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REGIONAL POLYCENTRISM

A possible route towards a regional sustainable transport system in Scania

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Preface

“I don’t know if you have ever observed this strange thing, the self. Often the more you look the more it doesn’t seem to be like it, and the more you look the more it isn’t it. It’s just like when one is lying on the grass and staring at a cloud - at first it is like a camel, then like a woman, and when you look again it becomes an old man with a long beard, but this doesn’t last because clouds are transforming every instant.”(Gao 2001).

This quote from a Chinese author illustrates my struggle with this thesis. Seeking for truth and clarity might confuse you more than you even were in the beginning. The long and winding road that is supposed to lead to truth can change your understanding of a phenomenon. The citation can also illustrate our ever changing world, what might seem true today might be false tomorrow. The long and winding road seems to me in this context more important than the goal itself. My road has not only been long and winding but also worthwhile.

I would like to thank the persons that I have interviewed for disposing their time and contributing with their thoughts and opinions. Without their participation the study wouldn’t have been able to carry through.

I would also like to give the warmest thanks to my tutor Ola Jonsson for engagement and interest for my thesis and of course also his contribution with interesting thoughts.

Abstract

The purpose of this thesis is to investigate how regional polycentrism can contribute to a more sustainable transport system in a specific region. Problems and opportunities for regional polycentrism to contribute to a sustainable transport system are also discussed. The focus of the study is the southernmost region of Sweden, which is Scania. The method is mainly qualitative, consisting of a theoretical part and an empirical part. The material for the theoretical part has been chosen from earlier studies within the research fields sustainable transport and regional structures. The empirical study is a case study that consists of analysis of different planning documents, material from travel behaviour surveys and interviews with regional planners, infrastructure planners and project managers for sustainable transport. The findings in the study are that regional polycentrism offers opportunities for increased travel with energy efficient transport means, though the historical distribution of cities are placed along the railway network. Regional polycentrism as political norm, supports integrated transport and physical planning as well as for increased collaboration between municipalities in the planning process. Problems that appear are to estimate how much spatial planning can affect peoples traveling behaviour and the problem of finding a functional form of regional governance that is necessary for further development. High costs of public transport investments are also pointed out as a problem for developing a polycentric sustainable transport system.

Keywords: sustainable transport, polycentrism, traveling behaviour, regional planning, regional structure, accessibility.

Words: 23619

Disposition

The first chapter of the thesis will present a background to the study field, the aim of the study as well as the problemformulations and limitations.

Secondly, the methodological alternatives are discussed as well as the motivation for choice of methods. References are also critically discussed.

In the third part a theoretical framework is presented. Several different components constitute the framework. It consists of a discussion of the relevant theories on the subjects of sustainable transport and regional polycentrism. The framework is an important part from which context the thesis should be understood.

Earlier research and policies are presented in the fourth part.

The fifth part presents the empirical case study. The spatial structure of the region is presented together with regional planning documents, visions and travel patterns. The material from interviews is also presented.

In the sixth chapter the analysis of the material is presented.

In the final part of the thesis concluding remarks are presented. Questions and purposes in the thesis are answered and discussed. The theoretical reasoning and framework is also discussed and compared with the analysis of the case study.

List of abbreviations

CEO – Committee on Environmental Objectives.

ESPON- European Spatial Observatory Network.

ERDF – European Regional Development Fund.

ESDP – European Spatial Development Perspective.

EU – European Union.

RDP – Regional Development Programme.

SEPA – Sweden Environmental Protection Agency.

SRC – Scania Regional Council.

Table of Contents

Preface	2
Abstract	3
Disposition	4
List of abbreviations	5
1 Introduction	8
1.1 Point of departure.....	9
1.2 Purpose.....	11
1.3 Limitations	11
2 Methodological discussion	14
2.1 Case study	14
2.1.1 Choice of case	16
2.2 Semi-structured interviews	16
2.3 Literature study and sources	18
3 Theoretical Framework	20
3.1 Sustainable development - a background to planning principles.....	20
3.1.1 Sustainability and transport	22
3.2 Polycentrism	24
3.2.1 Central Place Theory	25
3.2.2 Morphological and functional approaches.....	26
3.2.3 Polycentrism and geographical level	29
3.3 Polycentrism as a political norm.....	30
3.4 Summary	32
4 Previous research and policies	33
4.1 Planning for car-dependence.....	33
4.2 Planning for sustainable transport systems	34
4.2.1 Transition towards a sustainable transport system	36
4.2.2 Mobility management	39
4.3 Swedish environmental goals and objectives	39
4.4 Swedish transport political goals	41
4.4.1 Planning for accessibility.....	42

4.5	Summary	43
5	Empirical study – Scania.....	44
5.1	Geographical background	44
5.1.1	Population	45
5.1.2	Existing infrastructure.....	46
5.2	Regional development programme	47
5.3	Polycentric vision and infrastructure plans.....	48
5.3.1	Polycentric development in Scania.....	49
5.3.2	Regional plan for infrastructure and transport.....	53
5.3.3	Environmental challenges.....	54
5.3.4	Accessibility in Scania.....	55
5.3.5	Physical planning.....	56
5.3.6	To increase the regional cooperation.....	56
5.4	Practitioner perspectives	57
6	Analysis	62
6.1	Regional polycentrism and sustainable transport in theory and practice.....	62
6.1.1	Morphological and functional connections to regional transport.....	63
6.1.2	Regional polycentrism demands transport.....	64
6.1.3	Regional polycentrism - more transport yet sustainable.....	64
6.1.4	Regional enlargement – external centrality	66
6.1.5	The question of cooperation	67
6.1.6	The alternatives?	68
7	Conclusions and Discussion	69
7.1	Regional polycentrism and sustainable transport	69
7.2	Discussion and future research	71
	References.....	73
	Appendix.....	80

1 Introduction

Urbanisation and growing big city regions is a much debated phenomenon today. Since the middle of the 20th century larger cities are growing like agglomerations around the city core creating a region (Hårsman et al. 2009:11). Historically the growth of suburbs can be described and explained like in the work of Girouards; *Cities and People*;

“The growth of suburbs was facilitated and partly caused by better public transport, first the horse omnibuses which spread over London in increasing numbers from the 1820s, then local railway lines, horse trams and finally electric trams. To begin with, the cost of transport inevitably made them impractical for the working classes, and as big nineteenth-century cities generated large numbers of middle-class people prepared to move out to them, they developed as very extensive one-class areas. The first suburbanites were not necessarily smug, conventional or respectable. St John’s Wood, the first English suburb, had a slightly raffish and dashing aura, and the function of a suburb as a place in which to keep a mistress lasted well into the century. Nor did living in suburbs imply a rejection of the city; it was a way of getting, or trying to get, the best of both worlds” (Girouards 1985:284).

In this quote the transportation possibilities are emphasised as a cause of suburbanisation and regional enlargement. Today the interest for studying relationships between spatial characteristics and transportation possibilities is strong. Several studies, within many different study fields have been carried out on spatial structures, transportation means and traveling behaviour (See: Banister 2007; Fredricsson 2010; Gärling & Steg 2007; Klingvall & Lindelöw 2009; Naess 2004; Vilhelmson 2000; Westford 2004).

1.1 Point of departure

Transportations possibilities have given new and more opportunities for households, companies and other organizations to locate themselves outside the central city core. Mobility enables people's opportunity to choose a residence in the periphery of the city and it usually also gives improved possibilities to employment and access to different activities. The increased mobility has also led to a concentration of activities towards easily accessible communication nodes and a wipeout of local activities and services. Employment and business have been located in central nodes in the traffic system where the price for land has been low compared to the inner city business districts. The traffic planning in the post-war era focused on people's increased use of the car (Hårsman et al. 2009:15; Westford 2004:11). The car was a symbol for freedom and mobility. In the late fifties the working class unions stipulated the goal that every family should be able to afford a car. After this the car could be seen as a part of the welfare project e.g. in Sweden. Sweden fast became the country with the highest number of cars per capita in the world (Lundin 2008:24-28). The increased use of cars has come together with areal growth of cities and regions. Increased sprawl of housing and workplaces have thus naturally resulted in increased geographical distance covered in societal interactions. The car have in this way both increased its own demand but also been built into our daily lives as a precondition (Vilhelmson 2000:3). The development of public transportation made it possible to create a regional sprawl around the public transportation stations (Hårsman et al. 2009:16; Westford 2004:11). In the late 1980s the demand for a reduction of car use in the city became a topic on the political agenda. The reasons were mainly two. One of them was that it was hard to find land to build new roads, which did not conflict with other private or societal interests. The other reason was the environmental and health aspects like exhaust emissions and noise (Westford 2004:12).

Today environmental and health aspects are an increasing concern within planning. Within traffic planning environmental aspects have mostly been focused on solving the problem with economic incitements and charges as well as technology development of vehicles and fuel (Westford 2004:12). There are though several studies that show that technical improvements designed to reduce negative impacts of cars risk to be offset by a future total increase in car use (Vilhelmson 2007:147). This means that the environmental problems caused by car use can't be reduced by means of technology aiming at reducing the negative impact per vehicle. Change towards lower volumes of traffic is also needed. Polices are therefore

important and must focus on the demand for car use (Gärling & Steg 2007:1).

To encourage citizens to travel by foot, public transports or by cycle are common goals in planning. Transportation with cars is challenged by environmental goals and strategies and therefore it becomes interesting to look closer into how people's traveling patterns can be changed preferably without a loss of welfare. With increasing accessibility in a region or a city; people, activities and services that are located close to each other could possibly lead to a decrease in travelling. Shorter distances could result in slower and more environmental friendly traveling (Vilhlemson 2000:3-4). To meet the threats of car-traffic and the environmental problems a regional development towards a polycentric structure has been suggested as a solution (Bergman 2011:62; Region Skåne 2011 & Stockholms läns landsting 2010). Polycentrism is generally understood as the spatial distribution of urban centres in a defined area that can be regional, national or transnational. Further conceptualisation seems to be diverse (Nordregio 2006:13; Kloosterman & Musterd 2001:623; Riguelle et al. 2007:195; Burger & Meijers 2011:1144). As a consequence of change in society of political, technological and economical structures the interaction between different geographical and political levels have changed. When it comes to governing, the regional level has gained great importance with a coordinating role of strategic planning (May & Perry 2007:1040; Jones 2001:1188). However, the spatial structure can be very complex. It is the physical result of the subtle interactions over centuries between land markets, topography, infrastructure, regulations, and taxation. It is also important to emphasize the fact that strategies are not unproblematic due to the fact that spatial structure is not automatically following planning policies. Spatial characteristics are thus of vital importance since it can have relevant impacts on for example economy, society and environment (Bertaud & Malpessi 2003:3). Therefore it becomes important to investigate problems and opportunities of planning policies to affect a spatial structure in desirable way.

1.2 Purpose

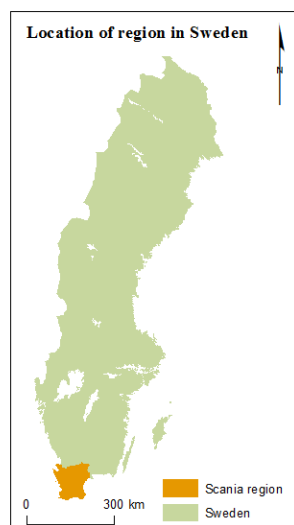
The purpose of this study is to investigate how regional polycentrism can contribute to a sustainable transport system in a region. To fulfil the purpose of this study the following questions need to be answered.

- What is regional polycentrism and how can it be connected to a sustainable transport system?
- What are the opportunities and problems for regional polycentrism to contribute to a sustainable transport system?

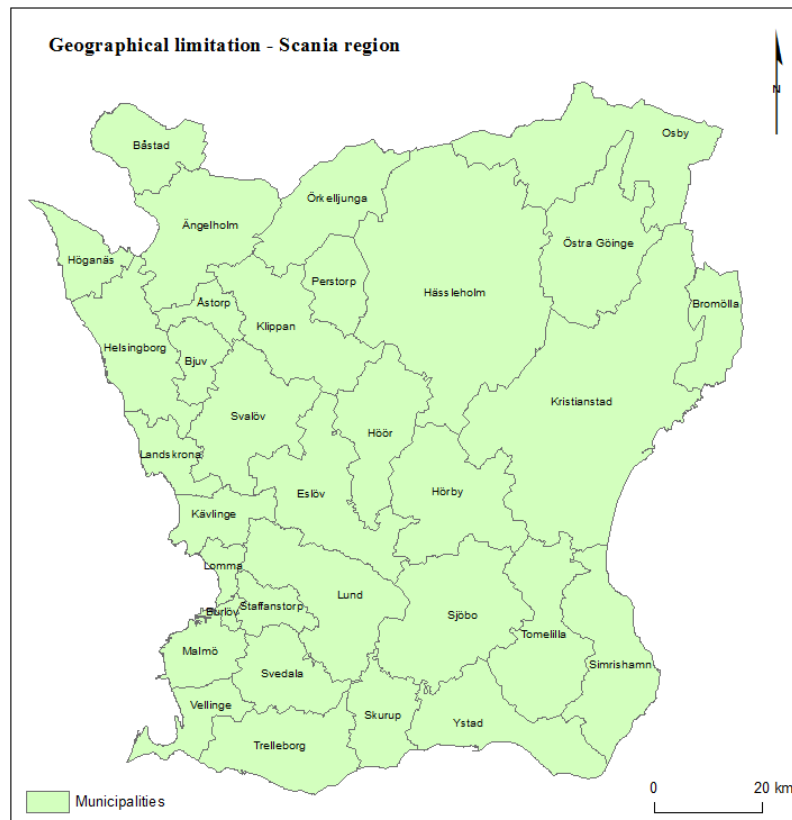
These two questions will be answered by a case study of the southernmost region of Sweden, Scania. Furthermore, a broad and open discussion about our physical structure of our society is of vital importance to change it for the better and live up to demands on improved living conditions. This study aims at contribute to that discussion.

1.3 Limitations

This thesis is geographically limited to the spatial structure of Scania. The material analysed in the study only concerns Scania. The Scania regional council (SRC) is an important coordinating institution for polycentric development in Scania therefore the study will be limited to the information and practical work about polycentrism from this institution.



Map 1: Location of region in Sweden. Map Source: Department of Human Geography, Lund University. Data Source: Department of Human Geography, Lund University. Modified by: Landgren 2012-05-01.



Map 2: Geographical limitation – Scania Region. Map Source: Department of Human Geography, Lund University. Data Source: Department of Human Geography, Lund University. Modified by: Landgren 2012-05-01.

The theoretical points of departure within this study are the current views on sustainable transport systems and polycentric regional structures. These two objects and their possible combination will therefore be in focus for the thesis. A regional polycentric structure often meets other combinations and goals but in this study the focus is on sustainable transports. Further, polycentrism is considered at different geographical levels. This study focuses on the regional level.

Another limitation with the study is a travel behaviour investigation, that could have given more depth to the study, will not be done. To make an extensive research of traveling behaviours in polycentric regions needs either data over a long time period or accessible data over two different regions. It will also be difficult to see changes in travel patterns after an implementation of polycentrism as a policy though polycentrism recently was introduced as a concept within planning. To carry out a travel behaviour study would be preferable in a future continuation of this study but with regard to the range of this study and the period of time given it rely on data and results from earlier investigations on travel behavioural studies and theories. It should be mentioned that the distinction between travel pattern and travel behaviour should be mentioned before moving on to the theoretical framework. Travel patterns are the sum of all aggregated travel behaviour. Travel behaviour is every individual's separate decision. Since travel patterns are based on peoples travel behaviours there is a need for understanding peoples individual decision-making (Røe 2000:12).

Further the regional enlargement process is in this thesis limited to the process that happens when technology advances enables greater accessibility to a labour market for a population. When the commuting possibilities increase a regional enlargement takes place. When local markets are related to each other in a commuting context the municipalities are tied together functionally and build larger labour market regions. Municipalities joining together administratively to build larger regions should not be confused with this process (Torége et al. 2008:12). The enlargement process can be seen as an effect of the technology advancement and the restructuring of the economic system has also been followed by changes in spatial structures (May & Perry 2007:1040).

2 Methodological discussion

Geography is a diverse subject that includes studies of human behaviour and the physical environment. The subject also stretches over the whole scale of philosophical approaches, from positivism to poststructuralism. The choice of method can in this case be both qualitative and quantitative or a combination of the two (Clifford & Valentine 2003:1). The method in this study has mainly qualitative characteristics.

Though to be able to analyse the case in this thesis from different perspectives, analysis of both data and text have been used. The research design here will be of intensive characteristics. Scania will be the case region and the emphasis is on describing details on the case. This type of research is often linked to realistic approaches in methodology from which this study is no exception (Clifford & Valentine 2003:10-12).

Intensive and extensive research design might seem like a question of scale or the question of depth or breadth in the study. Yet, the different approaches ask different questions using different techniques and methods for answering the questions. The objects are also defined differently in each of the two designs. In this study and other intensive studies the primary questions concern how a fundamental process works out in a particular case or limited number of cases (Sayer 1992:242-243).

2.1 Case study

All geographical research is not aiming towards quantitative rigorous studies about large populations or developing theories and models for universal legitimacy. Some geographers may limit their consideration small areas, short periods of time, small groups or even individual places and people. The principal underlying approach within most geographical research is to make useful generalizations. Explaining patterns, relations and changes might help understand human and physical worlds around us (Rice 2003:225). The main criticism for case studies is that it can't generalise to explain patterns. There is no formal basis for confirming the conclusions made about a population on the basis of a single sample. The analytic task of drawing conclusions on the findings and material is a matter of intuitive

decision by the researcher herself. This causes major problems with subjectivity (Ibid. 2003:225). From this perspective it can though be hard to argue for the importance of case studies. Thus, there are arguments that can meet the criticism of case studies (Flyvbjerg 2006). Further, there are benefits from the case study that can provide a stronger motivation than the limitations of such a study (Rice 2003:226). Flyvbjerg (2006:226-227) meets the generalisation problem with the argument that generalising is only one out of several practical skills that researchers need in order to carry out any study at all. Formal generalisation is only one of many ways by which people can achieve and accumulate knowledge. Only because knowledge cannot be generalised it doesn't mean that it cannot enter into the process of knowledge accumulation within a given field or in a society. The generalisation problem is also met by the argument that case studies fits perfectly to test for what Karl Popper called the falsification. This is one of the most demanding tests to which a scientific position can be exposed. If there is only one observation that doesn't fit in the scientific hypothesis the hypothesis is considered invalid and must therefore be revised or rejected. From this point of view it can be said that it is possible to generalise from a single case and the strength of showing an example is undervalued (Flyvbjerg 2006:228).

