

Peri-urban dynamics

Transitions in complex adaptive systems

A case study of Greater Manchester

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The spatial economical configuration of the peri urban area, with a clear separation between rural and urban functions, is no longer a realistic standard. The peri-urban area is an integrated rural-urban area characterized by dynamic developments. Increasing complexity of rural-urban relationships in the peri-urban area has resulted in incongruence between spatial changes and spatial policy. In order to better understand the dynamic developments that are at play in the peri-urban area, this research suggests a complex epistemology; fundamental changes are considered as transitions. Transitions are believed to be crucial in the understanding of complex behaviour and dynamic systems. The general objective is to examine whether change in the peri-urban area could be explained by the concept of transition. Moreover, the aim is to explore the possibilities and limitations of embracing a complexity approach and acknowledging uncertainty in planning.

A transition is regarded as a gradual and continuous process of fundamental change. The developments are characterized by a high level of dynamics. This high level of dynamics is partly due to its open and instable context. Contextual developments are important, and a transition should therefore be viewed from a multileveled perspective. The context does not directly influence the system but instead trigger self organizing rural-urban relationships changes. Several phases can be described in analyzing a transition; a predevelopment, take-off, tipping point, acceleration and stabilization phase.

Analyzing the developments in the peri-urban area of Greater Manchester gives us an enhanced understanding of the concept of transition. A qualitative case study has been chosen as the appropriate methodology. Information was gathered through in-depth interviews and an extensive literature research. In addition, other secondary sources that have been consulted mainly comprise of statistics and policy documents. Rural-urban relationships changes in the Greater Manchester region can be distinguished by five phases. The predevelopment phase (1930-1950) is characterized by a declining cotton industry, in which there is a clear dichotomy between rural and urban. The manufacturing decline and decentralization movements eventually result in a take-off (1950-1974). Due to expanding urban features in the rural area and a strong increase in service and commercial activities, the rural-urban relationships are in constant flux. Spatial planning adapts to developments during the tipping period (1974-1979) in which a new national government and the absence of regional policy 'trigger' self-organizing processes. The rural-urban relationships changes are becoming acknowledged by spatial policy and the 'opening up' of the peri-urban area is accelerating

(1979-1994). The commercial and services industry experience a strong development, this is stimulated by an extension of transport possibilities. In the period of stabilization (1994-present) the changing rural-urban relationships are becoming more embedded and integrated in institutional and organizational frameworks.

Complex adaptive systems, such as the peri-urban area, can be better understood by the concept of transition. Notions of uncertainty and non-linearity presume that the planner is becoming superfluous. On the contrary, the planner could play a vital role in managing spatial developments in these complex adaptive systems. This new perspective on planning embodies; (1) deflecting negative lock-in situation by creating diversity in the peri-urban area, (2) focusing on system innovations and stimulating fore runners, (3) anticipating on future trends and developments and ultimately (4) adapting policies and spatial strategies to an ever changing urban system. This last point is especially important since multiple transitions could occur in the future. Anticipating on developments and adapting towards a most desired transition could contribute to a new spatial management perspective for the peri-urban area.

Key words: ***peri-urban, transition, non-linearity, self organization, complexity, furcative change, spatial planning, Greater Manchester***

In 2009 I was given the opportunity to extend an ongoing research in analyzing developments in the peri-urban area. I was asked to explore a more quantitative approach towards understanding the developments in the peri-urban area of Greater Manchester. The concept of transition has been used to clarify these developments and is in line with a complexity approach towards planning. Complexity is a key word and is explicitly present in the work of a small group of researchers at the faculty of Spatial Sciences at the University of Groningen. The notion of complexity was very interesting to me and I was therefore delighted to participate in such a research.

It was however, not without obstacles. I soon learned that writing a master thesis is no easy task. It is as difficult as the four years of academic study that have preceded this final test. Abstract theories are very interesting but can at the same time lead you to lose sight in reality. The road towards finalizing my thesis, at some times, looked as it had no ending. Thankfully, I was not alone in my 'quest down the road'. The discussions with my supervisor, Ward Rauws, have been both constructive and inspiring. For this, I am very grateful. In addition, I would like to thank Marc Beeftink, Stefan Hartman and Gert de Roo for their useful comments during the whole process. Furthermore, I am thankful to Joe Ravetz who welcomed me to Manchester and assured that I was given access to the educational facilities. And last but not least, I would like to thank my friends and family for supporting me all the way to the end.

