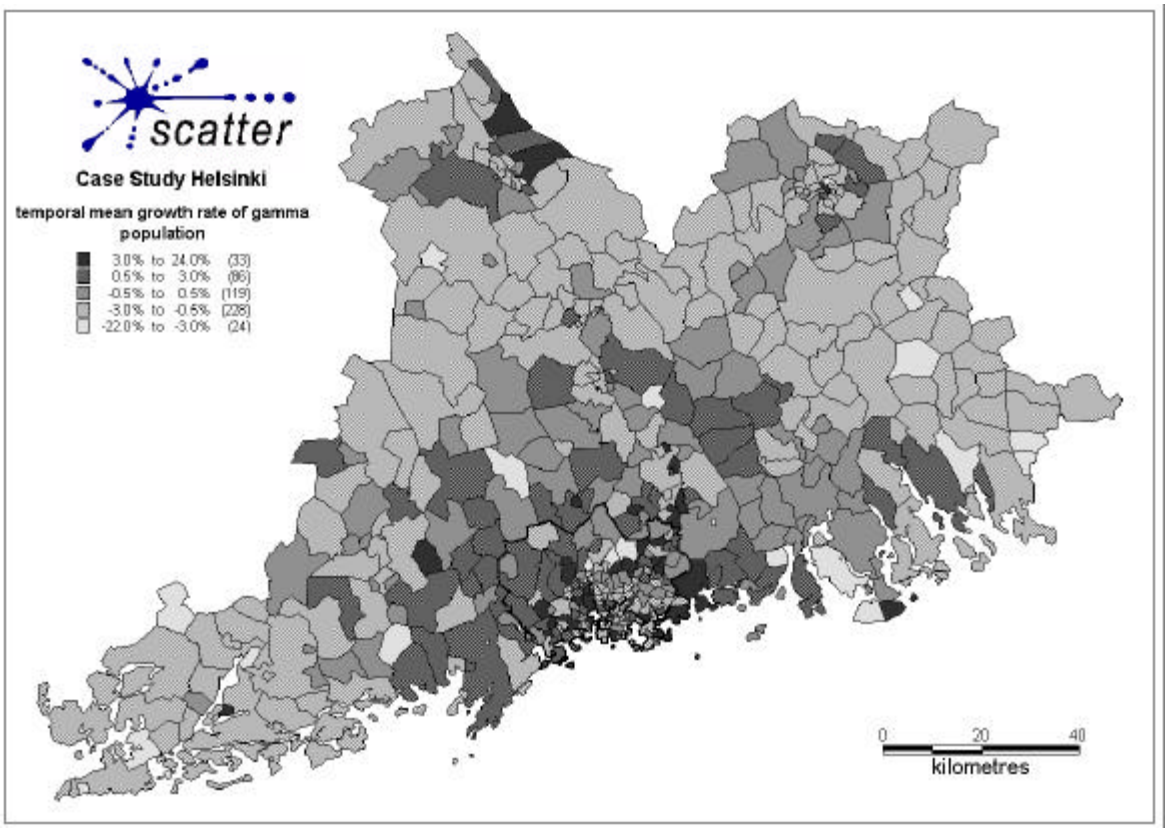


Figure 6 Spatial distribution of the temporal mean growth rate of $\tilde{g}^{\text{population}}$

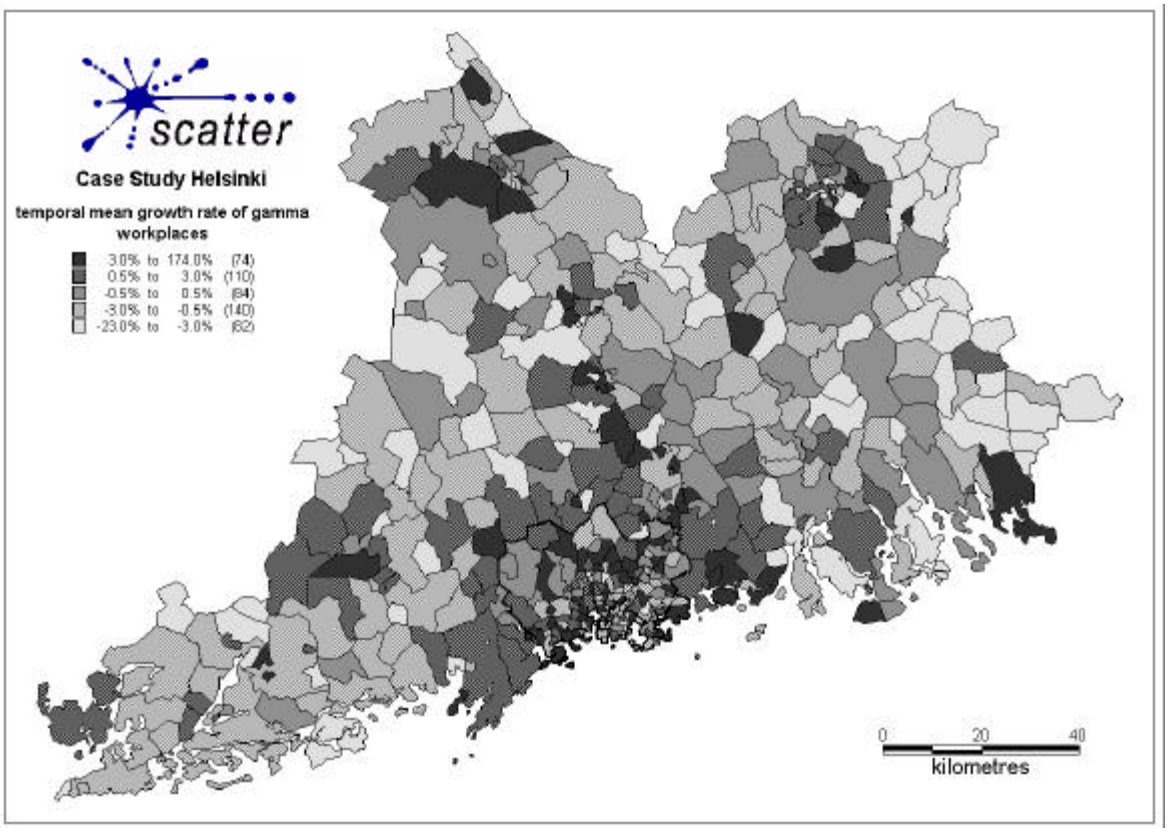


Figure 7 Spatial distribution of the temporal mean growth rate of $\tilde{g}^{\text{workplaces}}$

The temporal mean growth rates of $\tilde{g}^{\text{population}}(t)$ and $\tilde{g}^{\text{workplaces}}$, averaged over the period 1990 to 2000 on the level of communities is depicted in Figures 6 and 7. The largest population and employment growth areas have concentrated mainly within the capital region but growth can be clearly seen up to a distance of about 70 km from the centre. Rail lines also play a part in attracting jobs to the region. Many of the fasted growing areas are, in fact, those emphasising railway station surroundings. The spatial pattern indicates that the above average growing zones (communities) are scattered mainly over the capital region and on the border to the hinterland.

2.3 Development of the concentration-measure H

The concentration measure *H* for the relative density would remain constant over time, in the case of constant growth rates in the different zones. The population in the capital region during the 1990s is relatively more compact: growth has concentrated mainly within the capital region and nearby. Consequently, the population density in the outskirts has decreased as well as the relative H-measure.

At the end of the 1990s the spread in income levels has inflated such that incomes in the capital region's east and northern areas have decreased; as has been the case in the outer areas of the region. This can be also seen by the employees, workplaces and commuters. In the early 90s all and the employees/commuters show an increase of the relative H-measure and therefore a de-concentration of the urban area. The less educated, whose opportunities for improving their economic livelihood are more restricted, reside in these areas.

Workplaces and house prices show only in the mid of the 90s an increase of H^{rel}. Only the commuter length seems to increase over the last decade.

The negative concentration measures H^{rel} can be found in case of Helsinki for nearly all variables. This is pointing to an increase of concentration of activities in the inner regions of the study areas (urban centre and urban ring). The main growth centres of the case city Helsinki are situated in the outer urban ring. The negative annual H^{rel} is therefore based on the development of the hinterland with its negative growth rates ("negative growth centres").

Furthermore the negative H^{rel} of Helsinki can be also effected by the very short time intervals were data are available (only 10 years) and the huge rural hinterland.