Case studies are suitable for generating or modifying a model or hypothesis. A case study gives the opportunity to ask essentially different questions in an essentially different way than in extensive research. Some researchers argue that the choice of case and carefully planning of the case are the most important factors for making case studies offer more important advantages than within extensive research (Rice 2003:226). Flyvbjerg (2006:2299) argues that case studies are well suited for generating a hypothesis yet case studies are not limited to this. Case studies become the first step in a research process that extensive research in the later process can lean back on. Nevertheless if the possibility to generalise with case studies exists the activity is not only limited to hypothesis generating but also hypothesis testing and theory building.

There are as mentioned advantages with case studies that might be considered stronger than the limitations. Even though the objective with case studies is considered to explain the mechanism that generates the patterns that are the outcome of extensive studies one could argue for the benefits of such a study. Case studies should be judged on their quality to support the theoretical reasoning they generate and not their representativeness (Rice 2003:226). The generalisation problem would in this way be solved arguing that generalising is not the main objective.

2.1.1 Choice of case

Earlier studies can show us how different regions have different spatial structures. There are several examples of different regions with diverse spatial structures. Lately, several regions in Europe have been highlighting polycentrism either as a goal or vision in their regional development programmes (See for example: Region Skåne 2011 & Stockholms läns landsting). Scania is a part of the Oresund Region that has earlier been referred to as a polycentric region, which no other region in Sweden has been (Nordregio 2006:23). Scania has polycentrism as a regional vision for a long-term sustainable development (Region Skåne 2009). This makes Scania an exception of spatial structure in Sweden and Scania becomes a unique and interesting case of regional polycentrism. From the sustainability perspective it becomes interesting to investigate how for example transportation problems in cities and regions can be solved with regional polycentrism in a long-term perspective.

2.2 Semi-structured interviews

One part of the study is to carry out semi-structured interviews with actors involved in the planning process. The choice of respondents has been made upon their position and role in the regional planning process. As is usual within semi-structured interviews, the respondents are chosen on the basis of their experience related to the research topic. The interviews are not supposed to be representative but instead to understand how individual people experience something (Longhurst 2003:123). Responsible planners or project leaders over a regional planning project have been chosen to answer question about problems and opportunities when combining a polycentric regional structure with a sustainable transport system at a regional level. The interviews will also give a perspective on how theories and earlier research are interpreted in practical work and policies.

The respondents have been;

- Therese Andersson, branch head and project manager for regional structure at the SRC.
- Veronika Sörvik, planner at the section for planning strategies at the SRC.
- Moa Åhnberg, planner at the section for planning strategies at the SRC.
- Britt Carlsson-Green, project coordinator for sustainable travel and transportation in Scania. The SRC, the county administrative board and the Swedish transportation administration supports the project. The project is partly supported by several different actors inter alia the Swedish environmental protection agency (SEPA) and the European regional development fund (ERDF).

These interviews have also been complemented by a telephone interview with;

- Mats Petersson, branch head for transports and infrastructure at SRC.

The interviews have been carried out between the 19th and 27th of April 2012 and the interview guides are attached at the end of this work.

In the last few decades an interest has arisen regarding the validity of qualitative methods, including semi-structured interviews. Many geographers have, as mentioned above moved towards intensive methods to examine power relations and social process constituted in geographical patterns (Longhurst 2003:118). Semi-structured interviews can be used as the only method in a study or as a supplement to other methods. In this study the interviews constitute a supplement to the text analysis of documents and statistics. Clearly the study could have been extended with more interviews to bring more depth to the study as well as highlighting more perspectives. However, the chosen practitioners are all actively working with questions that concern regional polycentrism and/or sustainable transport, which will illustrate the different perspectives and in future research this study can be continued bringing in further perspectives. The critical steps for the researches using semi-structured interviews is to formulate questions, select participants, choose a location and transcribe data while at the same time remaining aware of the ethical issues and power relations involved in qualitative research. There are no strict rules for constructing a semi-structured interview. Semi-structured interviews should be seen as social interaction (Ibid. 2003:120-121).

2.3 Literature study and sources

The literature is relevant to the present study since it compose a fundamental part of the theoretical discussion. The part that consists of sustainable transport theories is based up on planning norms and why there is an attempt to directly control the transport system in a certain way. The work of Banister (2005 & 2008) constitutes a fundamental part of the discussion of sustainable transport in the study. The concept polycentrism is explored from literature of previous research on the topic. Previous research on polycentrism consequently refers to Christaller's central place theory (Christaller 1933), which is one of the historically important theories to explain polycentrism and therefore also indispensable in a study concerning polycentrism. In this study central place theory and Perroux's (1950) growth pole theory together constitute the basic frame of theoretical discussion. Articles on the topic have been used to reflect on different perspectives on polycentrism.

As a part of the study the current environmental goals in Sweden and the goals for sustainable transport are presented, as well as other policy documents. Some of this information is collected from websites. The websites can give important information on policies and goals established by governments, institutions or organisations. The institutions and organisations are judged as reliable and therefore also the information on their websites. The effort has been to balance different perspectives of the theories and approaches.

The literature that has been used in the empirical study is different types of regional planning documents. The regional development programme (RDP), the plan for infrastructure and transportation and a report on polycentrism in Scania are the analysed documents. SRC has published all documents. Using primary sources from a political organisation or equivalent is critical from the point of view that the organisation or institution has an interest to self-guard. The important role of the researcher is here to critically study the material.

Additionally I have participated at a discussion meeting for representatives from all municipalities in Scania. The meeting was voluntary and there were about thirty participants from the thirty-three municipalities in Scania. It is not clear though how many municipalities that were represented. The meeting concerned the municipalities' comprehensive plans (see appendix for further explanation) and the work for a connection of all the municipalities' plans. The meeting was a part of a dialogue between the regional department and the municipalities. Participating at the meeting aimed at giving an understanding for the dialogue process and enhanced cooperation between the municipalities and between the local and regional political levels. The critical point from a

methodological perspective is that representatives from municipalities voluntarily choose to participate, which means that some municipalities might not have been represented at the meeting for an unknown reason. The meeting will not be declared for in the empirical material, though thoughts and ideas that were brought up during the meeting will be discussed in the final discussion of the thesis.

Additionally data have been collected from a travel behavioural survey that was carried out during the autumn in Scania 2007 by Trivector Traffic AB. The data considers travels from within and to/from Scania. Yet the geographical limitation is uniquely Scania. The figures are used to illustrate general patterns and these figures can still indicate a general pattern or relation, which is here important and which is here the purpose.

3 Theoretical Framework

The theoretical framework consists of theories and approaches that are important to explain the findings in the following empirical material. The theoretical points of departure are further important to form the context on which this thesis is based. Firstly, the concept of sustainability is presented and how transport can be understood within sustainability.

Secondly, polycentrism and regional polycentrism are conceptualised and defined.

3.1 Sustainable development - a background to planning principles

This part of the thesis is supposed to give a background of planning principles. An important part of this chapter is also to illustrate the connection of transport and sustainability.

During the 1980's the awareness of the human impacts on the environment and the negative effect of car use increased (Banister 2005:2,11). In the struggle with the environmental problems and how to achieve a more balanced development the World Commission on Environment and Development came out with a report named "Our Common Future", the so called Bruntland report (1988). In the report the concept of "sustainable development" was for the first time launched (Banister 2005:2; Jonsson & Wahl 2008:39-40). The definition of sustainable development is according to the Bruntland report "[...] *meeting the needs of the present generation without compromising the ability of future generations to meet their needs*" (Keiner 2006:2). Sustainable development has been widely interpreted by different institutions and actors in society (Keiner 2006:2). The most common discourse of sustainable development distinguishes between three essential extents of sustainability, the ecological, the social and the economic (Ibid. 2006:6). In practice for planners and decision-makers there are in many cases a dilemma since future solutions of sustainable development might conflict with each other. Solutions that are economically sustainable might not be sustainable in other respects (Campbell 1996:297-296). For this reason a conclusion can be drawn that a compromise between the three extents is needed to achieve

sustainability. Gremmen and Jacobs (1997:58,62) suggest that a mutual understanding for sustainability is necessary instead of cooperation. Sustainability will not be achieved as long as the understanding of the concept is different from the different extents, which is the dilemma of sustainability. Figure one illustrates the eventual conflicts that might occur when trying to balance the three different extents of sustainability.

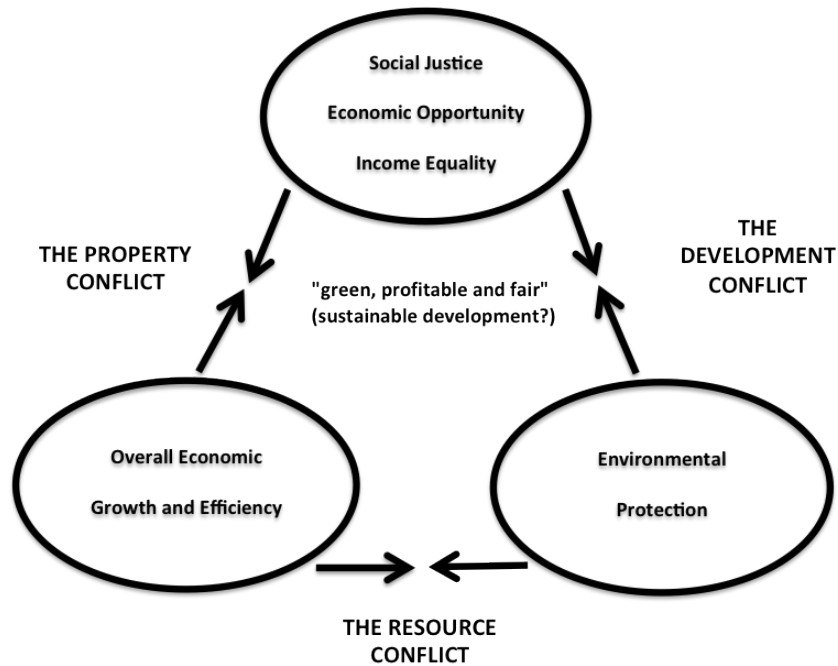


Figure 1: The extents of sustainability and the conflicting future goals.
Source: Campbell 1996:298. Explanations added by the author of this paper.

This triangle does not only show the conflicts that might occur. It also shows the potential corresponding interests. The conflicts are according to Campbell unavoidable consequently planners should act like arbitrators while the interests are giving the planners the opportunity to build coalitions in a specific question (Campbell 1996:197). The economic development planner supports thoughts of competition between cities and emphasizes the relations between production, consumption, innovation and distribution. The environmental planner is interested in consumer and resources relations and the production of wastes as well as the competition is between man and nature. The equity planner sees the conflict over distribution of resources, services and opportunities as the most important problems. The competition is here between social groups (Campbell 1996:297-298).

In this way it is possible to separate the dimensions and talk about ‘sustainable environmental development’, ‘sustainable economic development’ and ‘sustainable social development’ as independent domains of action (Edén et al. 2000:260).

The sustainability discourse has been more and more dominating in urban and regional planning strategies since the 1990's. Central governments are more than ever promoting sustainability programs specifically in terms of the environment (Kruger & Gibbs 2007:1). Campbell (1996:301) claims that sustainability has won the battle of big public ideas. The important task that remains is to narrow the gap between theory and practice. There is also a discussion whether planners should have a leading or following role in resolving sustainability. One possible option leading towards sustainability would be for community planners and environmental planners to collaborate more (Campbell 1996:309). It has become almost impossible today to read a planning document produced by a local or central government that doesn't mention sustainable development (Campbell 2000:259). In the last decade a large number of countries have adopted some kind of initiative or program for sustainable development. Words like sustainable transport; sustainable mobility, sustainable economy and sustainable traveling have since the introduction of sustainability programs been very important for urban and regional planning (Kruger & Gibbs 2007:1).

3.1.1 Sustainability and transport

Transport plays an important role in the world economy, both within countries and between countries. There are production related reasons and reasons related to travel. The production related transport is for example specialisation, which contributes to productivity but inevitably demands transport flows. The travel related to transportation is needed for social interaction with friends and relatives as well as activities like culture and sports. Given the desire to separate workplaces and habitations the trips for going to work (commuting) also become transport related activity (van Nunen et al. 2011:1). With elimination of trade restrictions at borders, like for example the European Union (EU) the increase in substantial welfare and benefits have been noticed since transport and trade become cheaper. It is important to observe that these institutional changes have had beneficial impact on the social and economic extents within the sustainability concept, yet probably not on the environmental side though it meant a strong increase in transport pollution. This can illustrate that it is not easy to balance all three parts of sustainability. It can also illustrate that it is probably more difficult to achieve major improvement in the environmental domain than the two other domains considering transport (Ibid. 2011:5).

The transport sector contributes to a great share of the total amount of pollution. Congestion problems are becoming more and more evident; pedestrians have to leave more space for car traffic and the land use for roads disrupt the landscape (Jonsson & Wahl 2008:40). In 1987 it was

realized that a more aggressive approach was needed for the economic domination not to prevail within the triangle of sustainability. The trigger of fundamental change in priorities was the concern over the global environment and in particular global warming and other issues such as acid rain (Banister 2005:3). Global warming and climate change is several times proven to take place with a small but consistent increase in temperature across the globe. Problems like sea level rises, crop failures and threats to biodiversity are examples that have increased the concern. Some of them are directly caused by human activity but for some of the reasons that caused the problems are not obvious (Banister 2005:1). It is clear though that this process of global warming needs to be stabilised and a substantial reduction of carbon consumption is necessary, since carbon consumption is the principle cause of global warming. The total amount of the main global warming gas CO₂ emissions increased by sixty per cent between 1970 and 2001. The transport share of this total has also increased from approximately nineteen to approximately twenty-nine per cent (Ibid. 2005:1). Within the whole traffic sector in Sweden, the road traffic causes the majority of the CO₂ emissions (Ericsson & Ahlström 2008:153-154, 163). It is also shown that the daily travel, accounts for about forty-five per cent and energy use and CO₂ emissions in Sweden (Åkerman & Höjer 2006:1955). The European Commission has decided that the European goal is to reduce the greenhouse gas emissions with twenty per cent until 2020 (compared to 1990) (Ericsson & Ahlström 2008:172). The CO₂ emissions conduct an essential part of the greenhouse gas emissions and are one of the largest threats from car traffic (Ericsson & Ahlström 2008:162).

These findings indicate that a fundamental part for approaching a sustainable transport system is to reduce car-traffic so that the European goals can be met. Transportation should in the context of this thesis be approached as one factor out of several others that has effect on the environment. The need for underlining the environmental problems caused by transport becomes from this perspective essential for achieving a sustainable transport system.

3.2 Polycentrism

Polycentrism is generally understood as the spatial distribution of urban centres in a defined area that can be regional, national or transnational. More concrete definition seems to be diverse (Nordregio 2006:13; Kloosterman & Musterd 2001:623; Meijers 2008:1322; Riguelle et al. 2007:195). The concept is though used among planners today and is also included in visions for regions (See for example: Stockholms läns landsting 2010 & Region Skåne 2011). After a first launch of a concept, it can progress into different phases. In the first phase, many interpretations of the concept are offered. In the second phase, certain of these interpretations are gaining a better position and become dominant. In the last phase, the concept broadens once again when the social reality is too difficult to deal with to fit precisely within any of these theoretical definitions of the concept. Since polycentrism is a concept with many interpretations, further research about polycentrism is needed to move forward with the definition (Kloosterman & Musterd 2001:623).

As a point of departure one specific approach can highlight the rise of polycentrism. Nearly to decades ago a researcher named Perroux launched the theory of growth poles. The growth pole was according to Perroux an urban centre in what he called economic space (Parr 2005:173). Perroux was trying to explain the emergence of the growth pole with an emphasis on innovating entrepreneurs, strong and impelled industries, the subordinated industries that were linked to the stronger industries and the complexity of industries. In a first place the spatial distribution of growth poles was not a major focus for Perroux (Ibid. 2005:176-177). Later, Perroux stressed the geographical aspects of growth poles only as one out of several possible perspectives. In this later stage the economic space is complemented with a geonomic space. In the geonomic space *“men and groups of men, objects and groups of objects, economically characterized in other respects, find a place here; they can be treated by geonomic localizations (...)”*(Perroux 1950:92) This localisation pattern would give rise to economic consequences and locations could be related to each other in geonomic relations in forms of lines, points and volumes (Perroux 1950:92-93).

What the growth pole theory couldn't explain was for example why a clearly identified industry could be linked to a subordinated industry elsewhere inside or outside a region (Parr 2005:177). Another criticism is that clustering in economic space didn't come with a corresponding geographical clustering and vice versa. Some researchers have also criticised the approach of growth poles since it only explains the static relationship of growth poles, which is not always satisfactory when it comes to spatial aspect of regional growth (Ibid. 2005:184). A theory that is connected to the growth pole theory, and which manages to complement it,

is the central place theory. It can be said this theory better can explain the spatial structure and the spatial organisation of a particular range of economic activity within a region (Ibid. 2005:185).