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1 Introduction

1.1 Background

Over the last decennia, urban areas have been characterized by an extensive outward growth. This outward extension has exerted pressure on the rural area, ultimately transforming rural functions into urban functions. This traditional dichotomy, in which the rural is dependent on the urban core, is no longer realistic. The 'encounter' of the urban and rural have created an area 'in between' the city and the countryside; the peri-urban area. Due to its situated position between the urban and rural, it has been subject to considerable change resulting in 'new patterns of built/ non-built and multi-functional land use [creating] new functional systems and land use types, covering larger areas at regional and inter-regional scale' (Hudalah, 2007, p.1). Economical, technological, demographical and social developments have not only changed the physical appearance of the peri-urban area but, even more, have changed the functional rural-urban relationships (Hornis & Ritsema van Eck, 2007). The peri-urban area is no longer merely an 'in between' area, but an area that interacts with other places; therefore characterized by a high level of dynamics. In this thesis it is assumed that the high level of dynamics incorporates the notion of non-linearity, thereby making it difficult for planners to intervene or to propose appropriate planning strategies (Bertrand & Kreibich, 2006; Byrne, 2003; Hidding, 2006). This study aims to increase our understanding of the peri-urban area as a complex and dynamic phenomenon and tries to explore the possibilities of analyzing the peri-urban area as a complex system. Thereby enlarging our perspective and making it possible to give recommendations for future planning strategies.

When dealing with dynamic and complex processes and an unseen future, Rauws & de Roo (2010) suggest considering the critical stages of rural-urban relationship changes as transitions. The concept of transition entails a high level of dynamics and assumes that developments move in a non-linear trajectory. The assumption of this transitional change of the peri-urban area forms the basis thought for this study.

1.2 The peri-urban area

Until recently, there has been no clear framework for understanding and analyzing the dynamics in the peri-urban area. However, there has been considerable academic attention towards analyzing developments in the peri-urban area. In order to better comprehend the peri-urban area and the analytical approaches towards its behaviour, this section entails: first, a demarcation of the peri-urban area; second, traditional approaches towards peri-urban development; and last, a contemporary view towards the peri-urban area.

1.2.1 Demarcation of the peri-urban area

There have been many inconsistencies in use of the term peri-urban area, or as Kurz and Eicher (1958) called it; the fringe. They noted that the difficulties which can be attributed to the lack of a precise category or definition are quite evident, namely “(1) inconsistency in the use of the term “fringe” within individual research studies; (2) difference in criteria used in determining fringe areas in different studies; and (3) erroneous combination of fringe areas with other residence areas in individual studies, the most frequent being the fringe and the suburb” (p.32. Kurz & Eicher, 1958). In the quest providing a framework for a conceptual clarification on the fringe area, Kurtz and Eicher utilized the following criteria as guides in formulating the definition: location, land characteristics, growth and density, occupation and governmental structure. Location is the most obvious definitive characteristic of the peri urban area. It is located beyond the city in a rural area. The land characteristic of the fringe is one of a unique nature; a mix of urban and rural land use. Regarding the growth and density, the fringe area is characterized by rapid population growth and an intermediate density. It shows potentialities for future (migration) growth since there is still much open land available. The occupational characteristic of the fringe shows a mixture of rural and urban. The governmental structure of the fringe area is one of considerable importance, since the government has influence on land use and on the type of facilities provided in the area. Of importance is the notion of governmental incorporation. Since the fringe is unincorporated, governmental responsibility is in the hands of local officials, making the peri-urban area under the jurisdiction of ordinances that are either completely urban or completely rural. In addition there is usually a lack in zoning regulations. Hence, Kurtz and Eicher (1958) conclude that “[...] the fringe is an area undergoing the growing pains of unplanned transition from land use consistency to inconsistency, i.e., from rural to a mixture of rural and urban” (p.33)

Thus, having acknowledged the fact that the peri-urban area is a place in which lots of developments are at play, we can discuss the academic planning approaches towards peri-urban developments.

1.2.2 Initial approaches towards the peri-urban area

The old historical city, identifiable by its central market-place and city walls, as the antithesis of the rural hinterland, where agriculture is the main economic base, is no longer a realistic standard. In fact, there has never been a clear contrast between the city and its hinterland. The peri-urban area has existed, although less explicit as it appears nowadays, since civilization first emerged over 6000 years ago (Thomas, 1990).

The first academic studies concerning the peri-urban area were mainly focusing on straightforward urban expansion. Louis (1936, in Thomas, 1990) was the first to mention the term

'fringe belt' (stadtrandzone) and stated that these peri-urban areas owed their origin to physical limitations upon urban growth, due to for instance city walls and open space that was maintained for defensive purposes. Conzen (1960) furthermore recognized that landscape changes in the peri-urban area were driven by cyclical events. He meant that at certain moments the peri-urban area expanded in a slow manner, sometimes rapidly and sometimes stationary. Both authors mainly focused on the morphological aspects of the peri-urban area and not so much on the underlying rural-urban relationships. Although acknowledging a variation in the level of dynamics in expansion, they dismissed the important underlying forces.

These underlying forces were more accounted for in the zone of problems approach of Burgess and Smith (respectively 1925 and 1937; in Pryor, 1968). They regarded the peri-urban area as a place that is influenced by a multitude of land use claims. Incorporating both rural and urban forces, the authors addressed the problems of this 'encounter', especially relating to functional and institutional changes (Pryor, 1968). A response to this multitude of claims, the practical planning approach was concerned with developing planning solutions. The starting point of this approach was, since the changing nature of land-use was at the root of many problems, to focus on planning control mechanisms that could be initiated in order to steer developments in the peri-urban area (Thomas, 1990). Examples of effective planning control in the peri urban area are urban corridors and green belts.