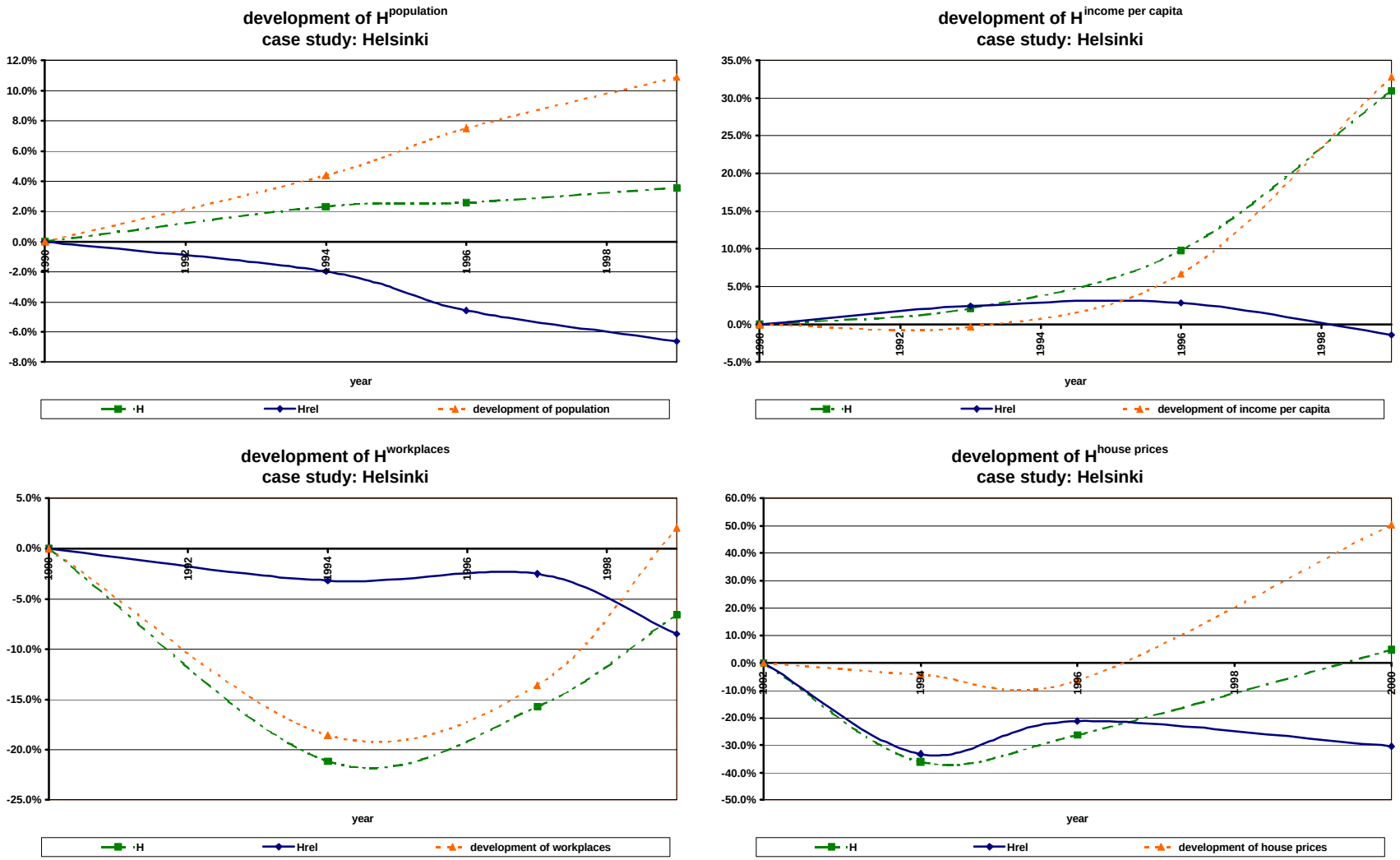


Figure 8 Development of $H^{\text{population}}(t)$, $H^{\text{workplaces}}(t)$, $H^{\text{income per capita}}(t)$ *and* $H^{\text{land prices}}(t)$

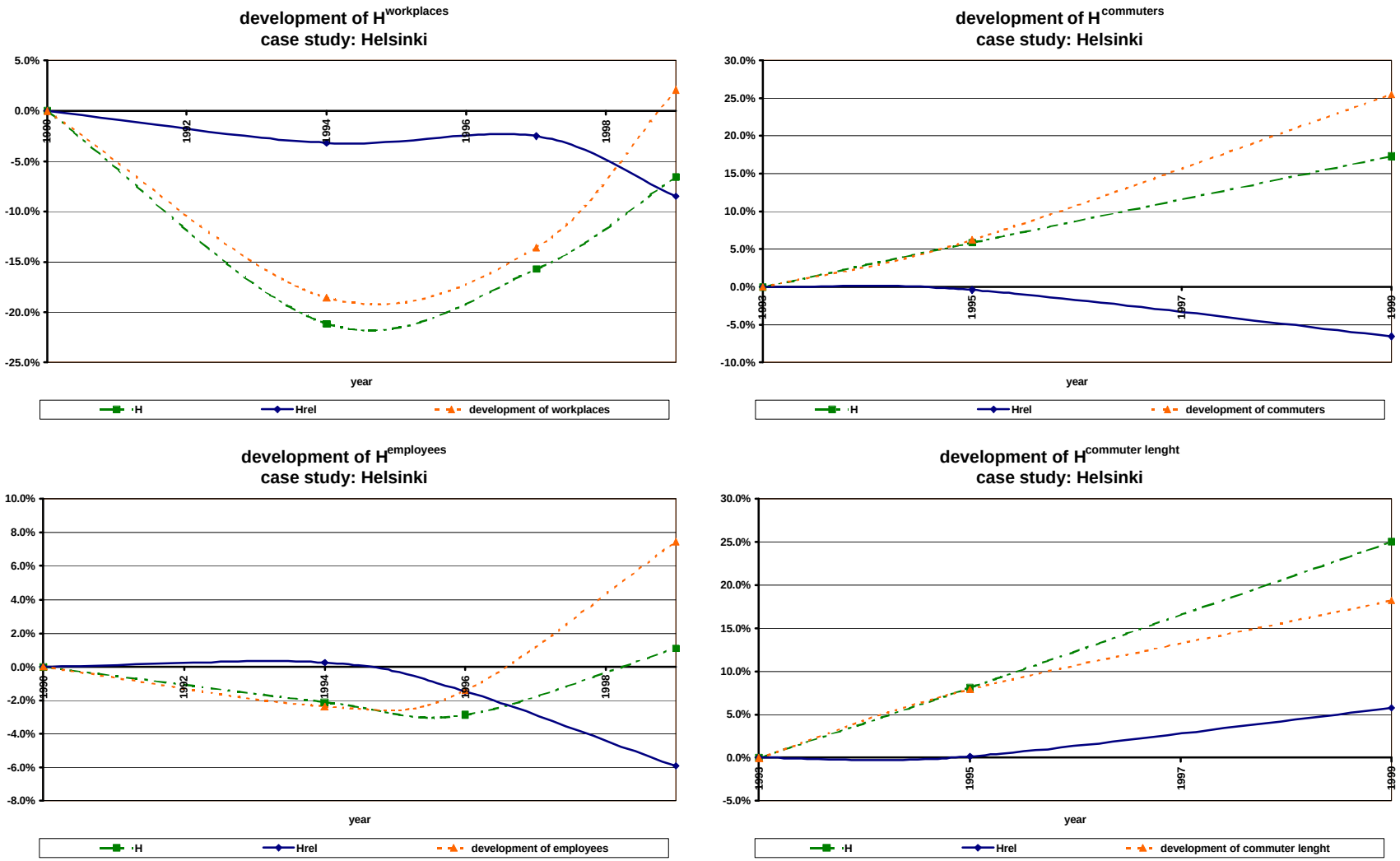


Figure 9 Development of $H^{\text{workplaces}}(t)$, $H^{\text{employees}}(t)$, $H^{\text{commuters}}(t)$ *and* $H^{\text{commuters length}}(t)$

2.4 Development of global and local Moran I

The time development of global Moran's *I* of inhabitants per km^2 (population density), workplaces per km^2 (workplace density), income per capita and house prices are shown in Figure 10 while in Figure 11 the global Moran's I of the other variables employees per km^2, commuters and commuter length are depicted.

The income per inhabitant and the house prices show a high positive level, the workplace per km^2 and commuter ad low positive level and the other variables a medium level of spatial autocorrelation. A high level of global autocorrelation indicates that the characteristics of the areas situated close to one another are similar while a low level of global autocorrelation indicates that there are some clustering regions but the most areas are uncorrelated (unsimilar) in the Helsinki area.

The global Moran I of the house prices shows a steadily increasing spatial autocorrelation. The increase of the spatial autocorrelation during the last ten years indicates, that within the Helsinki Region the economic interactions between the certain communities have spread out and slightly increased. The whole area has become more homogeneous, since the sprawling effect of the house prices statistically diminish the differences between rather rural and urban communities. The opposite deveolopment of the global Moran's I can be seen by the income per capita.

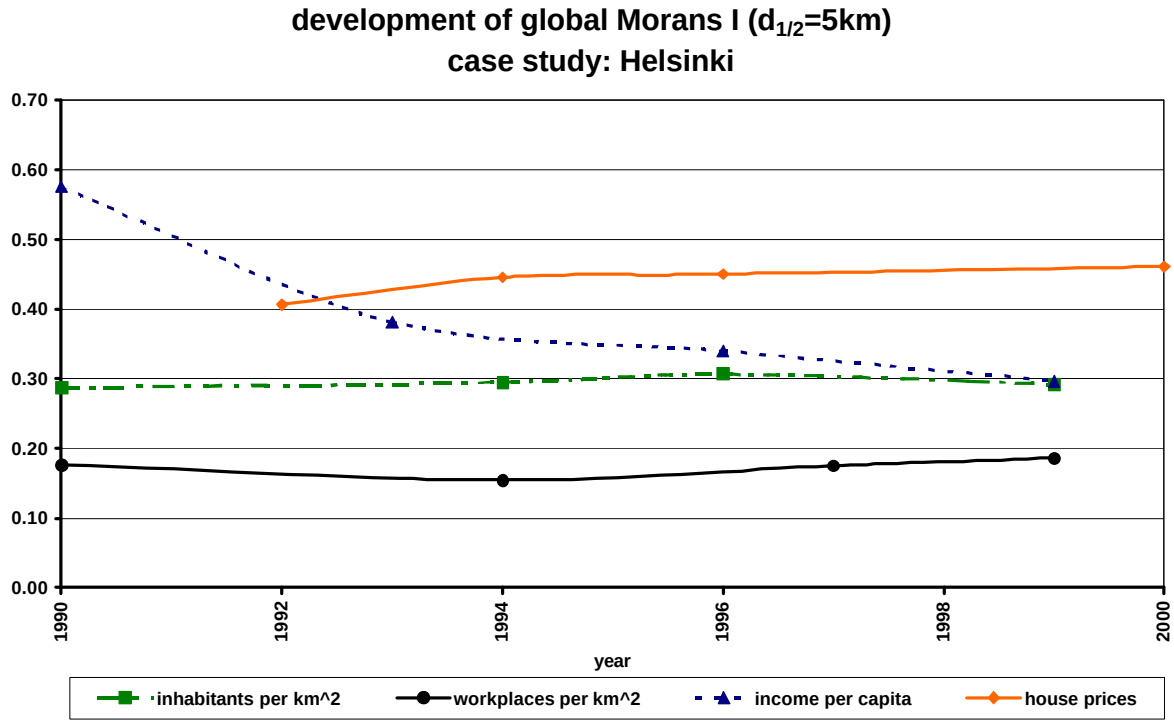


Figure 10 Development of global Moran I of population, workplaces, income per capita and house prices