3.2.1 Central Place Theory

The principal problem of Christaller's work was to understand if there are laws that determine the number, sizes and distributions of towns (Christaller 1966:1). In the investigation of these problems Christaller finds a hierarchy of towns or central places. These central places will be located where centrality of settlement and the variety of goods and services it provides are best correlated (Burger & Meijers 2011:1129). Because of the unequal distribution of population over a region, the population centre is as a rule the central place. Distinction is made between central goods of higher order that are produced and offered at central places with higher order and central goods of lower order that are produced and offered at a central place with lower order but also at all places of higher order (Christaller 1966:19). Consequently, lower order places are dependent on higher order places for the provision of goods and services. Only a minor proportion of places will be self-reliant in the sense that they offer a full range of goods. Lower order places do not provide goods and services to the higher order places and trade between lower orders centres are seen as unnecessary as these centres provides the same goods and services (Burger & Meijers 2011:1129-1130). Naess (2005:177) gives an example of how the population base, which is essential for retail and services to run beneficially, can vary between different types of services and commodities. For example, a generalist doctor doesn't need as large population as a brain surgeon, since the share of the population treated by the generalist throughout a year is far higher than the fraction that need to operate their brains. Functions like retail, health services, education, cultural activities and entertainment can thus be ranked according to the size of geographical area covered by each facility. The different sizes of the surrounding areas form the base of a hierarchy of centres. The largest centre contain both highly specialized functions and functions that demand a smaller population base. The smallest centres do only have the functions that can sustain with a small population base (Naess 2005:177). This is also the point for optimal correlation that was mentioned before. Figure two is showing the market areas in a system of central places. Christaller's theory focuses on rural regions in general and in city-hinterland relationships in particular and is a very detailed theory about spatial organisation of the local economy (Burger & Meijers 2011:1130). The scheme below, in figure two, shows how central place theory can illustrate a hierarchy of cities or market places.

Christaller's theory has been developed further by applying it on the internal distribution of centres in a city. There are several centres within a city, specifically in the larger cities with different local centres that can offer a different amount and type of workplaces, shops and other facilities (Naess 2005:177). Since the theory has been applied in wider scale it is important to pinpoint at which geographical level the theory is applied on.

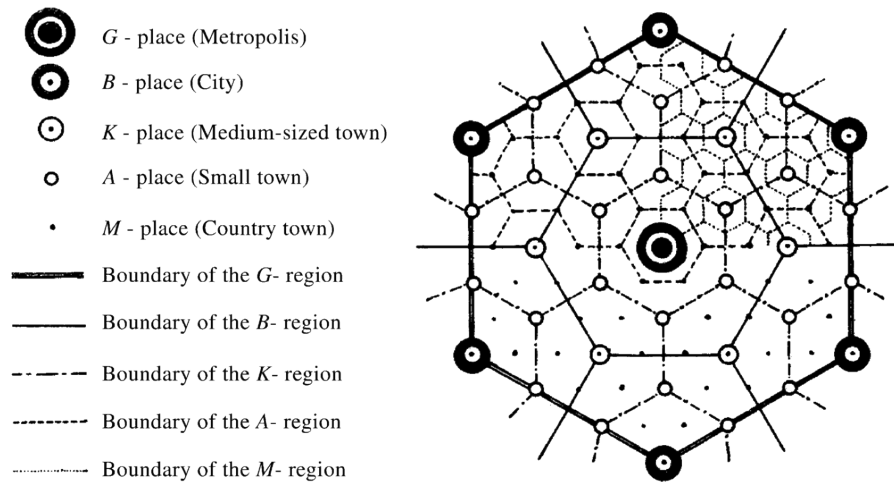


Figure 2: Christaller's scheme of market areas in a system of central places. Source: Christaller 1966:66; Naess 2005:177. Explanations added by the author of this paper.

Christaller's theory has been subject to some critics (Ibid. 2005:177). One of them is the fact that actual settlements often vary from the theory. An example that Christaller himself brings up is that cities are not often situated on mountain peaks even though they seem isolated and at a distance from the other city centres makes it according to the theory place where a city should be located. The criticism has led to a general acceptance for central place theory as a partial explanation of centre formations among researchers (Ibid. 2005:177).

3.2.2 Morphological and functional approaches

Polycentrism has been interpreted in several different ways; there is no clear consensus of how to measure polycentrism even though it is an uprising topic for economist and geographers. One major problem that arises when trying to measure polycentrism is whether the nature of polycentrism is morphological or functional.

Burger and Meijers (2011:1131-1132) extend Christaller's theory in an attempt to measure polycentrism today. Their basic concept of the extended theory is that no urban or regional system is operating on its own without influence of externalities. They claim that in today's economy all urban

systems are influenced by other urban systems, at least to some extent. The important difference from central place theory is that cities are not only ranked by their size and centrality but also by their nodality. The centrality in a closed urban system can be defined as follow

$$C_c = N_c - L_c$$

C_c is here the represents the *centrality* which is the surplus of importance of incoming flows from other places. N_c represents *nodality* which is the absolute importance of a centre base on internal and incoming external flows. L_c represents the local importance of internal flows. As an example C_c can be the total amount of commuters in to centre c . N_c is the total amount of employment in central c and L_c is the amount of employees that also live within centre c (Burger & Meijers 2011:1131). The extended definition is on the other hand

$$C_{ci} = N_c - C_{ce} - L_c$$

Where C_{ci} represents the *internal centrality* that is the surplus of importance of a centre based on incoming flows from other centres within the same urban system. N_c nodality in centre c and C_{ce} the *external centrality*, which means the surplus of importance of a centre, based on incoming flows from places outside the urban system. L_c represents the importance of internal flows. In this sense C_{ci} and C_{ce} are together the total centrality of a centre (Burger & Meijers 2011:1132). The distinction between nodality and centrality can in this case illustrate the two approaches of morphological and functional approaches.

The morphological approach of polycentrism is the distribution of demographic structures such as population density. Demographic factors are followed by building and economical activities, which therefore also can be seen as indicators of polycentrism. The functional approach to polycentrism is seen as the interaction between the different centres (Nordregio 2006:13-14).

The two different approaches to polycentrism are illustrated in figure 3. Functional polycentrism can never be equated with the morphological approach. However, those who follow the functional approach include rather than reject the morphological approach. The functional approach can be seen as an extended version of the morphological approach including the functional interactions between the centres. Like the morphological approach, which is concerned with the distribution with respect of the importance of urban centres, there is little focus on the existence of the relationships between centres. Instead the focus is on the balanced distribution of functional relationships. The more multidirectional the pattern is the more polycentrism in a region (Burger & Meijers 2011:1133).

Nodality provides the measurement of morphological polycentrism and centrality provides the measurement of functional polycentrism (Ibid. 2001:1134). Further, synergies between centres will not be achieved without linkages between them. In a policy context that means that one can't have a functionally integrated region without linkages resulting from economic complementarities between the different centres (Burger & Meijers 2011:1134). Figure three is illustrating the difference between morphological and functional polycentrism.

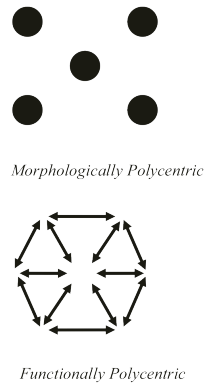


Figure 3: Morphological polycentrism versus functional polycentrism. Source: Burger & Meijers 2011:1134. Explanations added by the author of this paper.

Polycentrism has been measured in a couple of different ways since the definition is vague. Nevertheless, quantitative geo-statistical methods are often used to identify sub-centres within larger city regions (Riguelle et al. 2007:197). Monocentrism is one structure that can contrast polycentrism. Monocentrism is in opposite to polycentrism described as several centres with a focus on the hierarchy between them and not the balance. Figure four shows morphological monocentrism and functional monocentrism to contrast polycentrism (Burger & Meijers 2011:1134).

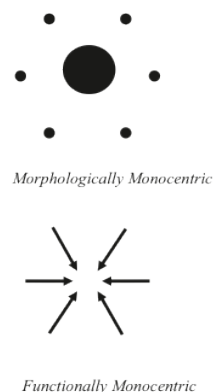


Figure 4: Morphological monocentrism versus functional monocentrism. Source: Burger & Meijers 2011:1134. Explanations added by the author of this paper.

3.2.3 Polycentrism and geographical level

When discussing polycentrism the level of scale should be considered. Polycentrism can appear at international, national or regional level. It refers both to inter-urban and intra-urban patterns. Even if the patterns are similar at different scales the causes and consequences of the development might differ (Riguelle et al. 2007:195).

This case study considers the regional geographical level, at which there is a distinction between different regional polycentric structures. Polycentricism can either refer to intra-urban patterns or to inter-urban patterns. The first case, intra-urban patterns exist where economic activities and population are accumulated in urban agglomerations and covers the functional activities around a city-core. Examples of cities with an intra-urban pattern would be Los Angeles, Paris and London. In a Nordic context this pattern can be identified in Oslo, Åbo and Gothenburg (Kloosterman & Musterd 2001:624; Nordregio 2006:23). Inter-urban pattern on the other hand suggests a network of smaller cities that are not spread out randomly but are relatively close in proximity. In this model the agglomerations and clusters do not refer to the nearest suburbs of a great city but rather the inter-urban configurations of a region with the following characteristics;

“They consist of a number of historically distinct cities. They lack a clear leading city which dominates in political, economic, cultural and other aspects (although inevitably, one of these cities has the largest number of inhabitants). Instead, they tend to consist of small number of larger cities that do not differ that much in terms of size or overall economic importance, together with a greater number of smaller cities. The cities making up these polycentric configurations are located in more or less proximity (mainly within maximum commuting distance) and, thus are concentrated in one specific part of the country. These cities are not only spatial distinct but also constitute independent political entities.”(Kloosterman & Musterd 2001:628).

In Europe the Dutch Randstad and the German Rhine-Ruhr area are examples of such polycentric urban regions. In a Nordic context the Oresund Region is the only example of such a spatial structure. The metropolitan areas Stockholm and Helsinki can be placed in between these two models because they affect the surrounding cities to a large extent but at the same time show an increasing tendency towards de-concentration within the urban landscape (Nordregio 2006:23).

3.3 Polycentrism as a political norm

From the analytical perspective polycentrism can be identified in early theories of spatial structure with starting point in the earlier described theories (Vandermotten et al. 2008:1207). This was at the time a description of European structural patterns and was based upon empirical observations of a general industrial economy and society typical of south Germany. Christaller viewed his work as analysing an object. This theory has later turned into the ideology for spatial planning within the EU (Ibid. 2008:1207). The term polycentrism was though founded by the policy-makers in the EU, when forming 'the best' spatial organization plan for Europe. The conceptualisation of polycentrism as a planning policy or norm consists of several critical aspects. Polycentrism include both focus on the larger cities but also investments in the lagging or peripheral regions. The concept was coined in 1999 when the European ministers for spatial planning adopted the policy document European Spatial Development Perspective (ESDP). The policy introduced several new key concepts within planning that can be seen as trendy and metaphoric. One of these concepts was in fact polycentrism, which has been widely debated by planners, decisions makers and even researchers. (Nordregio 2006:13; Kloosterman & Musterd 2001:623). On the same matter, there is also a research network founded by the European Commission and the Member States, European Spatial Observatory Network (ESPON). It was at first launched as a decision aid-program (Vandermotten et al. 2008:1208). ESPON aspires to achieve a better understanding of spatial trends, problems and opportunities on a European scale. To illustrate the findings newly developed indicators and mapping techniques are used to provide tools and instruments for better territorial governance at EU level (Meijers 2008:1315).

There has been an academic, political and practitioner interest in analysing the shifting structures and regulatory frameworks of economic development since the 1980's. In this interest there is an agreement of that the institutional collaboration is characterized by a movement from national government towards governance which includes interaction between state, economic actors and civil society stakeholders (Jones 2001:1185). Within the concept of governance there is a divergence between new public management, good governance, a sociocybernetic system and self-organisational networks (van Doeveren 2011:103-102). Though in this thesis the concept governance should be understood as a form of steering that coordinates different actors with a particular purpose within urban and regional development (Nordregio 2006:12).

The ESPON project was among the first projects that started in 2002, and focused on the specific situation and role of urban areas and also of its potentials as nodes in a polycentric development. In this sense ESPON can

also be seen as trying to consolidate two conflicting goals. The two main conflicting goals would be on one hand to make scientific research, but on the other hand to achieve policy objectives such as enhancing the polycentric development in Europe (Vandermotten et al. 2008:1208).

Since the launch of the concept of polycentrism from European leaders several policies have been accepting the strategy and driven the development towards this agenda on both local as international level. Critics have pointed out that the EU has encouraged an increasing economic competitive situation between cities and the development of the knowledge economy with the planning norms of polycentricism. The polycentric strategies can from one perspective be seen as contribution to sustainable development strategies (Vandermotten et al. 2008:1206).

There are though researchers that claim that polycentrism is a preferable norm and also a research point of departure. Even though the conceptualisation of polycentrism is debatable it is so far the best model, or at least starting point, for the evolving urban and regional spatial patterns in North America, Europe and Japan. Transport technology, Internet and other advances enabled people and economic activities to spread in another way than before. Population growth, immigration, changes in household types, process of suburbanisation of households and the de-concentration of economic activities etc. affect many urban areas within the advanced economies. With these changes in mind policymakers have to steer a course that combines accessibility with sustainability and competitiveness with equity (Kloosterman & Musterd 2001:625,630).

The question of steering is emphasised and becomes central when studying polycentrism. Studying polycentrism one should also be aware of that the polycentric regions differ in several aspects in a qualitative way. The differences mainly concern the spatial qualities, political units and representation (Kloosterman and Musterd 2001:620-631). Regions can be seen as conflict zones where different interests, identities and cultures appear. The strategic and conflicting question will be to define and create approaches to how different centres relate to each other. Creation of synergy between the centres creates something more than only the sum of all the centres together (Nordregio 2006:23).

Since the concept of polycentrism is hard to define the implications of measurements makes it hard to say whether polycentrism brings any advantages. Though, as a political norm and as the ESPON and ESDP express, polycentrism ought to bring advantages. Though attempts have been made, this previous research tells us that there is no correlation between polycentrism and sustainable development or economic efficiency. It could though be shown of a correlation between spatial equity and polycentrism, though the spatial distribution of GDP per inhabitant is more homogenous in polycentric countries (Vandermotten et al. 2008:1211,1214).

3.4 Summary

Sustainability is a dominating concept within planning since the 1990's. The concept consists of the three extents; environmental sustainability, social sustainability and economic sustainability. Planners often need to tackle these three extents in their work. Transport can be seen as a planning field in which it has been proven hard to tackle problems with the environmental extents of sustainability. Transport and in particular road traffic is one out of several causes to global warming, which has a negative impact on the environment. Polycentrism is a concept employed amongst researchers and practical planners today. Further, polycentrism could be described as the spatial distribution of urban centres within a defined area. This definition has origins in the growth pole theory and the central place theory. There have though been extensions of the theories, where morphological and functional forms of polycentrism have been identified. Polycentrism can exist on several different geographical levels; here it is the regional level that is concerned. At a regional level polycentrism can be divided into inter-urban and intra-urban structures. Polycentrism can as explained above be seen as an analytical object, deriving from theories. It can also be seen as a political norm and in that sense, that this structure will bring advantages. The debated definition of the concept makes it hard to measure and therefore it is debatable how to measure it and what the outcomes of polycentric development will bring. There is not a clear definition of polycentrism as such however the discussed questions and alternative interpretations should be considered when investigating polycentrism closer.

4 Previous research and policies

In this section there will be a literature overview on previous research and political policies that can relate to sustainable transport and regional polycentrism. Planning norms and principles for transportation will be described. Firstly the planning norms that have formed the current transport system are described and then how norms and goals have changed in the later decades. This change in planning norms have connections to the discussion of sustainability and the awareness of human impact on nature that arose in the 1980's as described in section 3.1.

4.1 Planning for car-dependence

In the aftermath of the Second World War the car meets the city and gets continuous development of society towards a total adaption of the car, this society can be called the car society. The idea of the car society emerged within a group of planning experts – architects, civil engineers and community planners. Although the idea was originally from the United States this ideal of a society completely adapted to the rules and conditions of the car got widespread attention also in Sweden (Lundin 2008:17, 285). Transport systems and planning of cities have during more than a decade been developed in symbiosis. The introduction of new and faster transport means has made an imprint of structures and sizes of cities (Lindelöw 2011:1). This knowledge is important to better understand transport political aims, norms and goals of today. The car became in the late fifties a mean of transportation for a huge part of the population in Sweden. This resulted in serious problems in forms of congestion and traffic related accidents. Stig Nordqvist was an active engineer at a Swedish consulting firm and he was among others an important actor within planning and construction (Lundin 2008:17). Shaping society in detail in favour for the populations' use of the car could according to Nordqvist eliminate the accidents, congestions and other problems that were caused by the car. The car society promised comfort, welfare and mobility. It was also claimed that it would bring democracy and freedom. A new attractive lifestyle and a utopian society were created (Lundin 2008:279). Other means of transport like the railway,

subway and trams have also contributed to the development of distribution and sizes of cities, thus the mass-ownership of the car was specifically prominent (Lindelöw 2011:1).

In the late sixties the negative consequences of society's adaption to the car could be noticed. One of the most evident changes was the transformed urban picture. The urban structure had been transformed into monotonically designed suburbs with enormous parking lots and garages surrounded by traffic routes. The car society was no longer associated with freedom, mobility and other positive contexts. It was rather associated with noise and pollutions. The car society can be described as an unsuccessful ideology that could grow persistently. It should be stressed that one of the reasons that the ideology could grow unconstrained, was that the actors who were in favour of developing the car society had too central and powerful positions (Ibid. 2008:279). The car society was seen as an expression of elite government and laissez-faire politics. The critics against the car society grew stronger during the growth of a broader movement emphasising the environmental issues. The critics were directed towards an accelerating environmental destruction that could be generated by the old political system, politicians, experts and bureaucracy. However, the critics didn't get any further anchoring in society at the time. Through planning, the car was successfully integrated in our everyday life. The car became an indispensable part of both or work and spare time (Ibid. 2008:280-281). Even if many people saw motoring as partly problematic, the characteristics of the car were too attractive. This is clearly the case even today. One could say that we have become the prisoners of the car society whether we want it or not (Ibid. 2008:281). Clearly the planning and development from former decades have made imprints on today's society. It is therefore reasonable to think that today's planning and development will make an imprint on the future society and also be able to set the preconditions for future urban and regional planning (Lindelöw 2011:1). The illustration of the emerging car society also initiates further reflection on the planning task as such (Lundin 2008:17).

4.2 Planning for sustainable transport systems

From a sustainable perspective transport concerns peoples choice of travel which have gained huge interest for research in the last decade. In the late 70's, in connection to the oil crisis several studies were carried out with focus on the correlation between density and the use of public transport as well as the energy consumption of transports at city level. A study that has drawn much attention is Newman and Kenworthy's (1989) study on gas consumption for transports and population density in thirty-two of the

world's cities (Newman & Kenworthy 2011:301; Westerford 2004:26). The results of the study have been debated since the consequences of socioeconomic factors and urban forms are not separately identified. Several studies have followed pointing out car-travel and daily trips as essential to reduce CO₂ emissions. In the 90's several studies followed investigating the correlation between habitations and traveling behaviour. There is also an increasing interest for studying a spectrum of variables for travel behaviour other than population density. Among others the distance to different activities have been addressed as an important factor (Westford 2004:27).