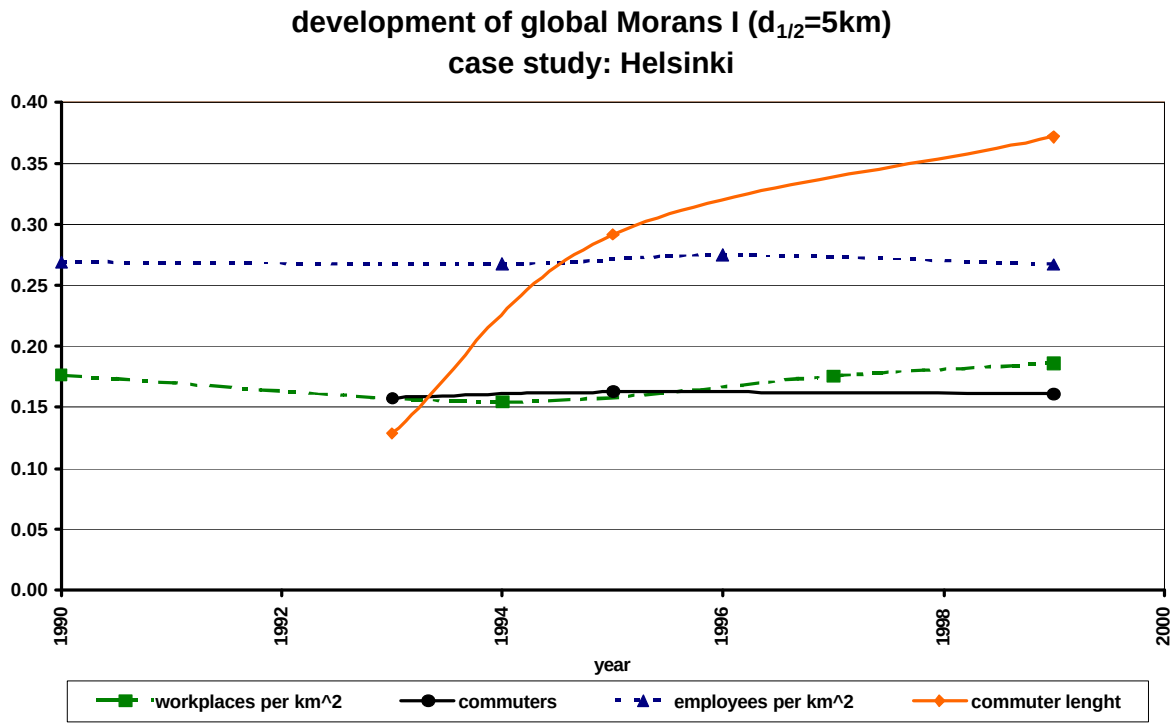


Figure 11 Development of global Moran I of workplaces, employees , commuters and commuter length

In the Figures 12 and 14 the spatial distribution of the local Moran's *I* of population and workplaces density are depicted. The neighbouring areas (dark) that are relatively the same in terms of population and employment and, on the other hand, those (light) that are relatively different. It can be stated that a clustering of communities with high spatial auto-correlation around the around an in the city Helsinki exists. The local Moran's *I* of communes of the outer urban ring are very low, because the differences of these communes with their neighbours are very high. High values of local Moran's *I* in the hinterland can be found e.g. in case of rural areas. .

Changes in the Local Moran I of the population and workplace density are shown in Figures 13 and 14. An increase of spatial autocorrelation indicates that regions becomes with its surroundings similar while a decrease indicates that regions becomes with its surrounding dissimilar. Especially in the capital region and also close to the boundery an increase of spatial autocorrelation can be seen. In the most regions of the case Helsinki nearly no changes or only very small changed can be indicated. This is due to the fact only 10 years are under investigation. The local Moran's I is a very stable indicator over time.

2.5 Note on the statistical measures

Of the city structure development parameters, the speed of growth and Local Moran are the ones that can be best depicted. The H-measure is dependent on the zonal definition and is also not particularly suitable for examining polycentric land use structures. The outputs were at their best when presented graphically on maps.

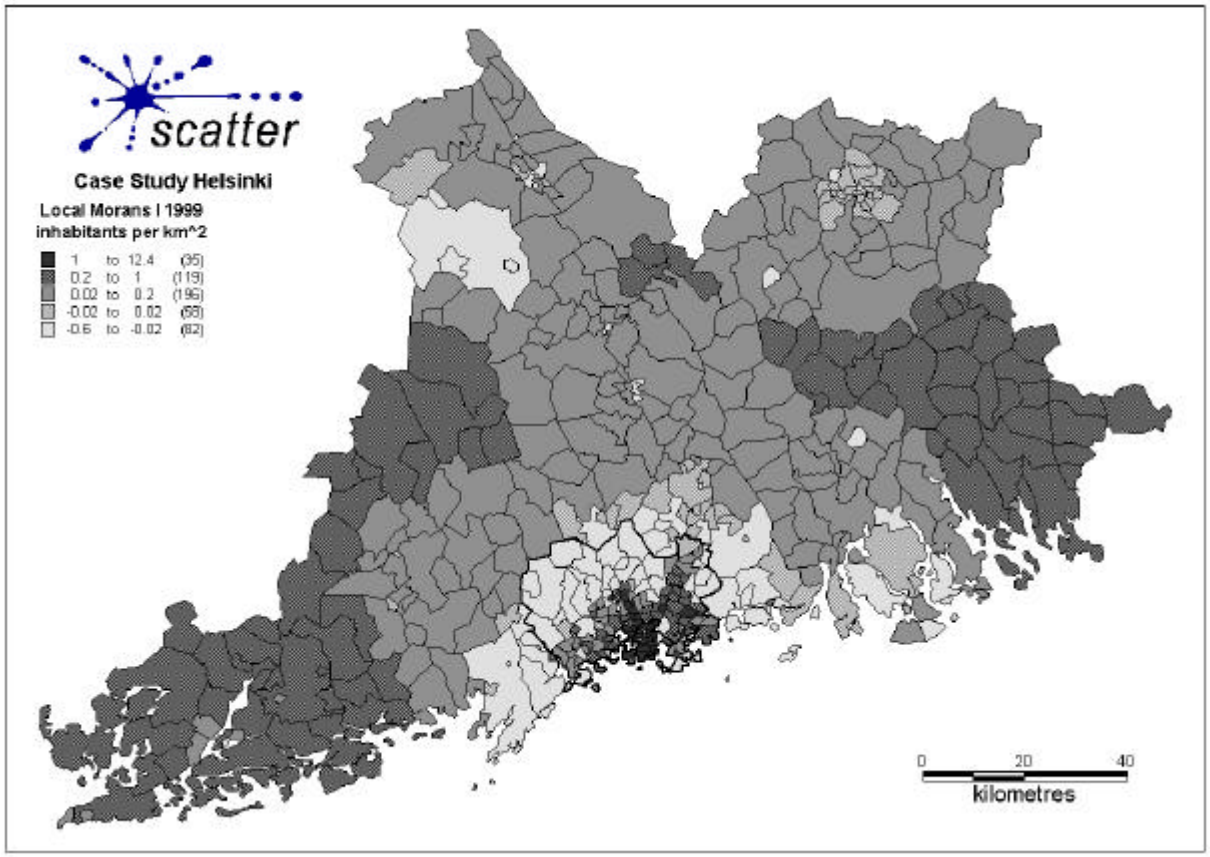


Figure 12 Spatial distribution of Local Moran I for inhabitants per km²

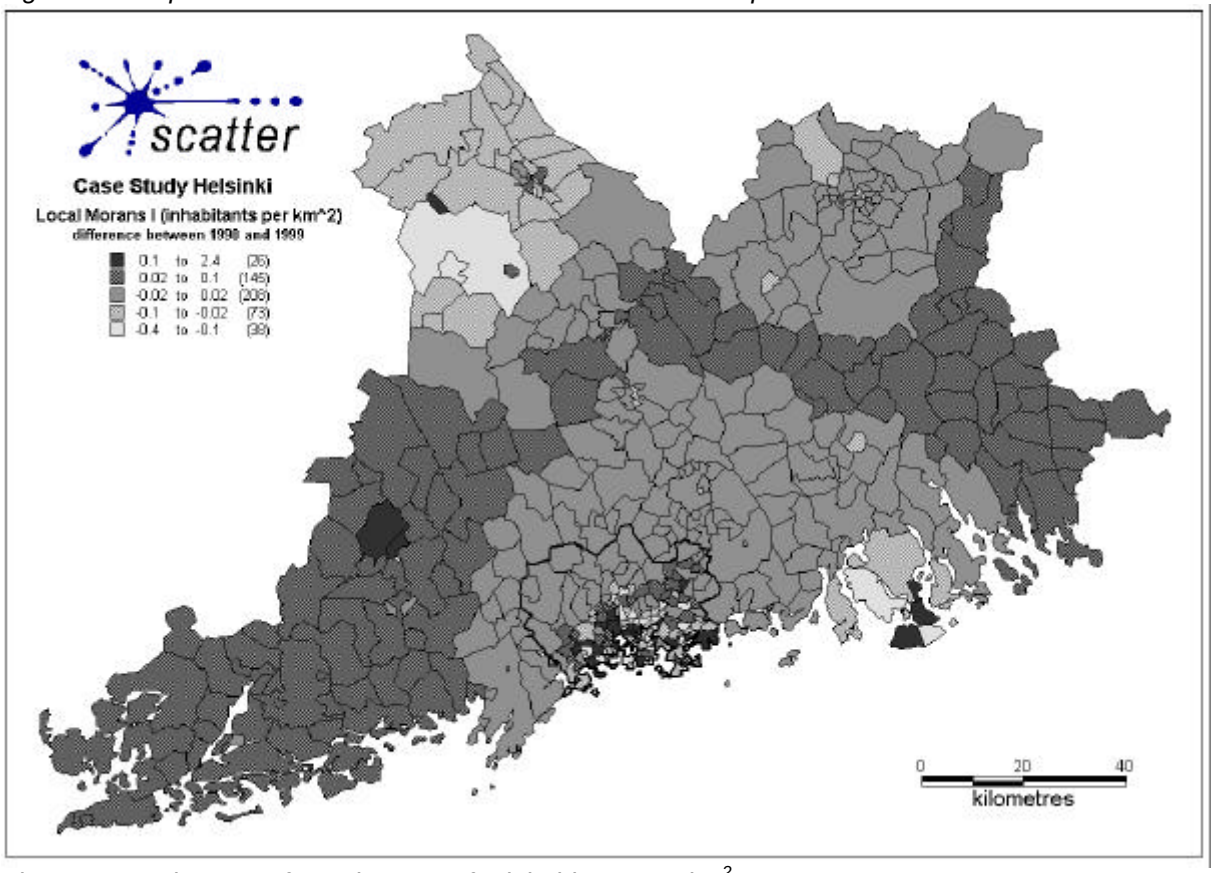


Figure 13 Changes of Local Moran I for inhabitants per km²

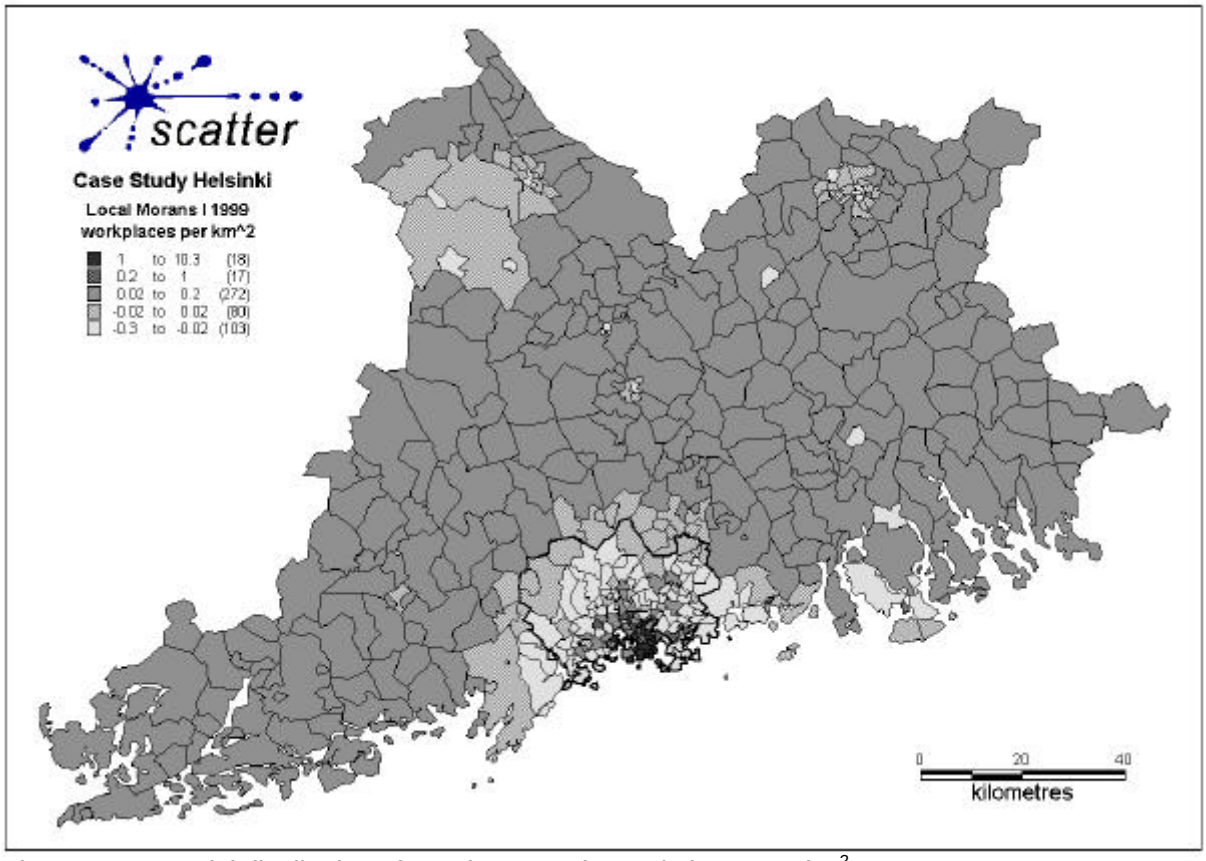


Figure 14 Spatial distribution of Local Moran I for workplaces per km²

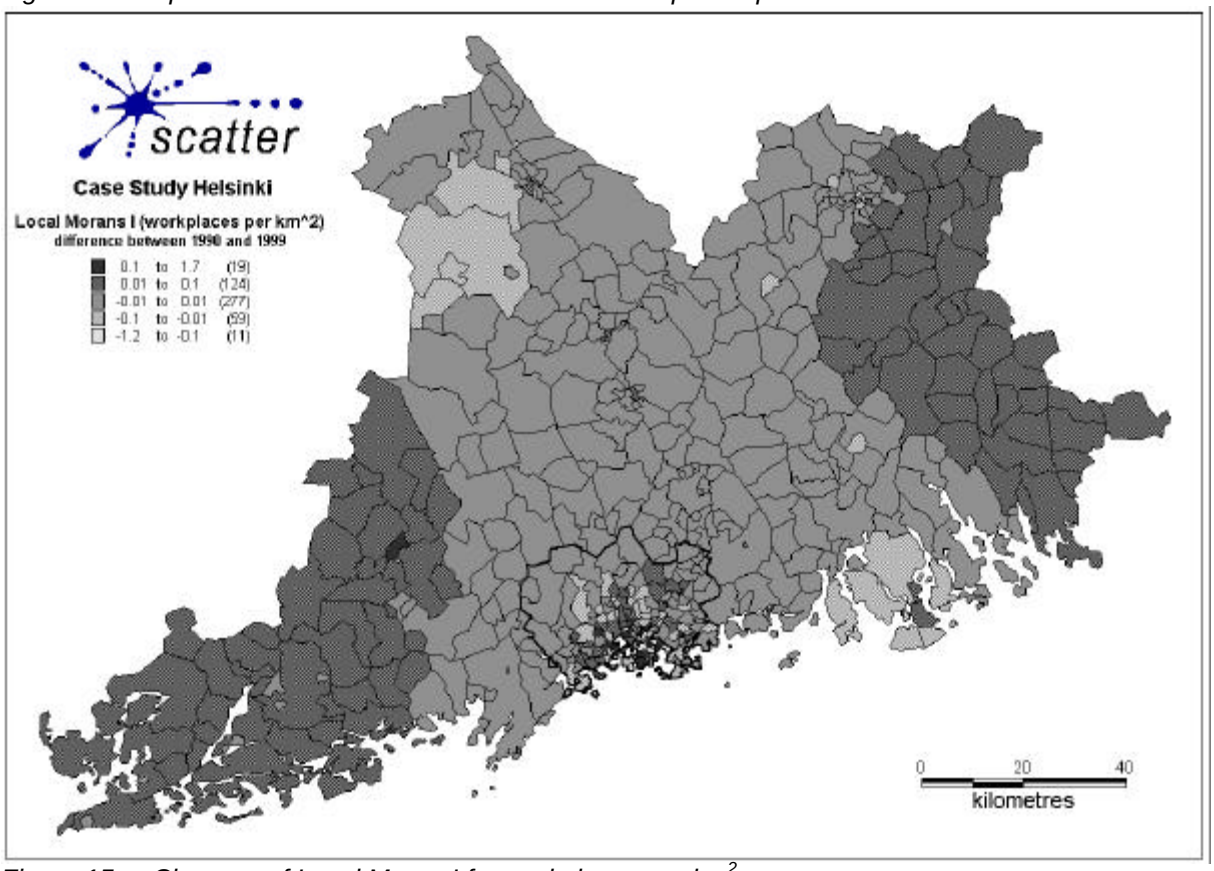


Figure 15 Changes of Local Moran I for workplaces per km²

3 PRESENTATION OF THE PLANNING SYSTEM

3.1 Land Use and Building Act

The Finnish land use planning system has changed recently . In 1999, Parliament approved the new Land Use and Building Act, which came into force at the beginning of the year 2000. The Act gives local authorities more extensive powers to make independent decisions in land use planning matters. Central government control was reduced. It was no longer required for land use plans approved by local authorities to be submitted to the Ministry of the Environment or the Regional Environmental Centres for confirmation. The local authorities are now adopting a more open and interactive approach to planning.

The aim of land use planning is to promote the following, on a basis of interactive planning and adequate impact assessment:

1. Creation of a safe, healthy, pleasant and socially well-functioning living and working environment that meets the needs of various population groups, such as children, old people and the disabled

2. Economic community structures and land use

3. Beautiful built environment and the fostering of cultural values

4. Preservation of biodiversity and other natural values

5. Environmental conservation and the prevention of environmental hazards

6. Economic use of natural resources

7. Well-functioning communities and good construction

8. Economy in infrastructure building

9. Proper preconditions for business and industry

10. Accessible services

11. Practical traffic arrangements, specifically with good preconditions for public transport and non-vehicular traffic.

The Finnish land use planning system comprises national land use guidelines, in addition to the regional land use plan, the local master plan and the local detailed plan.

3.2 National land use goals

The Government defines national land use goals, which are supervised by a central government or regional environmental authority when implemented in land use planning. The Council of State sets national land use goals. The guidelines indicate which issues should be taken into account all over the country in land use. These goals comprise, e.g. main infrastructure networks or natural and built-up areas of national importance. The national land use guidelines have been grouped according to subject as follows: 1) a well-functioning regional structure, 2) a more coherent community structure and a quality of the living environment, 3) the cultural and natural heritage, recreation uses and natural resources, 4)

well-functioning communication networks and energy supply, 5) special issues of the Helsinki region and 6) areal entities of outstanding interest as natural and cultural sites.

The national land use goals guide the transport policies set by the Ministry of Transport and Communication. The investments to major transport corridors should be consistent with the national land use goals.

3.3 Regional land use plan

The regional land use plan transfers national and regional land use goals to land use planning at the local authority level. These are the only plans to be submitted for approval. Preparation and approval of regional plans are the obligation of 19 regional councils, which are alliances of municipalities. When the plan is being drawn up, special attention should be given to ensure that there is an appropriate regional and community structure, to preserving landscape values and ecological sustainability, and to provide the proper operating conditions for business and industry. A regional council compiles the plan and the Ministry of the Environment confirms it. The regional land use plans and transport plans are relatively loosely connected. The impact assessment of combined regional land use and transport scenarios are seldom carried out.

3.4 Local master plan

Within a local authority, the local master plan is an instrument for guiding and coordinating land use at a general level. It can be either a very general strategic plan or a more detailed one for direct regulation of building, depending on the need. Municipalities may also decide on joint master plans, regulating road planning, and the siting of retail trade, workplaces, and residential areas. Such joint plans require the approval of the Ministry of the Environment.

The local master plan is used to resolve questions concerning the functionality and economics of the community structure, the accessibility of services, the preservation of natural and cultural values, the quality of the living environment and the reduction of environmental hazards. When the plan is being drawn up, consultations have to be held with the Regional Environmental Centre to ensure that national goals are taken into account in local plans. The transport system plans are connected with the local master plans. Thus the development of the regional transport system and land use structure depends on the cooperation of municipalities.

3.5 Local detailed plans

Local detailed plans are used for regulating building and the formation of the physical townscape. The emphasis is on taking local conditions into account. and Special attention has to be given to ensuring that there are enough parks and local recreation areas and promoting the use of the existing building stock. Detailed plans must not reduce the quality of anyone's living environment without a very good reason. Every local authority has its own building ordinance, the content of which is defined according to local needs. The dimensioning of streets, roads and rail lines goes parallel with local detailed plans.

Local decision-making is enhanced. Municipal plans are no longer be approved by higher authorities. Thus local authorities are expected to possess better resources and expertise. The government administration safeguards the achievement of national goals and provides assistance to local authorities. Appeals against local land use decisions are directed to administrative courts.