In theory different kinds of activities become a variety of choices that can offer a value for the individual. If the travels are seen as a derived demand, the individual is assumed to make a consideration over the profit and the costs (which could include time as a cost) of the trip. From a policy perspective an interesting question would be how to offer several choices at a local level (Westerford 2004:28).

Different methods are used when traveling studies are carried out. Handy (2002:160) categorize studies into three types aggregated, disaggregated and simulation studies. The simulation studies are not supposed to test hypothesis but instead the studies are based upon assumptions on behaviour and traveling.

Aggregated studies focus on the correlation between density and an average gas consumption and travel. Those studies discuss data at a high level. Disaggregated studies focus instead on data on individual level and household level. In this type of studies age, socioeconomic factors, level of education are some among many variables that are controlled for. The independent variables can also be density, distance to service etc. (Handy 2002:160-163 & Westford 2004:28-29). Some problems are though pointed out with traveling behaviour studies.

One problem is that almost all of them compare traveling behaviour at a given time. And this doesn't answer the question whether a change in urban form would have any effect on the traveling behaviour. In other words, an increased service supply in an area requires that the citizens use the new services (Westford 2004:30-31).

Another problem with the studies is that traveling behaviour within a specific area might hide a so called self-destruction, which means that individuals that like to walk, they choose a place to live where this is possible and people how like to/need to use a car choose a place to live where there are good access to parking lots for example (Ibid. 2004:30).

Yet, these traveling behavioural studies are often used for policy making. Several studies have concluded that the amount of transport and the choice of transport mean are influenced by several factors such as population density, the location of facilities, the provision of road and parking capacity, and residential location relative to the city centre (Naess 2005:168). Several researches on the topic have shown a lower average

traveling distances and lower share of care-use among residents in the inner-city centre compared to the residents further away from the urban core (See: Røe 1999; Naess & Jensen 2004). This relationship has been recognized in areas with a high rate of concentration of workplaces, supermarkets and other services that traditionally and historically are found in the urban centres (Naess 2005:168).

Cities, their sizes and structure have in the last decade been developed in symbiosis. Transportation possibilities do not only affect placement residences or land use. Placement of residents and land use in their turn also affects the transport system. It can be seen as two coordinated instruments that have effect on each other (Lindelöw 2011:1). Though the improved transportation possibilities have led to increased sprawl of the population. Several planners underline the negative effects of a sprawled structure. A sprawled structure has a high land use demand and causes increased car traffic for going to for example stores and other activities in the centres. There is also a concern for people that don't have accessibility to a car or driving licence since, sprawl risk to reduce their mobility even further (Hårsman et al. 2009:121).

4.2.1 Transition towards a sustainable transport system

The car dependent society is very difficult to reverse but it is also as Banister (2008:73) remarks the future for traffic planners. According to a study on future transport system in Sweden in 2040 a reduction of energy use for transport of 50 -70 per cent would be needed in order to achieve a sustainable transport system. Such reductions are unlikely to be feasible only through increases in energy efficiency, at least as long as the transport volumes continue to increase. Therefore it is necessary to investigate how volumes can be reduced (Höjer 2002:197). In theory of travel a distinction is made between desired travel and structurally enforced travel. Structurally enforced travel is for example the trip for going to work or school. Desired trips are for example going for a run or visiting friends. Such categorisations are used to indicate the difference between trips that could have been avoided, if structures had been different, and trips that are independent of structures and/or associated with activities that are not necessary for daily life (Höjer 2002:197; Vilhelmson 2007:151-153). It is concluded from earlier research that if much of the present demand for structurally enforced travel and freight is substituted for by for example; IT and multinuclear urban planning it can reduce CO₂ emissions to reach the goals set up by the EU. It will in this case even be possible to have an increase in the leisure trips (Åkerman & Höjer 2006:1955).

Banister (2008:73) suggests an alternative paradigm to strengthen the link between land use and transport. This paradigm is the sustainable

mobility paradigm and it proposes that public transport should be a prioritised sector for investment. The discussion is not whether the car should be totally excluded rather how planning can shape cities and regions so that people will use the car as little as possible in their everyday life (Banister 2008:74). The sustainability paradigm tackles several issues that contrast transport planning in the traditional way. The paradigm requires action to;

- Reduce the need to travel (fewer trips)
- Encourage a modal shift through transport policy measures
- Reduce trip lengths through land use policy measures
- Encourage a greater efficiency in the transport system (Banister 2008:75).

Within the frame of the paradigm the primary concerns are the physical dimension as for example the urban form and how this should be balanced with a social dimension. The contrasts are shown in the table below;

Table 1: Contrasts in traffic planning the physical dimension vs. the social dimension. Source: Banister 2005:238.

The physical dimension – Conventional approach	The social dimension – Sustainability approach
Physical dimensions	Social dimensions
Mobility	Accessibility
Traffic focus, particularly on car	People in focus
Large in scale	Local in scale
Street as a road	Street as a space
Motorised transport	All modes of transport
Forecasting traffic	Visioning cities
Modelling approaches	Scenario development and modelling
Economic evaluation	Multi-criteria analysis, including social and environmental concerns
Travel as a derived demand	Travel as a valued activity
Demand based	Management based
Speeding up traffic	Slowing movement down
Travel time minimisation	Reasonable travel times and travel time reliability
Segregation of people and traffic	Integration of people and traffic

Open processes where different actors and sectors are active and participate in the policy-process will address planning towards sustainable

mobility. The main problem according to Banister is to achieve acceptance for sustainable mobility and that concerns both key actors and the people. There must also be a willingness to change and acceptance of collective responsibility. Finding this is crucial for implementation of sustainable mobility (Banister 2008:79). The local and regional action plan should prioritise resources towards efficient forms of travel such as walk, cycling and public transports. Actions in the planning and development sectors should ensure that new development is located where trip lengths can be reduced. It is also important to see to the existing development and that it should be restored for reuse. Mixed use and high-density developments are preferable. The information sector should actively be utilized to take full advantage of technology developments (Banister 2005:250-251). Earlier research within the frame of achievement and implementation of sustainability shows us some important aspects. It is increasingly accepted that effective implementation of sustainable development requires all actors to be involved in the process. It must be seen as participatory for private individuals, companies, industries and governments. Sustainability needs to find acceptance within all these categories of actors. The loss of acceptance, if only from a single actor will obstruct the strategies for change towards sustainability. The question of cooperation and governance becomes more important. Decision-making process is carried out at all levels of government within a sectorial framework. Sustainability demands a cross-sectorial thinking for decision-making. There is a need for changes in the organisational structures of government so that this can take place. A stable government with appropriate structures is essential (Banister 2005:3).

In contrast to the planning norms during the post-war era, there has been what can be called a renaissance of public transport in Europe and United States. This is according Holmgren and Svensson (2012:11-16) not only the environmental concern. Public transport can also be seen as a tool for economic development even if the correlation between public transport and economic development are hard to prove. It has been complicated to isolate factors in the complex development of economies. It is though suggested that growing cities and regions consist of nodes. The nodes are cities or conurbations that are functionally integrated. The nodes have a high pressure on consolidation and therefore also the accessible areas. This leads towards a situation where cities and regions need to make the transport system more efficient. A more efficient transport system is a prerequisite to be able to handle flows of people, goods and to be able to grow through increased density and expansion but at the same time have a development that attracts people. The capacity of public transport and land use efficiency makes it possible to support transport between clusters and agglomerations in regional systems. The public transport importance has increased specifically in a regional context (Holmgren & Svensson 2012:11,16).

4.2.2 Mobility management

Mobility management has been used as a tool for changing traveling behaviour in Europe and in Sweden. The concept of mobility management was developed at a European level and mainly enhanced by the European platform of mobility management. This is a non-profit organisation and a network of governments in European countries. The minister that is responsible for mobility management for each country is representative in the organisation (EPOMM (2)). The aim of mobility management is to change people's attitudes towards different modes of transport, integration and communication between organisations. Mobility management consist concretely of several arrangements and some of them listed below and with examples of how the arrangement can be conveyed (EPOMM (1)).

Table 2: Arrangements of mobility management. Source: EPOMM (1).

Arrangements	Practical examples
Informative	Mobility centres and personalised travel assistance.
Commercial	Co-traveling and car pools.
Organisation/coordination	Plan for traveling reduction and steering of parking lots.
Educational	Educate employees so they can be able to give sustainable transport advices.
Telecommunications/flexible time planning	Replace travel by telecommunications.
Support/integration	Pricing of parking lots and congestion charges.

4.3 Swedish environmental goals and objectives

The Swedish environmental goals consist of one generational goal and sixteen environmental quality goals. The generational goal is over-all embracing and outline the direction towards the change in society that need to occur within one generation if the country's quality objectives are to be achieved. The generational goal also highlight that the Swedish environmental goals can't be achieved through expenses of exports of environmental and health problems to other countries. The environmental quality goals describe the condition that the Swedish environmental goals and work should lead to. These quality objectives are to be met within one generation and that is before 2020 (SEPA (1) 2012). The government in

Sweden bears the over all responsibility for the environmental quality objectives. Eight national agencies have been assigned one or more of the environmental quality goals. Each agency is responsible for following up and evaluation of their goal or goals. County administrative boards are regional environmental agencies with an overarching and coordinating role in the work to achieve environmental objectives. The municipalities have an essential role in this context. Their responsibility is to translate national and regional goals into local aims and action. In the private sector, both companies and environmental organisation are involved and engaged in the work for achieving the environmental goals (SEPA (3) 2012). The sixteen quality objectives are presented in table three.

Table 3: The sixteen Swedish environmental quality goals. Source: SEPA (1) 2012.

1. Reduced climate impact	2. Clean air	3. Natural Acidification only	4. A non-toxic environment
5. A protective ozone layer	6. A safe radiation environment	7. Zero Eutrophication	8. Flourishing lakes and streams
9. Good-quality groundwater	10. A balance marine environment, flourishing costal areas and archipelagos	11. Thriving wetlands	12. Sustainable forests
13. A varied agricultural landscape	14. Magnificent mountain landscape	15. A good built environment	16. A rich diversity of plant and animal life

In this study the fifteenth quality goal is of major importance and concern. The Swedish national board of housing, building and planning is the responsible agency for this goal. The goal is to achieve a good built environment and should be done through locating buildings in accordance with environmental principles. It should be done in a way that promotes sustainable management of land, water and other resources. Amongst other objectives for this specific goal one is of more importance for this study (EPA (4) 2010).

”achieving a varied supply of housing, workplaces, services and cultural activities, in order to reduce transport demand and improve the scope for environmentally sound and resource-efficient transport”(SEPA (5) 2012).

An all-party committee on environmental objectives (CEO) has been set up to secure broad political consensus on environmental issues. The committee’s role is to provide the government with information on possible solutions for how to achieve the environmental goals and objectives. The committee have pointed out specific strategies in some prioritised areas (SEPA (6) 2012). Two of these strategies are important to underline, as essential elements for this theoretical framework and the following analysis.

One of these prioritised areas has a strategy for a more resource efficient land, water and built-up areas. Further, the strategy is pointing out the regional planning as vital when it come to solving questions concerning the spatial structure. The sector for the build environment and infrastructure and other areal sectors have to improve to secure the environmental quality goals and objectives. Long-term and environmental adjusted planning should lead society towards sustainable development (CEO (1) 2009).

The other essential strategy is the strategy for resource- and energy efficiency for transports. The committee considers that both technical solutions and behavioural change are of vital importance within this strategy (CEO (2) 2009). In a long term perspective urban and regional planning is important for a structure that can reduce transports. Road transport stands for a huge part of the CO₂ emissions that seriously and negative effects on the environment, people's health and social effects like urban sprawl (SEPA (7) 2012).

4.4 Swedish transport political goals

The Swedish parliament and government are supremely responsible for planning of the society. It is also those who structure the goals, economic and juridical instruments that are implemented reach the goals. Most important though is that the goals are widely accepted by the general public and the institutions that need to realize a change. Since Sweden is a member state of the EU, the goals are to a large extent common for the member states. A fundamental principle within the EU is free mobility of people, services and goods. The increased trade and welfare have lead to increased transports and traveling with increased negative effects on the environment (Holmberg & Knutsson 2008:43).

Programs such as ESDP are examples of initiatives and strategies that are brought up by the EU to handle problems with the increased mobility (Ibid. 2008:43). However, the overall national Swedish goal is to secure "*a national economic effective and long-term sustainable transport supply for citizens and business in the whole country*"(Swedish Government, Regeringen 2009:13, translation by the author of this paper).

The overall goal is supported by two main objectives, which are a functional objective and a consideration objective.

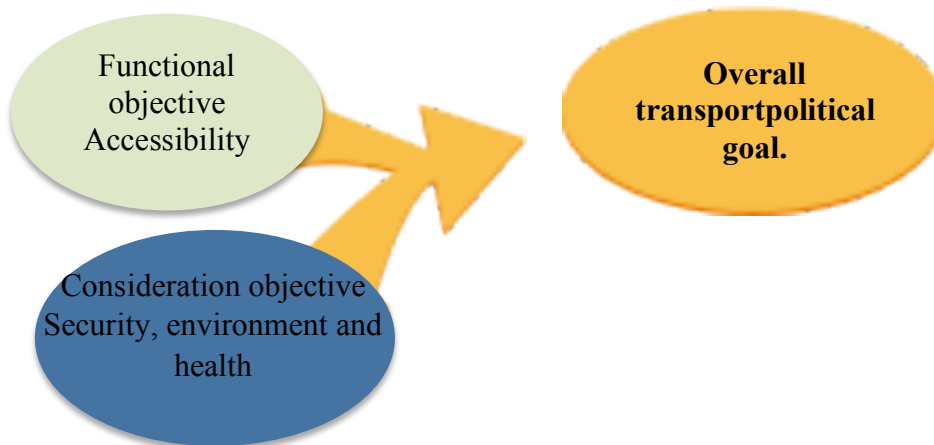


Figure 5: National transport political goals. Source: Swedish Government, Regeringen 2009:13. Explanations added by author.

The functional objective considers the accessibility of the trip or transport. The consideration objective considers security, environment and health. The goals should promote a good economisation of land, water, energy and other nature resources as well as a transport system for regional development and an equalisation of possibilities to development for different regions. It should also counteract the negative disadvantage of long transport distances (Holmberg & Knutsson 2008:45).

The regional goals emphasises that good accessibility to transports is a question of justice that gives the individual right to live and work where the individual wants. Transports are also a welfare question that will give Sweden and the regions within it a competitive advantage comparing to other countries and also within the frame for the labour market, a good infrastructure enlarges the labour market for people (Ibid. 2008:45).

4.4.1 Planning for accessibility

Accessibility is a concept that has become more and more important within planning today as noticed in earlier research and in the transport political goals. It is, as many other concepts used and defined in several ways. It is though commonly referred to as the easiness with which citizens; public organisations and business can reach different activities in society. The easiness can be measured in several different ways, some common examples are; travel distance, travel time, costs and comfort (Holmberg et al. 2008:56 & SKL et al. 2007:58). Accessibility is equally dependent on the function of the transport system and the localisation of habitation, facilities and services. The localisation of functions in relation to each other also affects the accessibility. For example a mixed development of habitations and work

places can increase the accessibility (Holmberg et al. 2008:56). Consequently, a collaboration of physical spatial structures and the traffic system is necessary to increase accessibility (Säfestad 2007:19). It is important to understand the differences between accessibility and mobility. The accessibility gives people more possibilities although with less mobility (Bösch & Brodén 2009:14).

The specialised labour market in many regions makes it hard to keep work places at a walking and cycling distance from the workers home. Travels to and from work often goes to other part of a city or the region. A neighbourhood area might generate a certain travel pattern depending on where the neighbourhood area is situated in in the city or in the region rather than being a result of the local design. This is also the essential issue for accessibility at a regional geographical level (Lindelöw 2011:3).

To develop a sustainable transportation system in Sweden our daily travel must consists of shorter distances with more energy effective transportation means and low land use demand. This can be reached through increased integrated transport and physical planning. Integrated transport and physical planning tackles both challenges, to create shorter distance with more energy effective transport means and at the same time it has a low land use demand, as well as it is a strategy to reach the transport political goal about accessibility in the transport system (Åkerman & Höjer 2002:1954-1955).

4.5 Summary

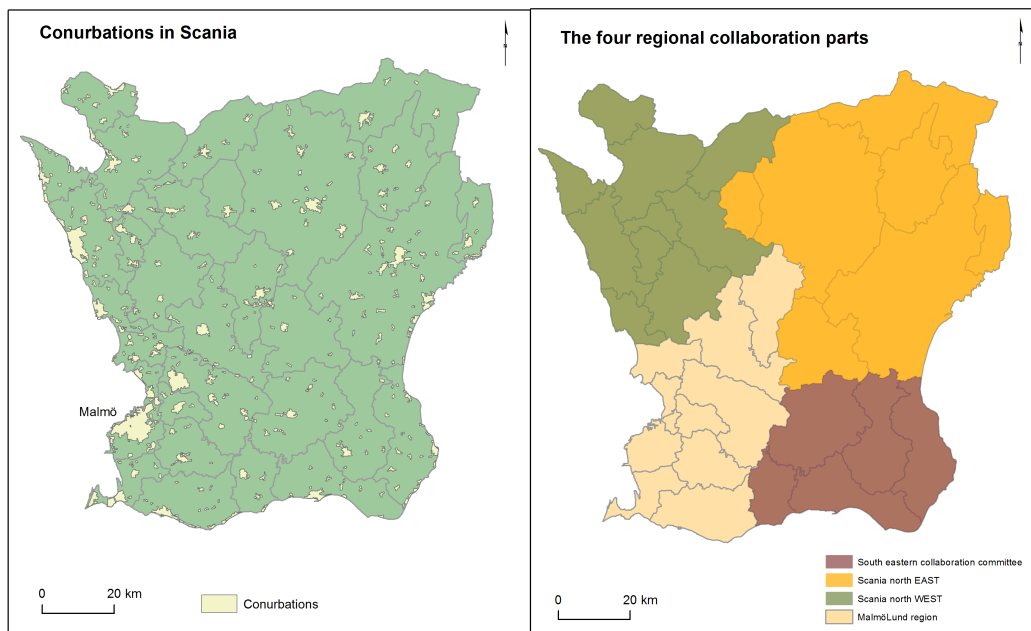
The sustainability debate and the awareness of people's impact on the environment have resulted in a change in planning norms and ideals, where car use should be reduced and replaced by sustainable transport systems. Several researchers suggest that this can be achieved mainly through; shorter distance with more energy effective transport means and low land use demand. Collaboration between different geographical institutional levels and governance is also important to move towards a sustainable transport system. The sustainable mobility paradigm can be seen as an example of how to steer the development towards a sustainable transport system and mobility management can be a practical example of that. A key issue for reaching the transport political goals and the more recent planning norms has been to integrate transport and physical planning which will reach the transport political goal for accessibility. Travel behavioural studies are often used for policy making.