Public participation is strengthened at the local level. To ensure opportunities for inhabitants to participate, procedures for participation and assessment are required in every planning project. The law calls for a special participation and assessment scheme to be drawn up when land use planning begins. Participation is organised separately plan by plan in consultation with all interested parties. That means both landowners and those whose living and working conditions and other circumstances the plan is likely to affect. Interested parties also include all authorities and organisations whose area of operations is touched by the plan.

It is now also possible to assess how topical the existing detailed plans are: each plan shall be reviewed after 13 years to confirm if it is up to date, and plan implementation will be more flexible. The act has stipulations on particular development areas and on local planning needs.

The new act also has regulations on national urban parks to be sited on land owned by the state or the local authorities or a similar body. The aim is to create and maintain extensive, parks, recreation areas, and green belts in urban conglomerations so as to provide a good living environment and protect the natural and cultural heritage.
New commercial premises greater than 2 000 square metres will receive a building permit only when the site is specially designated for that purpose in the town plan.

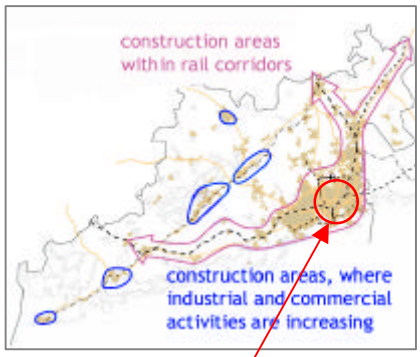
National Land Use Goals

set by the Council of State

Regional Plans

Objective:
Transfers national and regional land use goals to land use planning at the local authority level

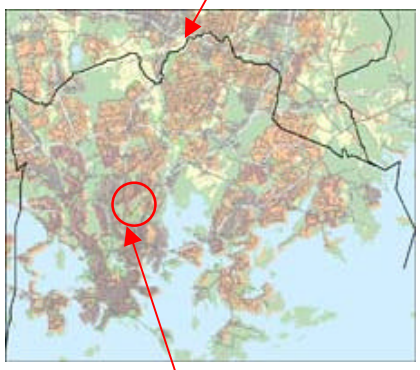
Responsibilities:
• Regional Council compiles and approves
• Ministry of Environment confirms



Local Master Plan

Objective:
Guidance and coordination of land use at a general level

Responsibilities:
• Municipalities may draw up jointly
• Ministry of Environment confirms



Local Detailed Plan

Objective:
Regulating building and the formation of the physical townscape

Responsibility:
Municipality draws up and confirms

Figure 16 Finnish planning system

4 SYNTHESIS OF THE INTERVIEWS OF EXPERTS AND LOCAL AUTHORITIES

4.1 The local authorities and experts interviewed

This Chapter 4 is a synthesis of the contents of the interviews that have been carried out to investigate changes that have occurred in the Helsinki Metropolitan Area and in its surrounding region. The purpose of the interviews was to detect and understand the local events and rationale involved in the emergence of urban sprawl, its relevance in the decisional agenda of local authorities and experts, and the overall level of awareness of this particular urban phenomenon.

The local authorities and experts interviewed were (in alphabetic order):
Mauri Heikkonen, Building Counsellor, Ministry of Environment
Antti Kalliomäki, Chief Municipal Engineer, City of Tuusula
Pekka Lahti, Chief Research Scientist, Technical Research Centre of Finland
Reijo Teerioja, Head of Traffic Planning Unit, Helsinki Metropolitan Area Council
Pentti Tuovinen, Director of Strategic Planning, Uusimaa Regional Council

The analysis of the interviews conducted on the Helsinki case study has led to the definition of several themes:

- Urban growth, migration and structural change
- Spatial structure of Helsinki Metropolitan Area
- Functional structure of Helsinki Metropolitan Area
- Identified impacts
- Global, national and local policies and management of urban growth
- Policy indicators and urban sprawl.

Maps and diagrams have been included in the report in order to illustrate the subject matters dealt with during the interviews. Part of this material was presented during the interviews of the local officials and experts while the remainder was used as preparatory background material for the interviewers.

4.2 Urban growth, migration and structural change

From a long-term perspective, the growth of Metropolitan Helsinki, like other metropolitan areas, is based on centuries of development. In the national economy, the structural shifts from primary industries to goods-related industries and then to the service sector, however, occurred both later and noticeably faster than, for example, in other Nordic countries.

Another feature particular to Finland is the striking characteristics of this shift. Situated in Europe's periphery, Finland's economic swings have been more powerful than in other Nordic countries and generally Central Europe. The migration to urban areas and the volume of new construction reflect these economic conditions. Internal migration within country characteristically accelerates during periods of economic growth and drops during recessions, while the migration between Finland and other countries acts vice versa. Metropolitan areas in Finland though have proven to be extremely strong magnets for people and migration from the countryside has persisted regardless of the state of the economy. Migrants continue to move to the cities where economic opportunities and the chances of finding a job are greater.

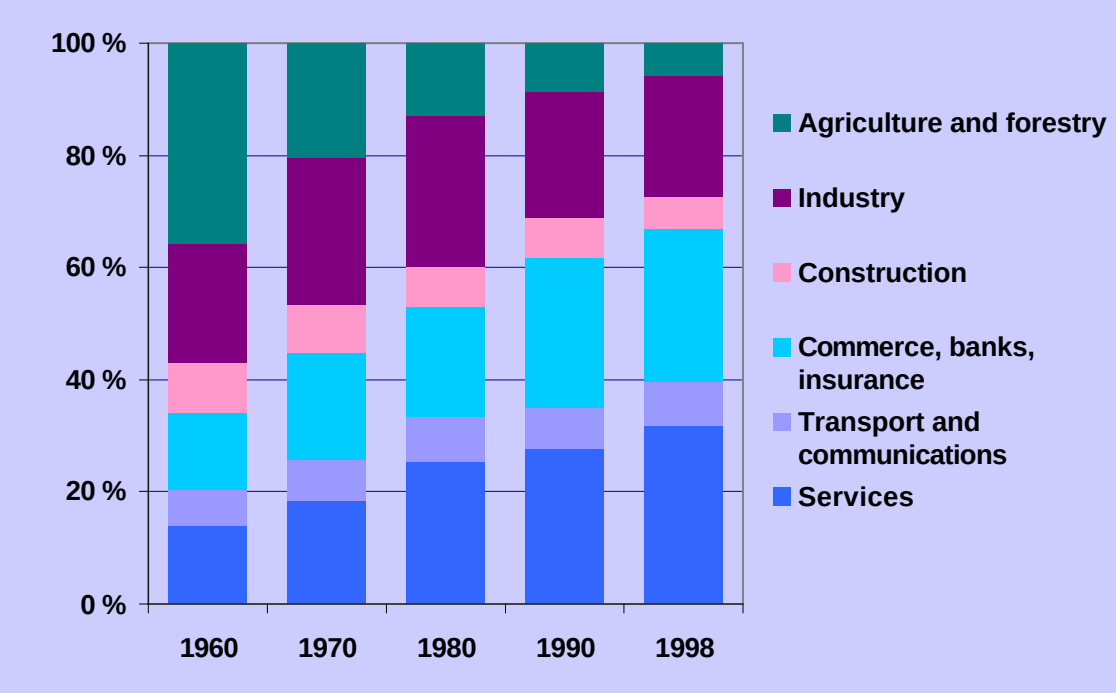


Figure 17 Structural change in the economically active population [2]

The economic changes in the 1990s have been the most intense since the decades immediately after the world wars. At the beginning of the 1990's Finland had a long and deep recession which was followed by an unexpected fast and strong economic upswing. This boom was reflected also in the migration of working age people to the big urban centres, especially the capital region and its surroundings.

The shift from a society based on primary industries to goods-related one means higher population densities. The resulting specialisation in functions also means an increase in transport demand. This trend is further accentuated by the advent of the information age. The need for even quicker transport and communications is increased. Contacts are created at a fast pace throughout the urban area, the entire country and the world. The combination of IT and physical travel has created the prerequisites for this and it is something that the prosperous Finns can take advantage of.

4.3 Spatial structure of Helsinki Metropolitan Area

4.3.1 Long term changes

While the spatial structure was shaped still in the 1930s by connections to rail service, the dispersal beginning in the mid 1950s was accelerated by the increase in car usage. Today's spatial structure of Helsinki Metropolitan Area has features of linear forms shaped by rail lines, scattered form shaped by motorisation, but also features of leapfrog effect. The cause of this last mentioned effect can be seen, for example, in terms of administrative municipal boundaries, language barriers and, at the micro level, property (private / municipal) boundaries. The language barriers between municipalities reflect themselves in the efforts made to safeguard the status of the minority languages in the municipality. A consequence of this is seen in the areas east of the capital region where there is a reluctance to accept regional growth due to its Finnish speaking character. In the spatial structure of the Helsinki Metropolitan Area, this barrier at the eastern boundary is clearly seen (Figure 3). On the other hand, one can pose a critical question: Has the alleged language policy directed city

[2] Suomen tilastollinen vuosikirja 2001, StatFin

structure dispersal elsewhere or due to this expansion restriction, has it had exactly the opposite effect, by furthering the development of a compact capital region?