5 Empirical study – Scania

In this part Scania will be described from a transport planning perspective and the regional structure perspective. The geographical background will have an important and introducing part where the regional structure of population, structure and transport are described. Thereafter policies and visions for infrastructure and polycentrism are presented as well as the overall goals from the RDP. The material from the interviews is presented in the final part.

5.1 Geographical background

Scania is both a historical region and an administrative county in Sweden with a regional self-ruling institution, which consists of thirty-three municipalities. There are almost totally 250 conurbations in Scania. Malmö with 275 000 inhabitants (2009) is Sweden's third largest city and is also the largest city in the region. The region is divided into four regional collaboration parts; Scania north east, Scania north west, MalmöLund region in the southwestern parts and Southeastern collaboration committee (SRC (1) (2012)).

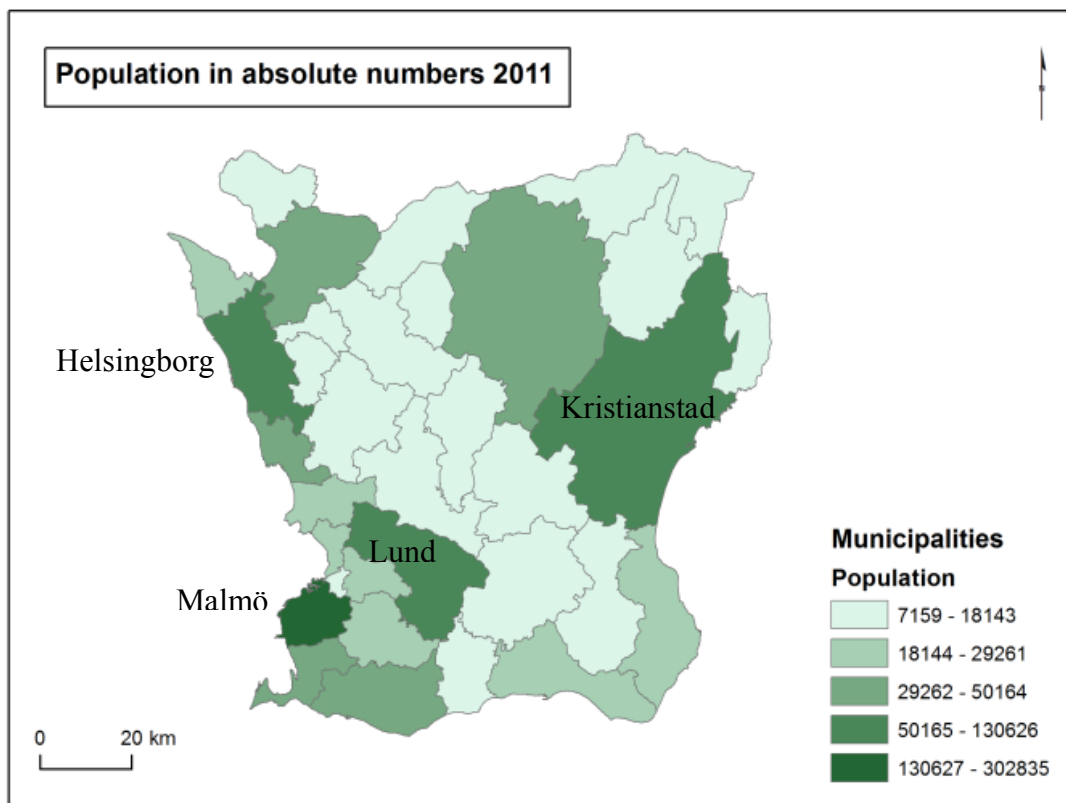


Map 3: Conurbations in Scania. Map Source: Department of Human Geography, Lund University. Data Source: Department of Human Geography, Lund University. Modified by: Landgren 2012-05-01.

Map 4: The four regional collaboration parts. Map Source: Department of Human Geography, Lund University. Data Source: SRC (1) (2012). Modified by: Landgren 2012-05-01.

5.1.1 Population

The population is steadily growing in Scania and the current population is concentrated in the southwestern parts (Region Skåne 2011:2,14). Scania is the most densely populated region in Sweden with twenty-three persons per square kilometre (Region Skåne 2011:25). Thirteen per cent of the Swedish population live in Scania, which constitute two per cent of the total national areal (Region Skåne (2) 2010:18). In absolute figures the greatest population growth between 2000 and 2010 has been in Malmö, with 24000 new inhabitants followed by Helsingborg and Lund with approximately 6000 inhabitants each. In relative figures the greatest population growth has been in Malmö, followed by some of the smaller cities in Scania. The population growth in the more rural areas has also increased in relative numbers, whereas the mediums sized cities have seen a decline in population growth (Region Skåne 2011:27). At municipality level there are only three municipalities that have seen a population decline and those are Osby, Östra Göinge and Simrishamn (Ibid. 2011:28). Map five below show the population in absolute numbers at municipality level. This can illustrate the population distribution between the municipalities in Scania.

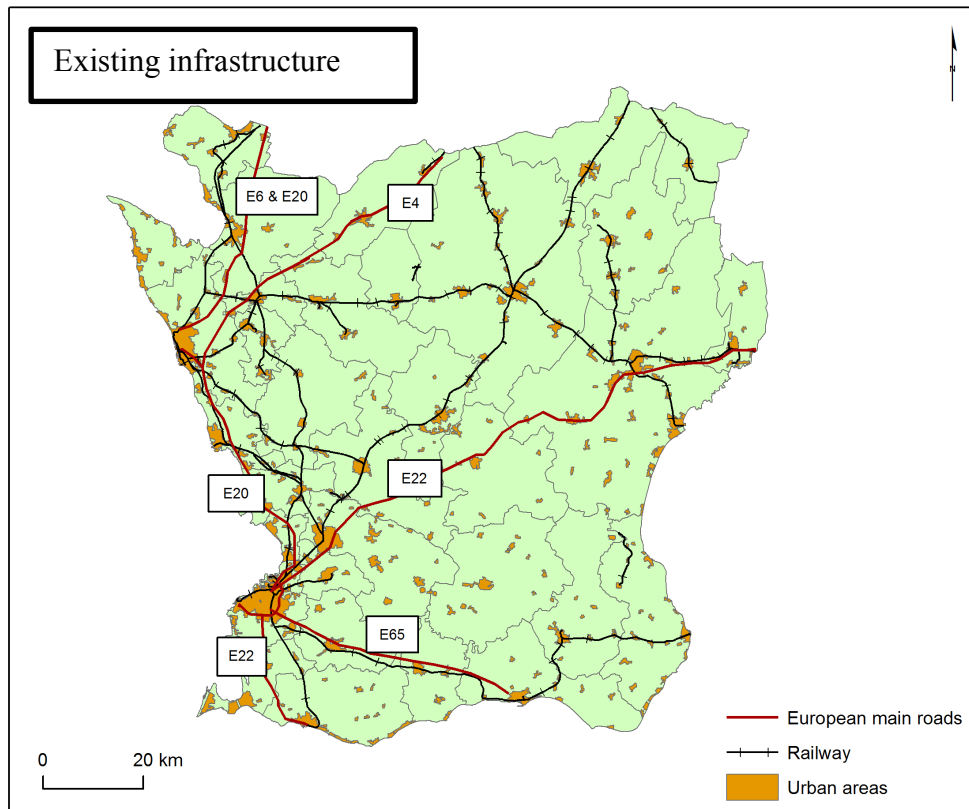


Map 5: Population in Scania, in absolute numbers. Map Source: Department of Human Geography, Lund University. Data Source: Statistics Sweden 2011. Modified by: Landgren 2012-05-01. The material is classified with natural breaks.

5.1.2 Existing infrastructure

The infrastructure in Scania is well developed in relation to other parts of the country (Region Skåne 2011:8). There are four national main roads going through Scania. These are all European main roads E4, E6, E22 and E65, which also constitute important interregional routes. E6, E4 and the road E20, that leads to the bridge over to Copenhagen, dominate the motorways. The bridge and E20 ties Scania to other important motorway connections in Europe.

The railway and its development have great importance for the distributions of cities in Scania. The railway network became the determine factor behind localisation of activities. When the railway network started to grow in Sweden, in the middle of the 19th century when natural resources, cities and towns started to be connected in a new transport system. New cities and towns also grew up along the railway. In these towns products where transported in and out to and from the rest of the world. The majority of the railways were built in the private sector. When the increased use of road traffic threatened the private railways, the state bought a large extent of the railways in Scania. For a lasting regional polycentrism the lasting railways and increased regional train traffic is of vital importance (Region Skåne 2011:16).



Map 6: Existing infrastructure. Map Source: Department of Human Geography, Lund University.
Data Source: Department of Human Geography. Modified by: Landgren 2012-05-01.

5.2 Regional development programme

In the RDP (2009-2016) (RDP) for Scania there are four overall objectives. These objectives are profitable growth, attractiveness, sustainability and balance. The objectives are in short described below.

Profitable growth: In economic terms Scania is an important part of the Oresund Region. As a welfare state it is important that Sweden is and remains competitive. Therefore, what is good for Scania is also good for Sweden.

Attractiveness: As a dynamic border region, Scania attracts people of all ages, all with different situations in life. Scania must remain an attractive region for visits and for people to live in. It is also important to remain attractive for investors and business activities.

Sustainability: Diversity is seen as social, cultural and environmental asset and together they cultivate a sustainable society.

Balance: Divergence of the cities characteristics and balanced development supports the dynamics that is required to simulate the development in Scania. It is important that all areas in Scania are equally motivated and as such it is beneficial to support a multiplicity of centres. The development of one area should not be at the expense of another (Region Skåne, 2009:15).

Since Scania is a relatively densely populated region that also has considerable transit traffic, Scania is vulnerable to discharges to road traffic and shipping along the coast. Additionally, Scania is a major farming region and the expansion of infrastructure is consuming fertile land, which is threatening both long-term food supply and the possibility of recreational areas (Region Skåne 2009:33). The policy solution for meeting these two challenges is a “*Sustainable urban development that includes investment in public transport and improved insulation of buildings (...)*”(Region Skåne (1) 2010:15).

The polycentric regional structure and density are a great potential for a continued regional enlargement and regional integration. The distances are short and there is a strong connection between rural and urban areas (Region Skåne 2009:9). The increasing integration of housing and labour markets in Scania offers an exceptional opportunity to increase a specialisation on the labour market and skills for the business sector (Region Skåne 2009:38).

“The expansion of the region and accessibility does not necessarily lead to additional and longer journeys; indeed it can mean that journey times are cut, the choice of transport is more efficient and there are fewer impacts on the environment”(Region Skåne (1) 2010:17).

A key issue in this context is that the regional transport sector must develop the public transport and make investments in rail-bound transport. The immediate emphasis must be to continue the competitiveness of public transport against private car use. In both national and international perspective improved rail-connections are important. Still, it is pinpointed that the car will be an important mode of transport for the foreseeable future. It is also stressed that cyclists should be better cared for so people are encouraged to use bikes for work, recreation and tourism (Region Skåne 2009:39). The increased population growth, the regional enlargement and the environmental problems give rise to and strengthen the need for an increased consensus between the municipalities' comprehensive plans, the regional development and the infrastructure plan. Collaboration is needed to plan and develop sustainable physical structures with respect of infrastructure, habitation, green structure and labour markets. A regional planning perspective is necessary in a sustainability and balance perspective (Region Skåne 2009:40).

Some operative goals have been set up in order to approach the overall goals. Concerning a sustainable spatial structure and infrastructure the most important are;

- The volume of CO₂ emissions caused by fossil fuels should decrease in line with the national goals.
- Of the total amount of travel the share of public transport should increase.
- An essential part of new buildings for habitation, work places and services should occur close to nodes in the public transport system.
- The share of the total labour force that has forty-five minutes or less with public transport to their work should increase (Region Skåne 2009:48).

The vision for Scania is that it should be possible to live and work in all parts of Scania through more job opportunities and that a good network of public transport will keep the parts together without being a heavy burden for the climate (Region Skåne 2009:9).

5.3 Polycentric vision and infrastructure plans

The plan for transport and infrastructure (2010) and the report on polycentrism in Scania (2011) are two documents that have separate purposes, which deal with different questions. Although these two documents both follow the RDP. The plan for infrastructure and transport can show how the transport planning more concrete tackles the question of polycentrism. The report on polycentrism can give a deeper understanding for how polycentrism should be interpreted in the context of Scania. In order to analyse the problems and opportunities for regional polycentrism to contribute to a more sustainable transport system these two documents are important material.

5.3.1 Polycentric development in Scania

The project for land use, accessibility and a polycentric structure started in 2005. The purpose that it would concretise the RDP and also to work as material when a new RDP should be compiled. All thirty-three municipalities in Scania are participating in the project and the political steering group is the presiding committee for regional growth and represents from the four collaboration parts of Scania. The objective is also to narrow the gap between the municipalities' development plans and the regional comprehensive plans with an emphasis on physical planning. The goal is to achieve collaboration within the physical planning and to develop energy efficient and sustainable physical structures.

There is also a reference group constituting of represents from the county administrative board, the association of local authorities in Scania, the chamber of commerce and industry in south of Sweden, Swedish National Board of Housing Building and Planning, the office of regional growth to mention some examples. The project is financed by the ERDF, nine of the municipalities in Scania, Scania northeast, the county administrative board and the Swedish agency for economic and regional growth.

From this project five reports have been carried out and one of them is polycentrism in Scania. The studies in the report on polycentrism have been led by SWECO Eurofutures AB. The methods to measure polycentrism have been a combination of different method and among them central place theory and an index from ESPON and most of the figures are based on data from Statistics Sweden (Region Skåne 2011:4-6).

Scania is in the report described as a region having an historical background of a morphologically polycentric regional structure and this is seen as an advantage for the region. It is pointed out that it is important to be competitive compared to other regions as well in Sweden as in an international perspective. The reason why polycentrism is considered the most sustainable and competitive regional structure is the long-term perspective that it brings. To focus on all parts of the region and help them find and develop their characteristics sets a good precondition for synergy effect. It also maintains the diversity within the region and consequently the options and attractiveness for people. To connect all cities in Scania will increase the possibilities though all cities don't have to offer citizens and business with the same supply. This increases the possibilities for individual cities to specialise. Henceforth, this is a precondition for regional growth (Region Skåne 2011:8).

The distribution of cities and conurbations makes it possible to develop good infrastructure, which facilitate the interactions between cities. Scania has according to the report a high level of functional polycentrism (Region Skåne 2011:10).

Urbanisation, technology and globalisation advances are some out of many factors that can affect societies; these different factors will probably have effect on people's future choice of settlement and life patterns. Globalisation leads to increased mobility, goods, services, capital and information over national borders. Planning for societies that can be adjusted to these changes is important

and regional polycentrism is one possible solution. The globalisation development is enhanced by political ambitions of increased market integration and decreased transportation costs. Increased density and specialisation enhance the regional enlargement so that the functional labour market and its branch broadness grow (Region Skåne 2011:17).

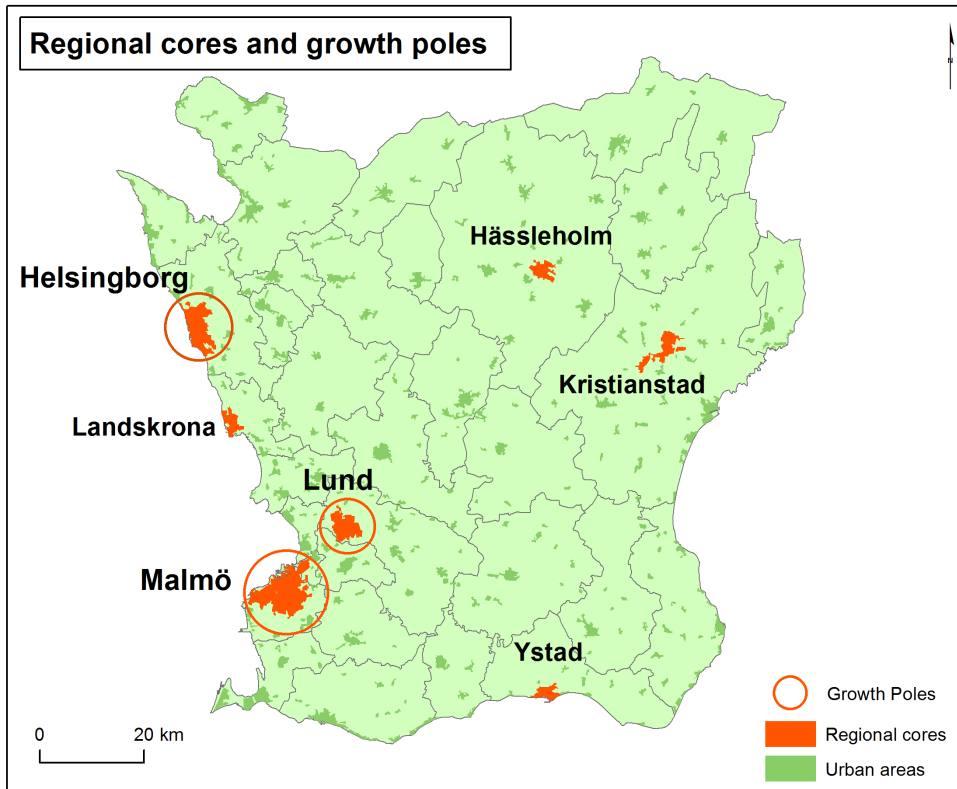
The frame for national politics is another factor that will have consequences for future societies. Many political decisions are today made at a global or European level. Although, the decisions bring consequences at local level and municipalities gets more and more dependent on their neighbours when it comes to different decisions. The competitiveness is increasing at the same time as cooperation between different actors grows. An improved regional accessibility is a precondition to accentuate a regional polycentrism where physical planning can be in favour for the whole region (Region Skåne 2011:19-20).