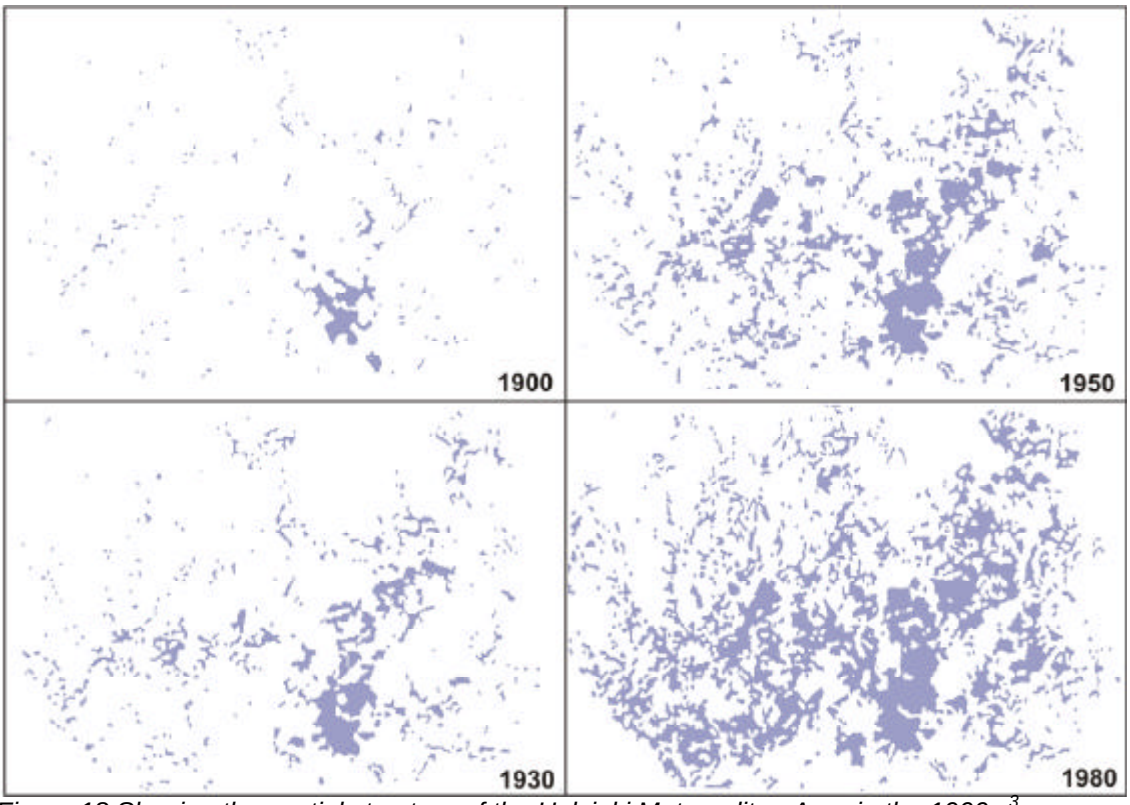


Figure 18 Shaping the spatial structure of the Helsinki Metropolitan Area in the 1900s [3]

A negative impact of the dispersed spatial structure is especially considered to be the open space fragmentation. In terms of people's enjoyment and preservation of natural diversity, the value of many small sized natural areas is considered to be less than one of the same size but having a consolidated open space.

4.3.2 Land prices in Helsinki Metropolitan area and in its surroundings

In the 1990s most of the new construction in the capital region has taken place in the built-up area. The price of building lots seems to guide land use in the Helsinki Metropolitan Area more clearly than in other parts of the country, with in-fill concentrated in old low-density areas. Outside the capital region where building lots are more affordable, new construction has clearly been directed to vacant areas.

[3] Lahti, P. & al. 1985. Yhdyskuntarakenteen kehitysnäkymät erityisesti yhdyskuntatekniikan ja teknologian kehityksen näkökulmasta. Suomen kaupunkiliiton julkaisusarja C 109. Espoo.

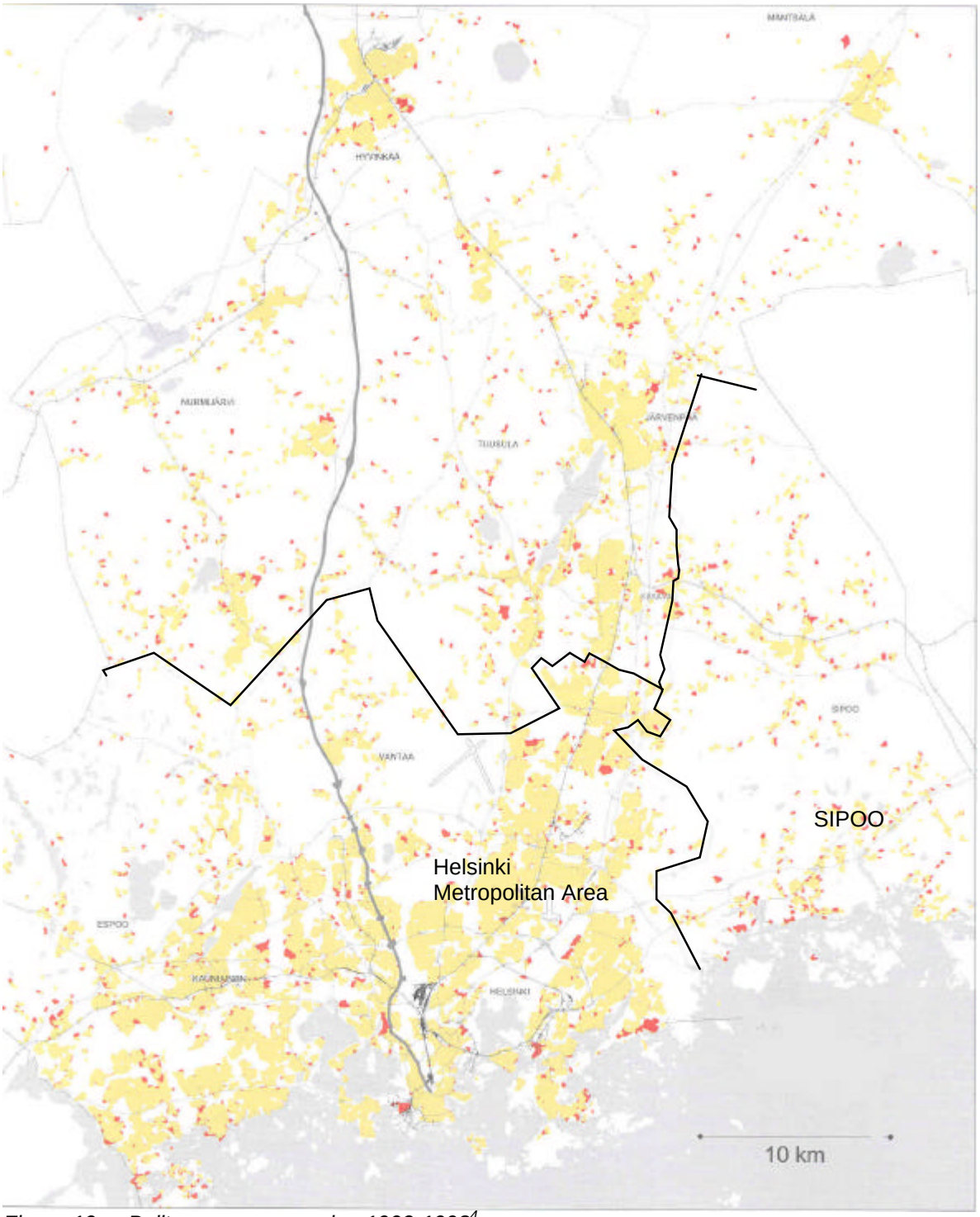


Figure 19 Built-up area expansion 1992-1998[4]

The amount of open space in Helsinki Metropolitan area has reduced. The critical question is how much of this change can be considered as a natural part of city growth and how much due to urban sprawl. One viewpoint of this is to consider the important part of the dispersal that portion of the new construction that takes place outside the existing built-up area but would have been feasible to locate within it.

[4] Halme, Timo.2000. Helsinki-Hämeenlinna-Tampere; Alue- ja yhdyskuntarakenne HHT-vyöhykkeellä. Hämeen liiton julkaisu V:50. Hämeenlinna.

4.3.3 Possibilities for achieving a compact metropolitan region

According to Lahti et. al, it is estimated that there is a real possibility to in-fill Finnish cities and towns with 170 million sqm of floor space, which equals the needs of about 4.3 million residents. This in-filling saves community and resident expenditures since it can benefit from already made investments. It is estimated that these savings would amount to some 10 billion Euro.[5] Even if the compact metropolitan structure is not totally realistic, the above estimate provides an interesting perspective of the development pattern of the Helsinki Metropolitan Area and its surrounding.

4.3.4 Building Law

As a special Finnish feature one can consider e.g. the Building Law which permits construction in outlying settlement areas. With prescribed preconditions fulfilled, the municipality is obliged to give a building permit for such an area. This increases urban sprawl or housing in peripheral areas.

4.4 Functional structure of Helsinki Metropolitan Area

4.4.1 Some spatial structures

The existing land use structure can be characterised as primarily mixed. On the other hand, the land use structure of Metropolitan Helsinki and its nearby surroundings also clearly has “polarity” features. The capital region is more or less a polycentric region where in addition to the inner urban region many regional centres have formed.

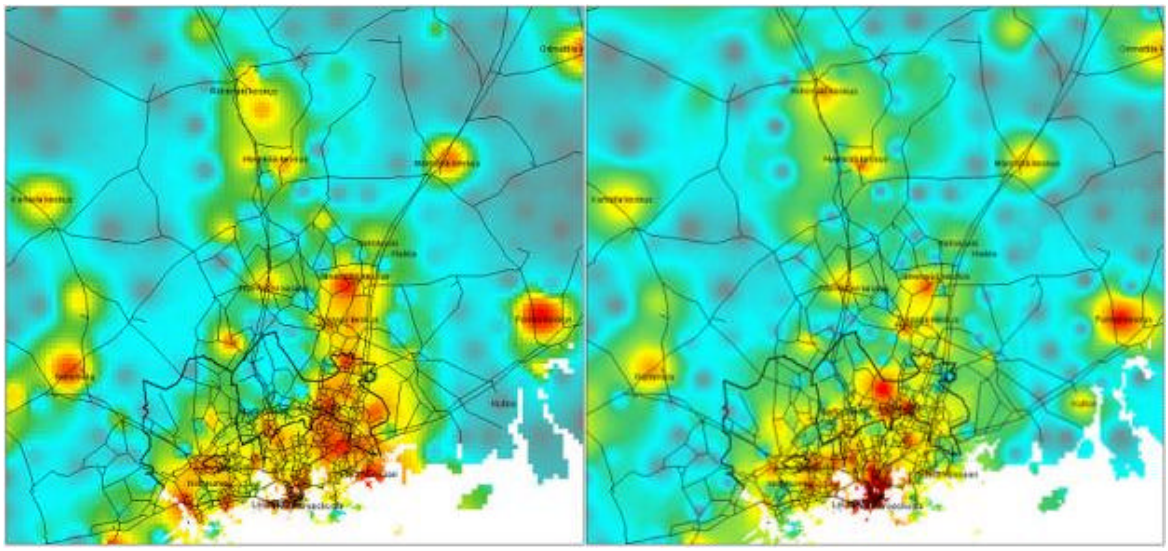


Figure 20 Zonal population (left) and employment (right) by zone in 1999 (focal smoothening)

[5] Lahti, P. K. Rauhala. 1994. Asuntoalueiden täydennysrakentaminen; Mahdollisuudet, kustannukset ja säästöt. VTT:n tiedotteita 1574. Espoo.