A decrease of fossil fuels can bring great losses in travel and investments for increased accessibility. Therefore railways and public transport have an important role in a polycentric region. Several existing stations should be given priority though they have a great potential to be strengthened with habitations and work places close to public transport stations. Comparing to other regions in the country Scania has good opportunities to strengthen the traveling with public transport (Region Skåne 2011:21).

In the report seven regional cores and three growth poles have been identified in Scania. A regional core is a city that is important for the surrounding area, has a relatively large population, a positive commuting net and relatively large branch broadness. A growth pole is a regional core that has a population growth and employment rates over the average of the regional cores. The growth pole should also have a dispersion effect in the region. In Scania a regional core must fulfil three criterions. These are;

- Have at least 14000 inhabitants.
- Have at least 200 branches within the municipality.
- Have a higher in-commuting than out-commuting.

Those regional cores are today Malmö, Lund, Hässleholm, Landskrona, Helsingborg, Ystad and Kristianstad. For being a growth pole in Scania, the regional core should at least have a population growth of 9,6 per cent and an increasing employment rate of 15 per cent, both within a time period of ten years. Three cities in Scania fulfil both of these criterions, Lund, Malmö and Helsingborg. Landskrona, Hässleholm and Kristianstad fulfil one of these criterions (Region Skåne 2011:31-33).



Map 7: Regional cores and growth poles. Map Source: Department of Human Geography, Lund University. Data Source: Department of Human Geography. Modified by: Landgren 2012-05-01.

There is an evident interaction between the conurbations in Scania. Commuting patterns goes in opposite directions, which means that the interactions are mutual. The smaller cities are dependent on the larger cities but the larger cities are also dependent on the smaller ones. Therefore, all cities don't have to provide the same type of business and services. To make this possible the accessibility is of vital importance. People have to move between the central places in the region for work (Region Skåne 2011:36).

The individual choice of habitation depends on several factors such as preferences, economic possibilities, tradition and age to mention a few. The housing market in Scania is not homogeneous. The densely populated areas in the western parts of Scania don't have the same habitation supply as the less populated areas in the eastern parts. At the same time it is important that the individual can chose to live where she likes. The better the transportation possibilities that are provided the easier it is to freely choose habitation and work place. Still, for many the economic possibilities set the limits. (Region Skåne 2011:42).

The distances between the centres in Scania are relatively short. The commuting patterns are going over the municipality borders to a large extent. Most municipalities have a negative commuting net, which means that more people commute out from the municipality than into the municipality. The larger cities Malmö, Lund and Helsingborg are those with a positive commuting net as well as the municipalities Burlöv, Båstad, Kristianstad and Perstorp. Both the commuting between public transport nodes and between the surrounding areas and the regional centres have increased in total figures during the 21st century. If the commuting is studied at centre level both smaller cities and larger cities have a

positive commuting net. Malmö the largest city has a positive commuting net but is not in the top cities for positive commuting nets, where instead Lund and Hässleholm is in the lead for a positive commuting net (Region Skåne 2011:43-45).

The high accessibility makes the commuting patterns in Scania dynamic. The share of public transport travel in Scania is about fourteen per cent from without the total amount of travel. There is though a great difference between the more rural areas and the cities. In the cities there the share of public transport is about forty per cent of the total travel, while in the more rural areas it is only a few per cent of the total travel. Therefore it is important to strengthen the public transport outside the larger cities. The figure below shows that the choice of transport mode differs between different areas. All differences are significant except the transport mode “other”. The figure show that the car is used twice as much in the more rural areas than in the larger conurbations (Indebetou & Qvester 2008:70).

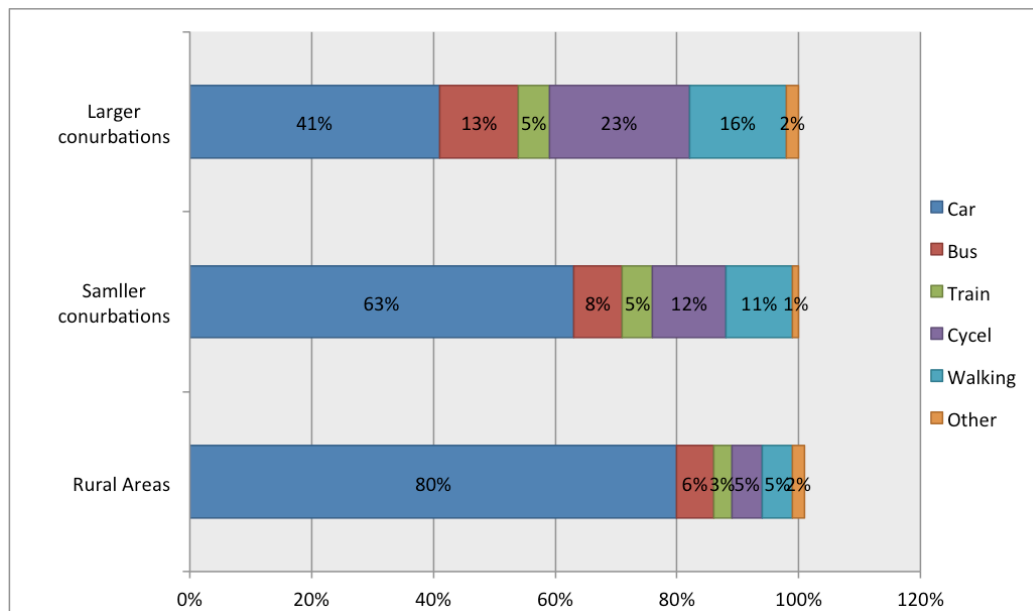


Figure 6: Transportation mode for inhabitants in rural areas, smaller conurbations and larger conurbations (Helsingborg, Malmö & Lund). Total $N_{\text{larger conurbation}} = 16582$; Total $N_{\text{smaller conurbation}} = 35409$; Total $N_{\text{rural areas}} = 15748$. Source: Indebetou & Qvester 2008:70.

Explanations added by the author of this paper.

Public transport is also an important factor when it comes to public services, and consists of different kinds of networks. One network is connecting busses and trains together. Cycle- and walking routes also constitutes a network that is important to get accessibility within the urban areas. The IT-infrastructure also plays an essential role for a more accessible society. Information technology increases studies and work at a distance, which can be attractive for many people (Region Skåne 2011:49-51).

5.3.2 Regional plan for infrastructure and transport

The regional plan for infrastructure and transport proceeds from the overall regional objectives that were described in the RDP. The regional plan for infrastructure and transport also follows the national environmental goals and the national transport political goals. Investments in transport and infrastructure are correlated to several other interests in our society. Several parts are responsible for how the infrastructure is being administrated. At a regional level there are strong associations with the public transport and the local planning and the regional development in general (Region Skåne (2) 2010:11). The regional plan and the national plan concern different projects. The national plan will though affect to regional plans to a large extent. The national plan can both economically steer the plans in a region and the national level is also responsible for some of the projects and investments in Scania (Region Skåne (2) 2010:3). The national plan mainly considers long-term investments in railways and national main roads as well as the support and amelioration of these roads. The regional plan mainly considers regional roads, cycling routes, buss traffic and government co-financing (Region Skåne (2) 2010:2). A new law for public transport was established in Sweden the first of January 2012. The law (2010:1065) about public transport the purpose of the new law is to be an overbridging set of regulations for the public transport at local and regional level (Region Skåne 2012:4). The latest regional infrastructure plan was established 2010 and have a long-term perspective on approximately ten years. There are six main goals in the plan for infrastructure and transport and two of them are shown in table four.

Table 3: Three of the goals in the plan for infrastructure and transport in Scania 2010-2021.

Source: Region Skåne (2) 2010:3.

CONTINUED REGIONAL ENLARGEMENT AND REGIONAL INTEGRATION	Develop the integration of Scania to a coherent functional region with a larger labour market, with polycentrism as point of departure. Spread the population over the whole region.
DEVELOP AN ENVIRONMENTAL ADAPTED AND SECURE TRANSPORT SYSTEM	An important part of the solution here is a continued development of fast regional transportation possibilities.

Scania is a region with growing population with potential for growth. There has been a fast regional enlargement and regional integration and there is a great potential for a continued development in that direction. There are changes in the region that becomes the precondition when planning the infrastructure. A change in travel behaviour, among other things increased commuting, is one of these changes. The potential for development lies within a dense land use structure and polycentrism (Region Skåne (2) 2010:3). Some of the objectives are more strongly connected to the polycentric development within the region and more concrete these objectives are to;

- Continue to invest in public transport.
- Railway investments towards adaption to environmental friendly transports – both for passenger traffic and freight traffic.
- Investment in cycling traffic towards Scania as a cycling region. (Region Skåne 2010 (2) 2010:4).

In the work with the regional structure for Scania several analyses have been carried out. These have been characterised by dialogue between the concerned parts such as the regional council and municipalities. The analyses concern land use, population growth, commuting patterns and services for example (Region Skåne (2) 2010:11-12). To achieve the goals that were mentioned earlier strategies have been set up. Some of them are;

Table 4: Main principles in the plan for infrastructure and transport in Scania 2010-2021. Source: Region Skåne (2) 2010:28.

CONTINUITY AND COLLABORATION IN THE PLANNING PROCESS	Regional and local collaboration in the planning process for infrastructure.
IN THE FIRST PLACE, MAKE USE OF EXISTING INFRASTRUCTURE	Make use of existing infrastructure in the first place and direct capacity improvements.
SUSTAINABLE SOLUTIONS SHOULD BE PRIORITIZED	Coordination of different transport means. Investments in the railway system.
FLEXIBILITY IN PLANS AND DECISIONS	The plans should be able to change if the demand is changing.
ADJUST THE INTERVENTIONS TO THE DIFFERENT PRECONDITIONS IN THE DIFFERENT PARTS OF SCANIA	Strengthen the transport in the densely populated areas and also in the less populated, so that people can live and work in the less populated areas.
A BROAD URBAN AND REGIONAL PLANNING PERSPECTIVE	Multi sectorial planning perspective on infrastructure and regional planning. Use the spatial structure characteristics that the infrastructure inhabits. Adjust the physical planning after the preconditions of public transport.

5.3.3 Environmental challenges

The traffic development on the roads have in Scania has increased heavily in the last decade. Public transport has a market share of approximately fifteen per cent in Scania (Region Skåne (2) 2010:18). The share of transport mode from without the total numbers of trips within and to/from Scania is illustrated in a circle diagram below. The figures are collected from the travel behavioural study that was carried out 2007 (Indebetou & Quester 2008:70). The figures show us that the car is dominating when it comes to private travels. This is an environmental challenge to turn the development towards more environmental-friendly transport means (Region Skåne (2) 2010:18).

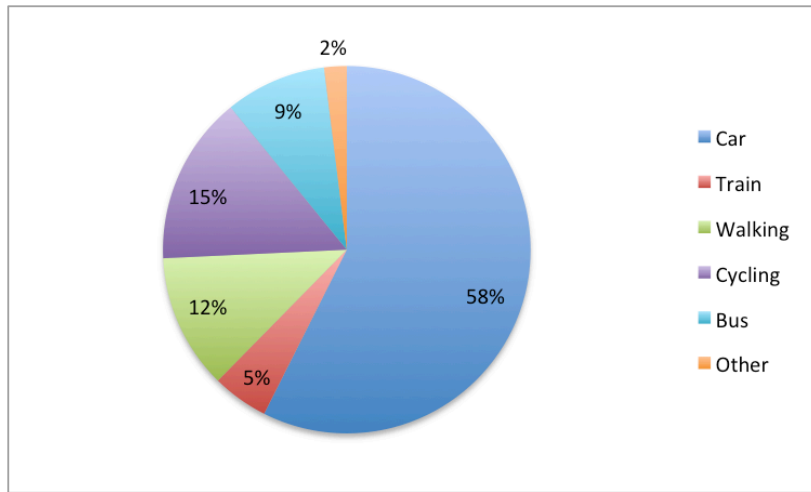


Figure 7: Distribution of transport mode from without the total numbers of trips within and to/from Scania. Source: Indebetou & Quester 2008:70. Explanations added by the author of this paper. Total N= 67739.

5.3.4 Accessibility in Scania

A change in structure on the labour market where different cities and conurbations collaborate with each other to a large extent has been facilitated through successively ameliorated infrastructure. The public transport has been extended, which has made it possible to commute longer distances. The population density is different within different part of Scania, which is partly due to the differences in job opportunities but also due to insufficient transport possibilities (Region Skåne (2) 2010:18). It is a great challenge for Scania to develop an accessible region in an environmental sustainable way. Shorter distances, better accessibility and comfortable communications lead to greater labour markets it is though important that the traveling becomes a goal in it-self. The challenge is to make the infrastructure establish a structure that won't create barriers. The accessibility is thereby essential for the regional concentration process, so that the labour market can work and to stimulate growth (Region Skåne 2011:69). The figure below shows the distribution of errands from the total number of trips within and to/from Scania.

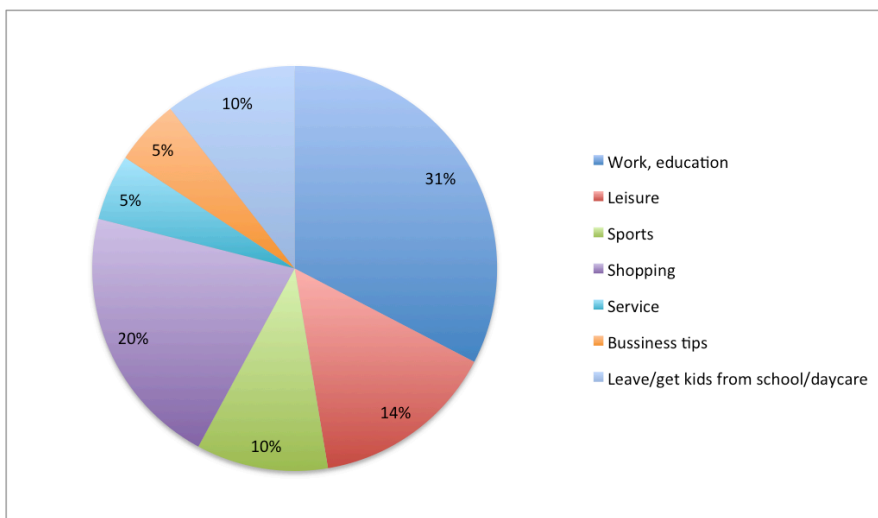


Figure 8: Distribution of errand from without the total numbers of trips within and to/from Scania during a week (home trips are not included). Total N =41 797. Source: Indebetou & Quester 2008:68. Explanations added by the author of this paper.

5.3.5 Physical planning

The post-industrial society and the changes of habitation preferences demand another physical planning than the industrial society. More and more companies and people want to be established in central places. Therefore a conscious and strategic physical planning is needed to meet this demand. Labour markets changes and mobility and flexibility are contrasting fixed places, which requests new physical planning. Cooperation between private and public actors needs to be broadened as well as an understanding for their respective roles (Region Skåne 2011:69).

5.3.6 To increase the regional cooperation

Peoples mobility is increasing and many companies in Scania act on the global market. This demands an increased cooperation between the municipalities in Scania. It is a challenge to be able to offer an attractive region with different possibilities for the region. With cooperation within the planning field, the synergy effects for the whole region will be bigger than the sum of all parts. A critical point is that the municipalities need to relate to the regional perspective. It is a challenge to in a long-term perspective create a functional cooperation between the regional and municipality level. Regional strategies can be successful, though only with support from the municipalities. Therefore an open dialogue with local actors is vital (Region Skåne 2011:69-70).

5.4 Practitioner perspectives

This part will consist of the presentation of the semi-structured interviews. Some of main questions have been the same for all of the respondents. These questions are here presented and the answers are represented for each respondent.

Question 1: Can you tell me about the background to the work with regional polycentrism as a vision in Scania?

Firstly, important to underline here is that polycentrism is so far not a goal or an objective in planning documents it is a discussion amongst the planners at regional and municipality level and a vision says Mats Petersson (2012-04-17). There is though a belief in a continuous progress and development of this structure amongst the leading politicians in the SRC and the discussion might go towards a proposal of including them in the regional planning goals contribute Therese Andersson (2012-04-26).

Andersson, Sörvik (2012-04-26) and Åhnberg (2012-04-26) all agree on that the polycentric structure has according to the regional planners always been there, it has always been given. When SRC started the project for land use, accessibility and polycentric structure in 2005 the focus was to see how and in what ways the regional structure can be developed Åhnberg adds.

Compared to the regions in Stockholm and Gothenburg, Scania is historically more polycentric. The discussion today, is not whether Scania is a polycentric region or not, rather how the existing structure, which is polycentric, can be developed in the best way. The point of departure must be a structure that already exists, remarks Åhnberg. That we want to be a competitive region is also a fundamental thought; we want companies to move here, we want to improve living conditions in the Oresund Region, to decrease the unemployment, get more people into work, find a way in which we can interact, to achieve sustainability Andersson points out.

Question 2: What are the potentials and possibilities with regional polycentrism in Scania, from a your perspective?

The strength in a polycentric development is according to Andersson that there will not be only one growth pole that is dominating the development and that Scania depend on. Several growth poles can contribute to development and that is a potential.

The potential is not the structure as such, the structure is there and has always been looking like that. The potential is rather how we can work with it and what we can do with it says Åhnberg. Additionally, Åhnberg declares that it is important to see what advantages the structure can bring. In comparison to Stockholm and Gothenburg, Scania has another regional structure and that can be seen as an advantage. At least in Stockholm they are trying to enhance a polycentric regional development without having the structure naturally, and they

do it because they have realised that the centralisation in the Stockholm region is in a long-term perspective not sustainable.

We can see it as an advantage if we work actively with the potentials and advantages and the report is a first step in that direction. Andersson adds.

The possibility with the structure is also an even distribution between centres that can avoid congestion effects and other problems that come with overcrowding Åhnberg continues.

Regional polycentrism is also a way to keep together the whole region and also the natural structure to continue to develop, says Andersson.

If we have strong growth poles that lead the development, this will generate growth to the rest of Scania, which is a possibility for a polycentric development Andersson resumes. Åhnberg adds that a possibility is also that many municipalities accept the growth poles and understand that Scania need them for the whole region to develop positively.

Sörvik notices that the opportunity with regional polycentrism is also that it gives a possibility to increase the accessibility between people and different activities at a regional level. If there is a good accessibility it will be easy for people to move even if there is a change in life. As for example you do not have to move just because you change jobs.

There is a great potential in that, these centres can complement each other says Åhnberg. It is essential that they complement and not compete with each other Sörvik emphasis.

Further, the potentials with the regional polycentrism from a transport perspective is that it gives possibilities to make use of the land near nodes and centres in a appropriate way says Britt Carlsson-Green (2012-04-27). Carlsson-Green continues, the possibilities also contain a greater consensus and that everybody feels responsibility for the common interests and this is an important factor for both a sustainable and polycentric development. How it is to be achieved is not sure, since people will probably to a large extent guard their own interests. There is also the possibility that the whole region should live which is an important goal says Carlsson-Green.

Petersson points out the potential that, if it becomes an objective and not only a vision, then the urban planners are given a tool to strengthen such a structure. There are also goals from the RDP with balance and growth, which is connected to regional polycentrism. The infrastructure and in particular the public transport gives the great potential to connect the surrounding land with the nodes and the growth poles. There should be a network of centres and that should support and complement each other Petersson continues.

Question 3: What are the problems with regional polycentrism in Scania, from your perspective?

In the report we take position and say that there are seven regional growth poles and everybody is not a growth pole. Criteria are defined for what actually is a growth pole. This has been problematic because there is no global criterion that can be used to define a growth pole. It always has to be adjusted after the

region, as also in this case. The criteria can look different depending on where you are geographically says Sörvik. Andersson adds that this can be a problem but there has not been a major discussion about that within the municipalities. Åhnberg continues to say that there hasn't at least been a discussion as far as they are concerned but they don't know if there are any conflicts between the municipalities that haven't come to their knowledge. Åhnberg continues that the discussion has not been concerned with who is and who is not a growth pole, rather it has been concerned with that the more rural areas shows a worry to be forgotten in favour for the growth poles. Nevertheless, there is less discussion about these problems than we first thought it would be.

Andersson comment that a problem is to spread the message that common good to have these growth poles and that they take a lead. It is a challenge to get the rest of Scania to feel confident and to support the thoughts that we need these growth poles. Additionally, there is a challenge to make the growth poles understand that they are dependent on the surrounding areas. The areas around the growth pole provide the growth pole with labour force. Therefore the interface between the different parts is so important.

A closer look on the municipalities' comprehensive plans and the population growth the latest twenty years reveals that the structure goes towards a more monocentric one or a region with only a few growth poles. That's where we have to narrow the gap between the more rural areas and the growth poles; the growth poles should never grow at the expense of others says Andersson. A major problem is that Scania is a polycentric region but we can also see a sprawled structure and patterns, which demands very high quality on infrastructure and claims new agricultural land. That is not in line with what we would like in a sustainable perspective says Andersson. The challenge becomes to make the planning consistent within the region. What we need is to integrate the physical planning and the plans for infrastructure. Nevertheless, the problem is that we have more wishes for infrastructure than what we got money Andersson continues.

Carlsson-Green points out that the problem for regional polycentrism from a sustainable travel perspective is that it is something that costs a lot of money. To improve the infrastructure and public transport in a way that has sustainable traffic solutions for people's travels is costly. Regional polycentrism and a sustainable transport system can be realised through major investments in public transport, though that is very costly. However, having the population concentrated in big cities causes other problems and everyone doesn't want to live in big cities. In this sense the polycentric development is favourable. And if we want to live like that and get people to travel in a sustainable way we must find ways that that make the travel very flexible, so that public transport becomes the preferable alternative. Time, economic possibilities and comfortableness are some of many parameters that affect the choice of transport mean. To make the majority of the population to avoid the car is to make it difficult and unwise to go by car.

Carlsson-Green continues, the problem with the concentration and location of habitation is that we can't decide where people should live. We must find solutions so that it is preferable to live in the most sustainable places from a

regional perspective. This is up to the planners within the municipalities to solve, so they make it attractive to live in these locations. The challenge is to provide these nodes with services, schools or whatever it can be and traffic supply so that the possibilities to move in a flexible way increases. This is a problem that is not solved and demands a lot of work to be solved. Even though, polycentrism is still the best structure to strive for. It is also important to spread the job opportunities so that people don't have to travel so far. People should have accessibility to their work says Carlsson-Green. We have to decrease the transports to reach our climate goals. Then we can discuss if we should have a regional enlargement with a possibility to work and live at a 150 kilometres distance. That is not sustainable. To always quest for more and longer travels must be stopped Carlsson-Green adds.

Petersson comment that a problem when it comes to sustainable transport and polycentric development that is often forgotten is that Scania is densely populated, and that causes delivery of goods to many places in the region so the freight volume is high in the region and thereby also have negative effects on the environment. Polycentrism is to some extent connected to other goals of regional enlargement and regional integration. Regional enlargement and regional integration might inhabit some conflicts. Though if we wouldn't have the polycentric vision how would we do then? What would happen if we vision a monocentric structure? Petersson is not sure of the answers to these questions but remarks that it would conflict the goal of balance that the whole region should live.

Question 4: How do you work to improve a sustainable transport system with a polycentric region as a vision?

What we can do is to plan the structures so that they can be combined with the infrastructure. We can demand public transport but we also need to focus on how to build to create a good precondition for public transport, do you plan for sprawl, do you build denser, how do you make use of stations? Those questions are important not only in the sense how do you let people have easily access to a station but also how do you make it a node in a system? What is the content in such a place? These kinds of questions are what we work with says Åhnberg.

Andersson underlines that the infrastructure is not a purpose of it's own. Somebody is going to move and it is impossible to only look at increased capacity and accessibility. It is more than that; we need to keep everything together.

It is also important what is made in the other end of the railway for example how can we plan it to generate the most positive effect? says Åhnberg. In general our focus is to always communicate public transport and walk and cycling routes and to use what we already have. In many municipalities they can improve the planning for increased use of the public transport as for example in Malmö and Lund. But in for example Sjöbo and Österlen it is more about giving a catchment area so that the public transport can be motivated says Andersson. If a municipality is not provided with public transport it is because they haven't planned for it. If there is not enough travel there can't be any public transport.

And the key to get enough travel is to locate activities near the stations, work places, habitations etc. Andersson continues. To build right so to say Sörvik comments.

Our work is to provide the municipalities with information, statistics and inspiration for the municipalities. We also give feedback on their comprehensive plans and say that this is in line with our work or this is not. We are also more and more being asked to be active in the municipalities planning work but we can never say what they should or not should do, it is up to them if they want to plan smart or not. What can be better, as we see it, is that we should push more for walk and cycle routes, which is not enough emphasised in the plan for infrastructure. This can be a critical aspect for people's possibilities to use public transport or not says Andersson. 1,5 kilometres is always 1,5 kilometres no matter if you are in Malmö or in Tomelilla. Although, the preconditions for driving or bike can be very different in the different municipalities. To work with a continuous development of walk and cycle routes is of vital importance and we will strive for emphasising that in the next plan for infrastructure Andersson continues.

In general our vision is to enhance public transport but there are some parts of Scania where the car is an important means of transport and where there is no attempt to prioritise public transport because there is not enough travel demand. The challenge here becomes to create good connections to the regional centres or nodes so that it will be possible to divide a travel and don't take the car the whole way. For example if you live in the rural areas you can take the car to the closest node and then take the train from there, to Malmö instead of taking the car the whole way. The dream is that you in the future shouldn't have to drive a car between the centres says Åhnberg.

Beyond what we do today there is much more that we can work with to improve the sustainability within the region, as for example we could work with office hotels and commuter parking. The car must be avoided more than it is today. It is not realistic to think that it can be avoided always, but to an increasing extent. These solutions are suitable for the polycentric region and also something that we should develop more says Carlsson-Green.

What we try to do and how we work towards polycentrism is that in our planning work we try to create as good preconditions for public transport as possible. The seven regional centres that we have, give us opportunities to tie these together with public transport. Regional railway traffic is prioritised and when that is impossible we bring in busses. This goes hand in hand with the polycentric vision. At a local level it is important to have a well functioning traffic planning institutions that can support walk and cycle routes Petersson says.

6 Analysis

The theoretical and empirical material will in this section be analysed and connections drawn between theory and practice. Following the purpose of the thesis, there will be a focus on how regional polycentrism can contribute to a sustainable transport system.

6.1 Regional polycentrism and sustainable transport in theory and practice

Scania can be defined as having a regional polycentric structure, defined as the definition of an inter-urban polycentric structure at a regional level, by Kloosterman and Musterd (2001:628). Since Scania;

- Consist of historically distinct cities.
- Consist of a small number of larger cities that do not differ that much in size and economic importance.
- Consist of cities that are located in more or less proximity to each other (mainly within commuting distance).
- The cities constitute independent political entities.

As described in the empirical material cities and towns grew up along the railways in the 19th century. It was the nodes for production and to that, the connected in- and out-flows of goods (Region Skåne 2011:16). There are relatively short distances between the centres and the political entities are independent at municipality level. One city is dominating in population size, Malmö but there are still other cities and towns that have an economic importance according to the report on polycentrism. During the interviews with the planners Andersson and Petersson, they remarked that polycentrism is not yet a goal but have potential to become so in the future regional development programmes, since there is a strong political belief in the continuous development and progress of this structure. As a vision and a considered objective in a future RDP, the polycentric structure becomes not only an analytical object that can be measured, as the examples in the report on polycentrism; it also becomes a political norm. The project on polycentrism in Scania is supported by the ERDF, which shows the political interest in such a norm and vision. According to the ESDP and ESPON polycentrism should bring some advantages (Vandermotten et al. 2008:1211). Pinpointed in the report on polycentrism is that the polycentric structure, with

short distances and the historically distribution of cities along the railway establish a good precondition to develop a sustainable transport system (Region Skåne 2011:16-17). In this way the existing infrastructure would be restored for reuse (Banister 2005:250-251). Both the normative and the analytical perspective are important to include in the definition of regional polycentrism, when analysing the possibilities to contribute to a sustainable transport system.

6.1.1 Morphological and functional connections to regional transport

The RDP in Scania and the connected project on polycentrism have pointed out regional polycentrism as a vision and strength in the region both functionally and morphologically. Even though both types of structure exist already, the structure as such should be taken advantage of and be strengthened to improve the regional competitiveness according to the regional planners Andersson, Sörvik and Åhnberg. This is also in-line with the report on polycentrism and the RDP. The polycentric development would be preferable to attract more people to live in Scania, partly due to specialisation of local centres, according to the report on polycentrism. In the interview, Petersson and Andersson comment on the connection between the infrastructure, balance and growth. Petersson, Sörvik and Åhnberg, also emphasise the possibility with a region where centres can complement each other. It is important to complement and not compete, Sörvik remarks. At the same time, the growth poles, that are pointed out in the report, are supposed to lead the economic development, which can illustrate a hierarchy between the centres that is described in the central place theory. Where the production and supply of services will be larger in the larger cities and smaller in the smaller cities (Christaller 1966:19). Though Andersson points out that having growth poles will bring growth for the whole region, the growth poles will spread the advantages across a larger part of the region with a positive impact on the rural and peripheral parts. In the central place theory, the smaller centres are dependent on the larger cities for service supply and productions. Further, it is seen as unnecessary for the smaller centres to exchange products and services since they provide the same sort of services and goods. There is neither any profit for the larger centres to exchange services or goods with smaller centres, in theory, since the larger centres already provide these sorts of goods and services (Burger & Meijers 2011:1129-1130). In this sense the policy and the central place theory conflict each other though there is no fundamental thought about complementarities in the theory. The extended version of the central place theory is needed to further explain the functionality.

The sizes and distribution of cities in Scania, which have been characterised as morphologically polycentric, bring an opportunity for development of infrastructure between them. Functionally the transportation flows have been measured and according to the report on polycentrism it will be possible to increase the transportation flows and functionality within Scania. This facilitates interactions between cities. The increased transport and complementarities within a region contradicts the approach to achieve a sustainable transport system, since

planning for increased transport can lead to increased travel between cities as well as increased need to travel, that is more trips. This contradicts with earlier research on sustainable transport that suggests shorter distances and a decrease in need to travel (Banister 2008:75-79).

6.1.2 Regional polycentrism demands transport

Interaction between the cities is emphasised as a precondition to approach the goals for growth and balance in the whole region. Investments in new infrastructure are needed to accentuate the polycentric development (Region Skåne 2011:19-20). In theory this can be understood as an example of the extended version of central place theory where functionality plays an important role and from a policy perspective the interactions are vital for the centres to complement each other as described by Burger and Meijers. Pointed out in both theory and practice is that the synergy effect within and between urban systems will be bigger than the sum off all the centres together (Burger & Meijers 2011; Nordregio 2006; Region Skåne 2011). Additionally, there can be a focus on all parts of Scania so that they can develop their own specialities and characteristics, which sets a good precondition for synergy effect and regional growth (Region Skåne, 2009:15).

From earlier research this can show how the demand for mobility that has come with improved technology and that, according to researchers like for example Lundin, has been dominating the planning norm in the last decade. From a polycentric and regional perspective the mobility between labour markets is important from both an economic efficiency point of view and personal point of view, as Sörvik notices; it becomes a possibility to be able to live and work in different centres so if you change jobs you don't have to move.

The relationship between polycentrism and transport is from this perspective understood as such that polycentrism demands functionality through more transport.

6.1.3 Regional polycentrism - more transport yet sustainable

Critics have opposed mobility as a planning norm, since this causes high levels of car use and CO₂ emissions. More recent planning norms have shifted towards a more sustainable transport system, which suggests less travel, shorter distances, more resource efficient transportation means and open processes where different sectors and actors participates in the policy-process (Banister 2008:75-79). The distribution of cities reflect the historically placement along railways, which facilitate travel and transportation between the centres by rail (Region Skåne 2011:16). This creates an opportunity for rail-bound traffic based on existing infrastructure to contest other transport means in Scania. Since regional polycentrism is offset by more transport and there is a quest for more transport and infrastructure this initiates the opportunity to direct this development towards

more travel yet with more resource efficient transport means in particular rail-bound traffic at a regional level. The shift towards a sustainable transport system at a regional level in Scania; is met by arguing for that public transport, cycling and walking should be prioritized where ever it is possible, according to the plan for infrastructure and all the respondents. The above-mentioned transport modes are supposed to replace the car to as large extent as possible thus reducing the CO₂ emissions caused by car traffic. These trends in planning are found in the practical example of the plan for infrastructure and transports, where strategies indicate a quest for sustainability and an improvement in public transport. In the Swedish transport political goals, the RDP, the report on polycentrism and the plan for infrastructure and transport, accessibility is an important planning principle that is expected to bring a sustainable transport system.

The accessibility goal and planning norm requires an integrated planning where localisation of habitation, facilities and services is planned in collaboration with the transport system (Holmberg 2008:56; Säfestad 2007:19). Integrated planning will tackle both what is demanded for a sustainable transport system and the accessibility goal (Åkerman & Höjer 2002:1954-1955). The local and regional action plan should prioritise resources towards efficient forms of travel such as walk, cycling and public transports. Actions in the planning and development sectors should ensure that new development is located where trip lengths can be reduced. It is also important to see to the existing development and that it should be restored for reuse. Mixed use and high-density developments are preferable. The information sector should actively be utilized to take full advantage of technology developments (Banister 2005:250-251). This is in-line with the environmental goals, which specify that buildings, activities and workplaces should be located in a way that can reduce the transport demand (SEPA (5) 2012). The policy solution in the RDP is to invest in public transport and improved insulation of buildings (Region Skåne (1) 2010:15).

Specialised labour markets are needed for economic efficiency and optimal utilisation of the workforce competence. The resulting specialisation, where cities should complement each other, depends on good communications between the centres. Travels to and from work often goes to other parts of a city or a region. Therefore a neighbourhood area can generate a certain travel pattern depending on where it is situated in a region (Lindelöw 2011:3).

The physical planning is also something that needs to adapt to the transport system, where locations of habitations and activities are important for the accessibility (Region Skåne 2011:69). Infrastructure is not a purpose of its own, activities, work places and habitation should be placed close to stations according to increase accessibility, says Andersson. The regional planners also support the municipalities with information and statistics and are often asked to assist when the municipalities are planning at a local level says Andersson.

What Carlsson-Green though points out is the difficulty in predicting if people want or at least accept to live in specific cities in a specific type of housing and infrastructural embedding. Everyone might not want to live near a station. Through research we can say that people travel in a specific way depending on the

structure of built environment, yet it is questionable if we want a society where people can't decide where and how they should live Carlsson-Green continues.

During the discussion meeting, arranged by the planning department of SRC, some of the representatives from the municipalities stressed that all municipalities cannot plan in a desired or specific way. All municipalities have different preconditions and requirements. It is rather problematic for municipalities that do not have the prerequisites to plan for accessibility. As for example some municipalities have industrial areas close to the railway station or not the same provision of walk or cycling routes, which complicates the planning for accessibility. It is also problematic for the less populated municipalities or the smaller conurbations though their catchment areas are not stable enough to provide public transportation.

The different parts of Scania should be kept together by the public transport in order to meet the sustainability goal, which demands a reduction of the impact on the environment and climate (Region Skåne 2009:7). This is also emphasised in the report on polycentrism as well as in the RDP. However, as statistics show, that the car is still dominating our daily travel as means of transport and work trips are the most usual purpose when trips are made in Scania (Indebetou & Quester 2008:68-70). Public transport has a market share of only fifteen per cent (Region Skåne (2) 2010:18).