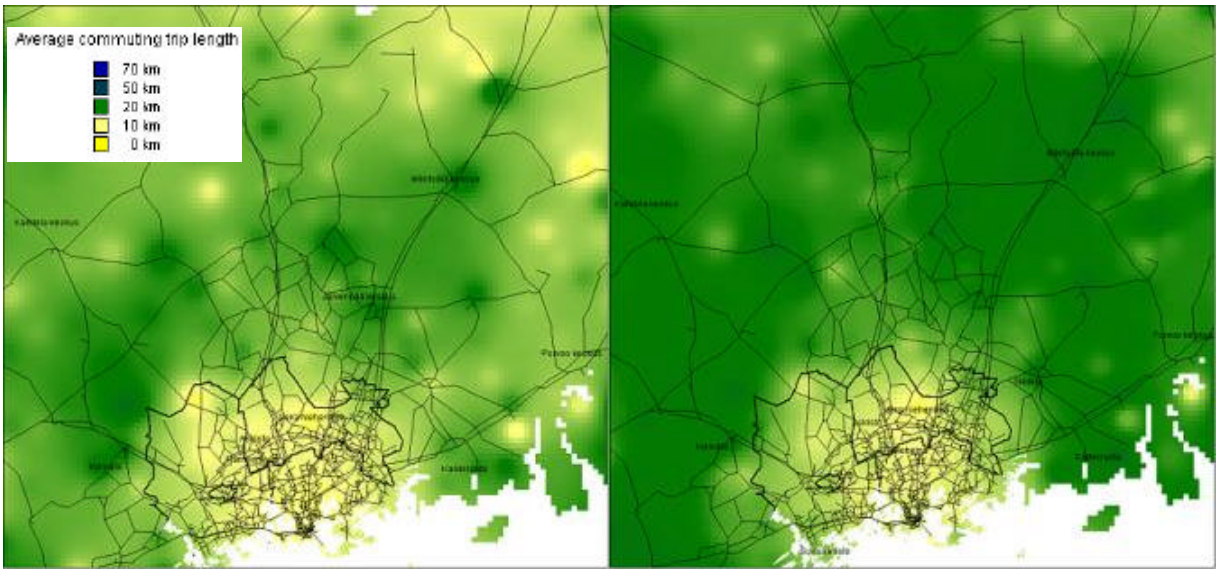
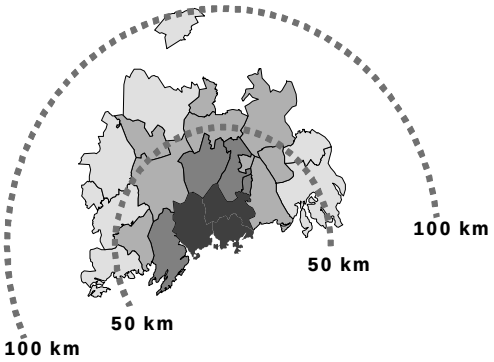


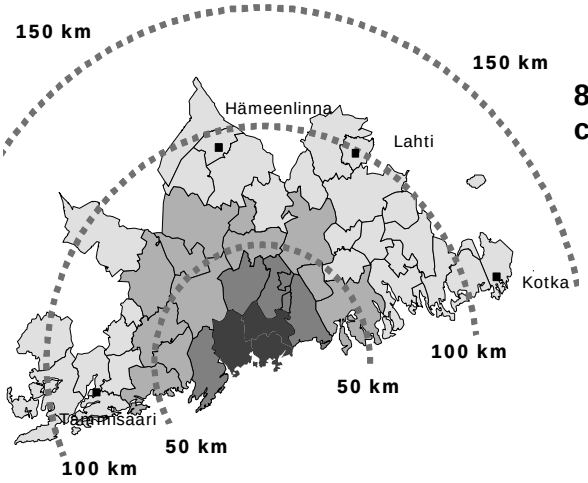
Figure 21 Commuting trip lengths in 1993 (left) and in 1999 (right), focal smoothening

1980



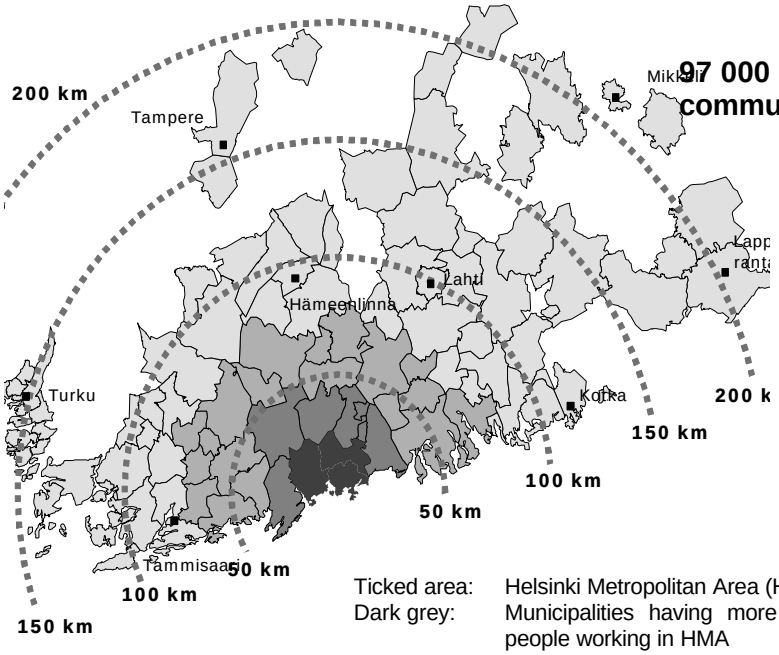
47 000 commuters to HMA (Helsinki Metropolitan Area)

1990



88 000 commuters to HMA

1999



97 000 commuters to HMA

Ticked area: Helsinki Metropolitan Area (HMA)
Dark grey: Municipalities having more than 40% of employed people working in HMA
Grey: Municipalities having 10-39,9% of employed people working in HMA
Light grey: Municipalities having 2-9,9% of employed people working in HMA

Figure 22 Commuters to Helsinki Metropolitan Area in 1980, 1990 and 1999[6]

[6] Pääkaupunkiseudun tulevaisuuskuva PKS 2025, Helsinki Metropolitan Area Council, Development Planning Unit, Helsinki 2002

4.4.2 Regional polarisation

Job self-sufficiency (the balance between job location and housing location) is low in the capital region's eastern and northern areas that are mainly residential and correspondingly high in central Helsinki and the southern part of Espoo. Many specialised activity clusters have also formed in the region; for example, activities related to the airport, IT clusters adjacent to Helsinki's inner ring road, and university related clusters in Viikki, downtown Helsinki and Otaniemi. In the outskirts, by Helsinki's outmost Ring Road III, shops demanding a lot of space are located; notably, automobile dealers, furniture stores, and shopping centres. Heavy industry is little by little being eliminated from the capital region; except for shipyards and ports.

This polarity creates more demand for commuting and cross-town travel that is difficult to orient to using public transport. Perhaps the most important impact of polarisation could, however, be that created by the specialisation of workers. For the highly educated, real alternatives for work locations in their own highly specialised fields are small. The selection of residence is restricted again by high prices and by the fact that family members typically going to work in different locations and children are going to day-care or school. Families with children have moved further from the centre of Helsinki where housing is more affordable. In practice this particularly means moving to the vicinity of the ring roads and rail lines, but also outside the built-up area.

4.4.3 Social segregation

Structural change in the 1990s, together with its related unemployment and immigration to the capital region, has increased social segregation. It is not altogether certain to what degree this development is connected to urban sprawl and to what degree to the growth of the metropolitan area. The northern part of Helsinki Metropolitan Area's relative decline in income during the 990's can be seen in the development pattern that occurred during the past decades. In the 1960-1970s people moved to these areas from the countryside. Housing construction was then fast and slated for the lower end of the market. The education level of these residents was relatively lower than other parts of the capital region. The 1990 recession hit especially hard just this group; demand for the less educated work force dropped. And now, the aged real estate does not attract affluent households to these areas.

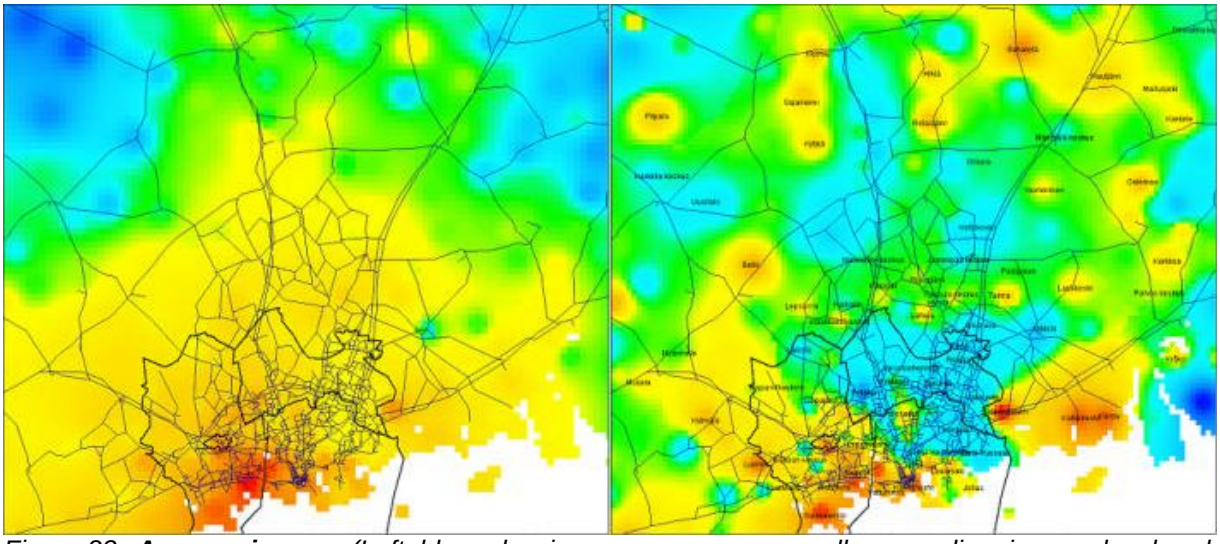


Figure 23 ***Average income*** *(Left: blue = low income areas; green, yellow =medium income level, red = high income level) and* ***average change in income*** *of wage earners living in the area in the 1990s (Right: blue = lower increase in income level than the average, green = average increase, yellow = slightly higher increase, red = considerably higher increase)*

The competition between municipalities can also be viewed as one potential factor increasing social segregation and urban sprawl. From the regional economic growth perspective it would be most cost-effective to have a land use and housing policy which would maximise tax incomes while at the same time cost the lowest possible. From this viewpoint it would be advantageous for the municipality to attract university educated, working-age, high-income residents. These people could possibly be enticed to the area by planning for spacious dwellings. In practice, municipalities, however, take the responsibility for regulating rental housing in order to restrain the growth in social segregation even if the differences in levels between municipalities are discernible.