Mobility management, which in this study can be identified in form of the project on sustainable travel and transportation, also work to reduce trips made by car. Attempts are for example made for office hotels and commuter parking says Carlsson-Green. In the plan for infrastructure and transport as well as in the report on polycentrism the main focus is on connecting labour markets with public transport. Nevertheless, in a densely populated region there is a high demand for goods at different places, which causes freight as remarked by Petersson. Causing a lot of road traffic.

6.1.4 Regional enlargement – external centrality

In the RDP and the plan for infrastructure and transport there is a goal for regional enlargement. This goal can be seen as conflicting with the regional integration goal as mentioned by Petersson. In theory this can be connected to internal and external centrality explained by Burger and Meijers (2011:1131). The internal centrality can be interpreted as the regional integration since that is the surplus of importance of a centre based on oncoming flows from other centres within the same urban system (Burger & Meijers 2011:1132). The external centrality represents incoming flows from other urban systems. In other words, Scania as a region is connected to other regions and the incoming flow from them. From this perspective a regional enlargement would probably facilitate for more people to work in Scania and live elsewhere or vice versa. This would connect Scania as a region to other labour markets. The regional enlargement can be connected to ambitions for increasing the economic growth. Though it conflicts the sustainable transport system if trips and trips lengths are increasing. Since once again, shorter

trips and less need to travel is preferable in terms of a sustainable transport system (Banister 2008:75-79). Carlsson-Green is sceptical to the regional enlargement process and adds that there is a need to reduce travel to reduce the impact on the climate. It is not sustainable, more and longer travels must be stopped.

Though, with further regional integration the link between the labour markets can be strengthening as well as the internal centrality. Here regional polycentrism has an important role since the regional integration causes more travels, these trips are shorter and can in another way be directed towards more resource efficient transport means.

6.1.5 The question of cooperation

In the plan for infrastructure and transport one of the strategic goals is continuity and collaboration in the planning process. Specifically, that is regional and local collaboration in the planning process for infrastructure. It is also emphasised as a strategy that the physical planning should be adjusted to the preconditions of public transport and that there should be a multi-sectorial perspective on infrastructure and regional planning (Region Skåne (2) 2010:28). Further, a mentioned challenge in the report on polycentrism is to increase cooperation between municipalities. It is a critical point that the municipalities need to relate to a regional perspective. Regional strategies can be successful though only through support from the municipalities (Region Skåne 2011:69-70). The question of cooperation and governance becomes important in the switch towards a sustainable transport system. The decision-making process is carried out at all levels of government within a sectorial framework. Sustainability demands a cross-sectorial thinking for decision-making. It is therefore a need for changes in the organisational structures of government so that this can take place (Banister 2005:3). Collaboration between different geographical institutional levels is also necessary for integrated planning, which is required for a sustainable transport system (Åkerman & Höjer 2002:1954-1955; Säfestad 2007:19). Additional, this can also be connected to the concept of sustainability in general where a possible option leading towards sustainability would be for community planners and environmental planners to collaborate more (Campbell 1996:309). Regional polycentrism can here be successful though in their work initiates collaboration between municipalities as well as collaboration between the regional and local level of planning. The discussion meeting is for example an attempt to this cooperation.

6.1.6 The alternatives?

Accepting that there is or will be flows between centres are a precondition to be able to connect the two perspectives of transport and polycentrism. If the transportation not uniquely is based on IT-communication, that is. Functionality does not exclude the morphological approach but morphological polycentricism can be applied without accepting functional polycentrism (Burger & Meijers 2011:1133-1134).

In many aspects the flows and interactions can be seen as the complex structure in which we live in today as a result of technology advancements within the transportation and information sector. Communication and interchange of goods and services are today far more complex than in earlier centuries (Vilhelmson 2007:146).

In this way functional polycentrism is connected to transport of different kinds. From earlier research on the topic the travel and car use has been pointed out as an essential factor for reduced CO₂ emissions. Private car use is also the most common transport mean for daily travels.

Connecting the two perspectives the utopian sustainable transport system would be a morphological region without interaction. With the morphological approach the travel only occurs within the nodes and are probably shorter than the travel to other nodes. This reversed development scenario without interaction and transport between nodes can only be addressed like a hypothetical situation. It is not very likely that development will be reversed in that way.

However, increased use of IT-communications could probably to some extent decrease the need to travel as suggested by Åkerman & Höjer (2006:1955).

Considering the demand for transport systems that have a low demand on land, as this is a requirement for approaching a sustainable transport system, a monocentric structure proposes an alternative since activities and people are clustered in one growth pole and demands less land. Though as Carlsson-Green points out, everyone doesn't want to live in a big city. That causes other problems like traffic jams and congestion.

Contrasting the sprawled structure that would bring disadvantages as those mentioned in section 4.2, exclusion of people, little social interaction and more car use and high demand of land (Hårsman et al. 2009:121).

7 Conclusions and Discussion

The purpose of this thesis is to investigate how regional polycentrism can contribute to a sustainable transport system. To fulfil the purpose the following questions were asked;

- What is regional polycentrism and how can it be connected with a sustainable transport system?
- What are the opportunities and problems for regional polycentrism to contribute to a sustainable transport system in Scania?

In the following part these questions are answered and discussed. Additionally, conclusions from the analysis are drawn.

7.1 Regional polycentrism and sustainable transport

Polycentrism is generally understood as the spatial distribution of urban centres in a defined area. Polycentrism derives mainly from theories on sizes and distribution of cities as well as how urban centres grow economically. There has though been an extension of these theories to a morphological and functional approach. Polycentrism has been measured in several different ways and can be analysed from different geographical levels. One of the geographical levels is the regional level, which can be declared as regional polycentrism. Regional polycentric structures can be divided into inter-urban and intra-urban patterns. Theories and attempts to measure polycentrism have become a political norm, to strengthen regional growth and competitiveness for regions within the EU. Since there is a wide interpretation among the employers of the concept regional polycentrism it is hard to further define regional polycentrism. Regional polycentrism can though be seen as a concept that needs, for a closer examination, to be defined from the mentioned perspectives in the specific case. The following questions should be considered when investigating regional polycentrism in a specific case:

- Is it an analytical object or a political norm?
- Is it morphological and/or functional?
- Is it an inter-urban pattern or intra-urban pattern?

Further, to connect polycentrism to a sustainable transport system one has to accept the functional polycentrism, the functionality and interaction between centres can be seen as the transport possibilities. From the sustainability perspective there, transport has been proven difficult to meet in the environmental sustainable way. There is a need to reduce CO₂ emissions caused by transportation. Road traffic is a major problem that needs to be reduced to decrease the CO₂ emissions in order to achieve sustainability. And as earlier research has shown this cannot only be done through technology improvements. It must also include behavioural changes. Behavioural changes can be achieved if regional structures can be planned in a way that reduces the need to travel by car. Regional polycentrism can be connected to a sustainable transport system through investments in public transport system and through planning policies for physical and transport planning.

Further, the possibilities and problems for regional polycentrism to contribute to a sustainable transport system are presented below;

Possibilities:

- The morphological regional distribution of centres is dense and distances are short, which creates a possibility to easily connect them to each other by public transport. The centres are also historically placed along the railroad network, which reuses the existing development.
- Regional polycentrism contributes to a sustainable transport system though the emphasis in the vision and practical work is to support investments in walk and cycling routes and public transport.
- Regional polycentrism as, a political norm, initiates an integrated transport and physical planning which is required for a sustainable transport system to be attained. In practical work the regional planners provide the municipality planners with information and statistics to help them plan for accessibility. The integrated planning can tackle the two challenges to create shorter distances with more energy efficient transport modes as well as it has a low land use demands.
- Regional polycentrism, as a vision, can be interpreted as forming a forum for an open process, involving several actors (at local and regional level). This has the opportunity to enhance collaboration between municipalities as well as between the local and regional planners. As described in earlier research the collaboration attitude is of vital importance for achieving a sustainable transport system. In this sense it can be seen as one of the possibilities for regional polycentrism to become the forum for discussion and for collaboration parts to meet.

Problems:

- The question of cooperation and governance is of great importance for achieving a sustainable transport system. These institutional changes are difficult to affect and implement with regional polycentrism.
- A problem of vital importance is that regional polycentrism is offset by more travel, specifically between labour markets. It becomes a problem for regional polycentrism to meet this travel demand by public transport though it demands high costs and investments in public transport.
- A problem for regional polycentrism to contribute to a sustainable transport system is that the planning norm structures and transport rely on travel behavioural studies that are not able to prove how a change in planning policy/practice would affect the travel patterns. Transport research that the planning norms rely on hides an inherent uncertainty. That is to say, a person might have chosen to live in an area because this person likes to cycle to work or travel by car. A change in structure might not have effect on these people's travel behaviours.
- Regional polycentrism aims towards a densely populated region, which demands a lot of freight, not only labour markets need to be connected. Goods will still have to be delivered to the different centres, which cause a lot of road traffic, which in turn demands even more costs and investments in the public transport system.

7.2 Discussion and future research

The competitive advantage seems as a fundamental benefit of the polycentric structure according to practitioners and the report on polycentrism. It can though be argued that an advantage of such a development addresses the problems for achieving a sustainable transport system, since regional polycentrism in fact requires more transport to accentuate the development. Regional polycentrism necessitates transport to bring economic growth and more accessibility for the people. As research can show the social and economical extents are easier to meet in the question for transport. However, the challenge to meet the environmental extent is crucial. Though for meeting the extent of environmental sustainability, the travel behaviour need to change in Scania. People's choices of travel modes as well as the travel distances need to change and this can in theory be achieved through conscious integrated planning which depends on that municipalities collaborate to a large extent. The regional and local planning levels also need to collaborate more in order to approach a sustainable transport system. The project

for land use, accessibility and a polycentric structure can possibly bring an open process, where different actors and sectors are active and participate in the policy-process, which is required for a development of a sustainable transport system. Further, the project on sustainable travel and transport also contributes to this open discussion, though more focused on participation and collaboration with private actors. The case of Scania can show how difficult it can be to implement certain visions and policies in practice. However, regional polycentrism seems to have been nominated to the optimal visions of regional structures, not only in Scania. The premier objective for this regional vision seems to be regional growth. From this perspective the sustainable transport system is understood as something that attracts people. To achieve regional growth, a population growth and a growth of branches and companies within the region. Though to attract these the region must be attractive and to be attractive a sustainable transport system is preferable though people want to live in good environments. Therefore it could be argued that a sustainable transport system can be seen as an incitement to attract more people. The question that arises is how regions that are sprawled or monocentric can be attractive and survive in the competition between the regions.

Further polycentrism in Scania, initiates an opportunity to attract more people though it can meet people's residence preferences. Not all people want to live in big cities as Carlsson-Green points out. Polycentrism offers the alternative to live in smaller towns without decreasing the accessibility and the attempt is to plan for this without increasing the demand of the car that will increase the negative impacts on society. The commuting which is a high share of the total travel in Scania should be possible without a car, at least between the regional centres. It also seems like polycentrism is the so far best solution for meeting the request for low land use demand, shorter distances and collaborative steering forms and at the same time provide alternative habitation locations for regional growth. This can illustrate the difficulties for planners to balance sustainably. Here the economic interests meet the environmental interests without any given solution or priority.

The debate about sustainable transport and regional polycentrism leads to thoughts of in what ways the development can be directed towards a sustainable transport system. As for example economic incitements for example taxes, congestion charges and prices for public transport.

Looking back one can clearly see how regional structures are formed through advanced technology and increased transport possibilities. The car and the railway constructions have caused different travel patterns. Planning ideals of today will probably affect the future of our regional structures. This emphasises the importance of evaluating our ideals carefully before making the ideas into norms. The car-society could promise welfare and mobility. Though it also came with negative impacts on the environment. The sustainable polycentric society aims at keeping the welfare while reducing the negative impacts on the environment. The question that remains is whether it also will come with unexpected negative impacts. Therefore more research is needed both on travel behaviours and patterns. It is also essential to investigate how the outcomes of this research is interpreted and used in policy making. Moreover, the research on how a change in planning policies and practice can effect travel patterns.

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Discussion meeting for a collocation of the municipalities' comprehensive plans at a regional level led by Region Scania (2012-04-27).

Table of Figures:

Figure 1: The extents of sustainability and the conflicting future goals. Source: Campbell 1996:298.

Figure 2: Christaller's scheme of marketing regions in a system of central places. Source: Christaller 1966:66; Naess 2005:177.

Figure 3: Morphological polycentrism versus functional polycentrism. Source: Burger & Meijers 2011:1134.

Figure 4: Morphological monocentrism versus functional monocentrism. Source: Burger & Meijers 2011:1134.

Figure 5: National transport political goals. Source: Swedish Government, Regeringen 2009:13. Explanations added by author.

Figure 6: Transportation mode for inhabitants in rural areas, smaller conurbations and larger conurbations. Source: Indebetou & Qvester 2008:70.

Figure 7: Distribution of transport mode from without the total numbers of trips within and to/from Scania. Source: Indebetou & Qvester 2008:70.

Figure 8: Distribution of errand from without the total numbers of trips within and to/from Scania during a week. Source: Indebetou & Qvester 2008:68.

Table of Maps:

Map 1: Location of region in Sweden. Map Source: Department of Human Geography, Lund University. Data Source: Department of Human Geography, Lund University. Modified by: Landgren 2012-05-01.

Map 2: Geographical limitation – Scania Region. Map Source: Department of Human Geography, Lund University. Data Source: Department of Human Geography, Lund University. Modified by: Landgren 2012-05-01.

Map 3: Conurbations in Scania. Map Source: Department of Human Geography, Lund University. Data Source: Department of Human Geography, Lund University. Modified by: Landgren 2012-05-01.

Map 4: The four regional collaboration parts. Map Source: Department of Human Geography, Lund University. Data Source: SRC (1) (2012). Modified by: Landgren 2012-05-01.

Map 5: Population in Scania, in absolute numbers. Map Source: Department of Human Geography, Lund University. Data Source: Statistics Sweden 2011. Modified by: Landgren 2012-05-01.

Map 6: Existing infrastructure. Map Source: Department of Human Geography, Lund University. Data Source: Department of Human Geography. Modified by: Landgren 2012-05-01.

Map 7: Regional cores and growth poles. Map Source: Department of Human Geography, Lund University. Data Source: Department of Human Geography. Modified by: Landgren 2012-05-01.

Appendix

Interview guide:

Administrative questions to all respondents:

Can I record the interview?

Would you like to be anonymous or can I mention your name and position?

Interview guide for interview with Mats Petersson:

What role does the infrastructure has when it comes to polycentric development in the region?

Can, and how in that case, infrastructure strengthen the polycentric development?

Are there problems and contradictions of a polycentric development in Scania, from a transport perspective?

How can regional polycentrism be combined with a sustainable transport system?

What are the potentials for a regional polycentric development in Scania, from a transport perspective?

Interview guide for interview with Therese Anderson, Veronika Sörvik and Moa Åhnberg:

How did the discussion about polycentrism started in Scania?

What is the purpose with regional polycentrism?

What are the potentials and possibilities for a polycentric regional development in Scania from a transport perspective?

What are the problems and contradictions for a polycentric development in Scania from a transport perspective?

In which ways are the polycentric development sustainable?

In your work, how do you support the municipalities in their work, more practical?

In the report it is mentioned that accessibility is an important factor for the polycentric region to work. In your work, how do you support accessibility in the region?

Concerning the accessibility, how do you support the municipalities in their plans for accessibility?

In what ways then can the polycentric development combine shorter distances and sustainable travel, as it will do according to the program?

Do you think that the polycentric development should become an expressed objective in the overall regional planning goals?

Interview guide for interview with Britt Carlsson-Green:

Can you tell me what the purpose is with the project for sustainable travel and transport?

What is the role of the project when it comes to regional polycentrism?

What are the potentials and possibilities for a polycentric regional development in Scania from a transport perspective?

What are the problems and contradictions of a polycentric development in Scania, from a transport perspective?

The planning system in Sweden:

The planning system in Sweden constitutes of interface between different actors in at different geographical level, national, regional and local.

General laws and planning policies:

The goal with the national planning is to contribute to sustainable human and natural environment from a social, natural and ecological perspective. According to the plan and building law, different public interests should be weighted against each other in an open and democratic process while at the same time respecting individual rights (Boverket 2009 (1)).

Regional planning and regional development programme:

The physical planning is primary a question for at local levels. Though certain planning questions have consequences beyond municipality borders and make regional imprints. The questions concerning the regional level are for example railways, larger roads and environmental questions (Boverket 2009 (2)). Regional development planning increases in Sweden as a consequence of Sweden's membership in the EU. In the regional development planning several aspects are integrated such as physical planning, economic development, development of infrastructure, social cohesion and planning of resources such as water and land including conservation of natural and cultural heritages. County administrative boards and regional councils have gained more influence and responsibility in the regional development progress in Sweden. It is though important that the local plans guide the regional development plans and regional structure plans, when they are produced (Boverket 2010 (1)) .

Public transport at a regional level:

A new law for public transport was established in Sweden the first of January 2012. The law (2010:1065) about public transport the purpose of the new law is to be an overbridging set of regulations for the public transport at local and regional level (Region Skåne 2012:4). The new law demands some main points that are;

- Establishment of new regional public transport institutions.
- The regional public transport institutions will decide on traffic supply programs and general traffic duty.
- Public transport companies can freely establish commercial public transport everywhere in the country.
- Even commercial public transport companies have to leave information about their traffic supply to a common system for traffic information.

The regional public transport supply programs must be established in dialogue with municipalities, public institutions, traffic operators and other concerned actors. The programs will form strategic decisions about the public transport in the region (Region Skåne 2012:4-5). This law will increase the decisive power of the region when it comes to public transport.

Local planning and comprehensive plans:

The physical planning is regulated in the planning and building law and the municipalities must have an updated comprehensive plan, where the overall planning principles and the general interests are represented. The comprehensive plan is supposed to constitute a foundation for more detailed plans (Boverket 2010 (2)).

Description of statistics from travel behavioural survey 2007:

The survey is based on mailings and is a traditional travel behaviour study. It consists of two parts, one survey and a travel diary. The travel diary contains detailed question about all travels a specific day and the survey has more general questions about accessibility to transportation means and other background questions about the respondent. The percentage that is represented in the figures are rounded off to the closest integer (Indebetou & Quester 2008:39).