In summary, the most important factors shaping Helsinki Metropolitan Area's city structure are:

- long term structural changes in the global and national economy
- increase in the total population of the city
- increase in household income
- decrease in travel times due to the road network and public transport services
- housing market (housing prices lower in the periphery than in the city core)
- the availability of government subsidies for rural activities (tax subsidies for commuting)
- appeal of rural ambience and of low density settlements

4.4.4 Identified impacts

Urban sprawl is viewed on a whole as an impediment to sustainable development. The most important impact of the sprawl is seen in terms of traffic congestion, environmental hazards and cost of providing public infrastructure. A compact region benefits from the existing infrastructure and services. Urban growth means more costs such as for traffic and district heating networks and public services (e.g. schools and day cares). Significant savings can be attained from a compact development just through the provision of transport infrastructure.

Although motorisation has clearly shaped societal structure, in Finland the rate of motorisation is however lower than the European average. Within the capital region the traffic has been relatively successfully directed to public transport. About 40% of the trips within Helsinki Metropolitan Area are by public transport. This is an example of "best practice" for the successful development of public transport within Helsinki Metropolitan Area.

The commuter-shed has however expanded beyond the central municipalities and in the outlying areas most of the trips are by car. Due to the size of its employment area, the largest in Finland, traffic conditions in the capital region are an anomaly compared to elsewhere in the country. In the central area, in terms of the number of residents, the traffic level of service is still acceptable, but it is clear that conditions in the outlying areas are radically different than in the rest of Finland.

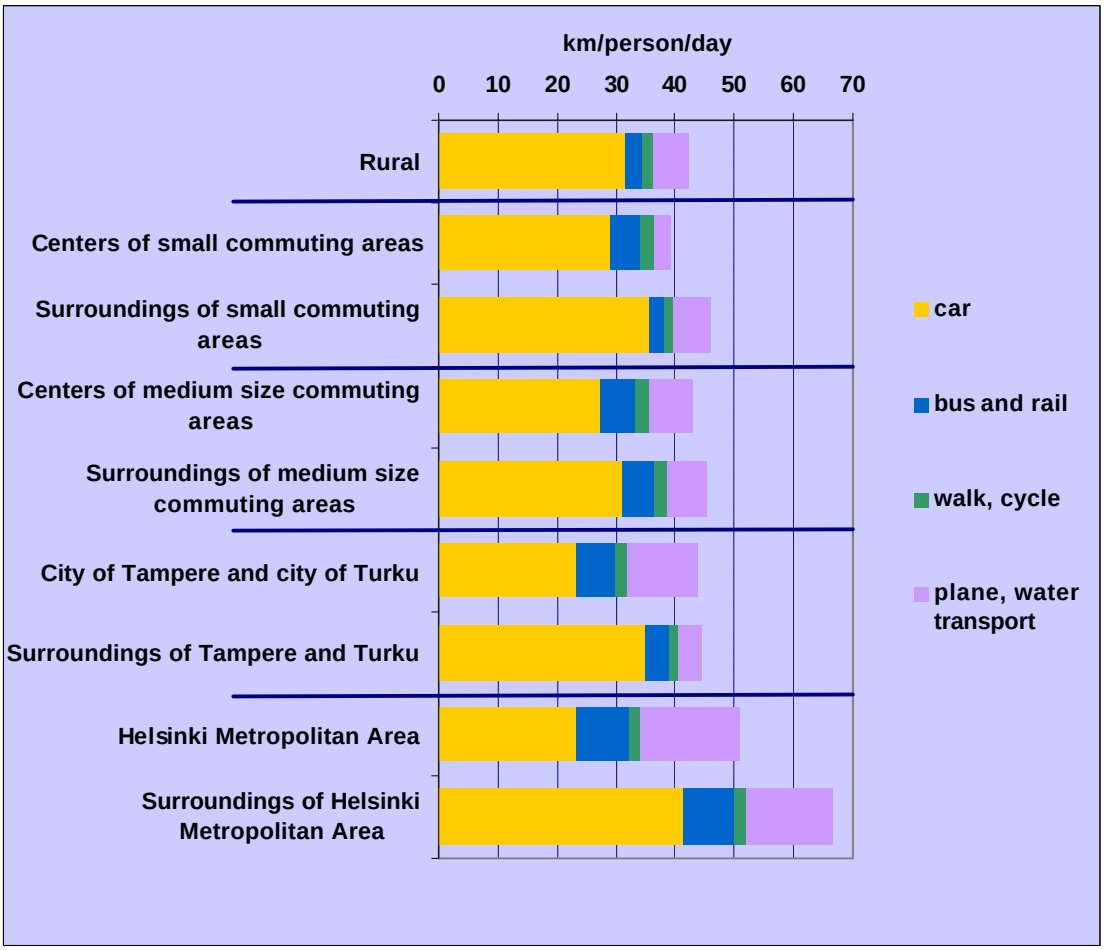


Figure 24 Average kilometres travelled per person per day[7]

From the transport growth perspective, the future challenge is to see how the capital region's growth can be guided to other urban areas or how the polarisation of work locations and residences can be managed. On the other hand, one can question whether restraining the capital region's growth is an economically viable alternative at the national level.

Sense of community affects the city structure but it is just one factor. A significant factor, particularly in the Helsinki Metropolitan Area, is the sense of rootlessness felt by those moving from the country to the city. Also crime grows in relation to city growth and to the disparity in social classes – not necessarily to the degree of urban sprawl.

4.5 Global, national and local policies and management of urban growth

4.5.1 Global, national and local policies

The dispersal of spatial and land use structure can be considered as a global societal development phenomenon, but density differences can impact locally. Global events (e.g. motorisation as well as the structural change from primary industries to goods-related industries and the service sector) occur in different countries at different rates. At the local level, however, societal structure is shaped by e.g. housing policy, city planning and transport policy.

[7] Source of data: Henkilöliikennetutkimus 1998-1999

City structure, both its past and future development, can be viewed as either a technological or political question. Technical questions such as traffic and IT development shape regional and societal structures. The price of energy determines how expensive dispersed development is and especially its related transport costs. If dispersed development and mobility are inexpensive urban sprawl will continue.

Commuter tax subsidies and energy prices have affected the spread of the commuter-shed for decades. Although the purpose has been to guarantee labour's mobility, reduce unemployment and safeguard for example Finnish heavy industry, these policies have furthered urban sprawl. In the 90's the petrol tax in Finland has already been increasing in a step-wise fashion. This policy has wide ranging impacts affecting sustainable development and transport policy goals as well as the national economy through tax revenues.

The central means to regulate congestion in the inner-urban area has been parking policy. Parking pricing and restricting the number of parking spots have restrained the traffic growth trend. This has guided the commercial and service growth to regional centres (Tapiola, Itakeskus and Tikkurila) and this can be considered as a positive impact. The parking policy is not seen as an important factor for dispersing the large department stores but speciality stores have decreased in the central area. As an offshoot, new small businesses have been created in other areas. Restricting parking supply is seen as both increasing and decreasing car traffic levels. Traffic flows to the centre have decreased and diverted elsewhere.

Rail traffic, both metro and tram, and their related city structure consolidating impacts are considered as positive. For example, the metro has over its 20-year life produced many lively and relatively compact regional centres on the east side of Helsinki. On the other hand as a side effect both road and rail traffic infrastructure development increases property values. As a consequence low wage earners are forced to move away; thereby opposing a compact city structure. There is also uncertainty about whether it is possible to succeed in the future to keep working places concentrated around rail lines.

4.5.2 Institutional structures

The Helsinki Metropolitan Area and its commuter-shed contain regional administrative units at different levels: provincial, municipal, road district and local public sector transport service systems as well as environmental officials.

Government decisions supporting the development of a compact city structure include e.g. the Helsinki Metropolitan Area Council's capital region transport system planning which crosses municipal boundaries, research, and traffic monitoring activities. The Helsinki Metropolitan Area Council's efforts in promoting Helsinki's public transport system are also considered a positive action. The Helsinki Metropolitan Area Council, though, is not a democratically elected agency and it does not have the authority to decide on land use matters.

Planning decisions, which have a large impact on the development of the city structure, are made by the municipalities. The Finnish municipalities have relative high autonomy in decision making compared to municipalities in other EU countries. Urban planning capability is rated high in these authorities. Problems though are the competition among municipalities to attract businesses and taxpayers, and the municipal autonomous decision-making on planning matters. The businesses and taxpayers locating in the capital region commuter-shed are contested over by more than 10 municipalities. Private citizens and businesses have through their own choice of location an impact on municipal decision-making.

A democratic decision-making dilemma arises from the competition between municipalities. Spatial planning develops gradually over decades and demands a long-term national policy.

Local decision-making though is short term in nature due to the brief time frame in between elections. The elimination of boundaries between areas in the capital region and peripheries would likely shift the city structure question to a longer period but the administrative structure changes would not in themselves remove the conflicts arising from local area interests.

A regional land use plan spilling over municipal boundaries is not, in the existing conditions, a significant factor, because the regional land use planning is totally dependent on politicians of local administrative units, and therefore the decisions, in most cases, can be on very general level, only. Efforts to contain urban sprawl could be possibly supported in the future through binding provincial land use plans. Existing land use plans guide general plans and furthermore the provincial plans. It should be completely the opposite; a top down approach with employment areas being planned comprehensively. Under the existing circumstances, environment and transport policy goals are usually fundamentally approved but in practice these principles are not always applied.

A lesser problem is the separation of Finnish traffic planning from land use planning. The separation occurs at school, in planning and in the administration right up to at least the ministry level. Land use planning and traffic planning education takes place in separate administrations, transport system planning and city planning are not sufficiently co-ordinated, and there are individual environment and transport and communications ministries although there is, of course, a long record of co-operation between them. Elimination of this separation in school as well at the administration level would promote city structure sustainable development along with possibilities to integrate planning and construction activities better. At the municipal level the fragmentation in management is not considered as a significant problem except in some cases there may be different interpretations and practises for applying regulations and laws.

4.6 Policy indicators and urban sprawl

During the interviews it was also asked what kind of indicators are relevant from the decision-making point of view in determining city structure and its impacts. Quite illustrative urban sprawl indicators are the growth in the average length of a work trip and traffic level of service variation relative to population change. Other somewhat more difficult to measure indicators are service accessibility and the socio-economic costs of mobility. From the local decision-making perspective, the main interests are the impacts of urban sprawl on the municipal economy in the short and long term.