Concluding, the peri urban area is merely considered as the area 'in between' two forces (urban and rural). The approaches that have been described are rather simplistic. Instead, it is believed that dynamic developments are at play, making the whole system, i.e. peri-urban area, a complex set of relationships (Gallent et al., 2006). Rural-urban relationships are therefore not easily analyzed by the abovementioned approaches. In the next paragraph, a more contemporary view on the peri-urban area will be discussed in order to theoretically link the peri-urban area to a complex system approach.

1.2.3 The contemporary peri-urban area

Up till this point, a small part of the origin of the peri-urban area and some early academic thoughts on the subject has been grasped. Contemporary thoughts, however, are more considering the high dynamics of the area. Whereas the aforementioned ideas on the peri-urban area had its focus on the traditional dichotomy core-periphery, Hoggarth (2006) envisages that this is outdated. Flows of people, goods and communication are directly interconnected bypassing a single core as it 'meeting point'. In addition, Sassen (1991) signalled a shift between the core and periphery. Globalization has blurred the classical distinction between the city and its periphery. The new

economy has not only changed the position of urban cores but has also resulted in new (regional) hubs. The peri-urban area can be seen as such a new regional hub. Wezenaar (1994) agrees that it should be made clear that these peri-urban regions are anything but 'areas on the edge'; they are the central link in the spatial momentum. Sieverts (2003) goes deeper into the notion of centrality, by stating that "the term 'central' extends beyond a merely geometrical meaning, to function as an alternative expression for significant, important, and powerful (p.15). His concept of a 'zwischenstadt' has a more network like-structure and does not have one main centre but several functionally and symbolically diversified centres. Those numerous centres are supplementary and when considered together constitute the very essence of the city. The peri-urban area is thus no longer a part of the city, but a new network like 'city' of its own. Castells (1996) brings yet another dimension into the question. He states that there is another layer next to the - what he calls- space of places, namely space of flows. Space of places constitutes the 'real' space of territories, geography and areas. This space of places is becoming increasingly dictated by forces within the realm of 'space of flows'. Space of flows is the term of the space which independently coexists next to the ordinary geographical space. The changing rural-urban relationships are believed to be influenced by this increasing space of flows, hence the relevance to the peri-urban area. This is in the same line of thought as the aforementioned ideas of Hoggarth (2006) and Sassen (1991); flows make the city and its hinterland interwoven and part of a new global network.

Conclusively, the traditional distinction between urban and rural areas is disappearing and is currently changing into a new multifunctional system. Here it is argued that this system is characterized by a high level of dynamics. This dynamism is represented by an interchange of stable periods of relative causal relations and more dynamic periods in which relations are believed to be non-linear (Byrne, 2003). Traditional theories do not fully comprehend these new functional systems, as they do not entail the 'complexity' characteristics of the rural-urban relationships changes. When addressing planning strategies in the peri-urban area, one should be aware not to dismiss these 'complex' elements. One of the aims of this research is to understand this incomprehension by viewing the peri-urban area as a complex system.

1.3 Aims and Objectives

In order to improve the ability of policymakers to deal with the notion of non-linearity and high dynamics, Rauws & de Roo (2010) suggest considering the periods of high dynamics in rural-urban relationships as transitions. They argue that when viewing the peri-urban area as a complex system, the concept of transitions is a way to understand the non-linear development of these complex systems. This study aims at understanding rural-urban relationships as transitions. Hence, the general objective of this research is to examine whether change in the peri-urban area could be

explained by the concept of transition. On a more general note; what are the possibilities and limitations of embracing complexity theory and acknowledging uncertainty in planning?

In the quest for an answer to these questions, the area of Greater Manchester is selected for a case study research. Therefore, led by the main objective and after deploring the Greater Manchester case, we will be able to answer the following research question:

Which structural changes have taken place in the peri-urban area of Greater Manchester and can this be explained by the concept of transition? Moreover, what is the added value of research on the peri-urban area with a complex epistemology?

The research question will lead to the following sub questions:

1. To what extent is it possible to distinguish different phases of dynamics in the rural-urban relationship developments and can these be considered as transitional phases?
 - What are the spheres of influence underlying the dynamics in the peri-urban area and on which levels are they at interplay?
 - To what extent can the rural-urban relationship changes be identified as transitional phases?
2. In what way could the transitional perspective of rural-urban relationship changes support spatial planning?

1.4 A case study of Greater Manchester

This study constitutes of a case study of the peri-urban area of Greater Manchester. Greater Manchester is a metropolitan county in the United Kingdom and has been selected due to a multitude of factors.

1.4.1 Selection of the case study

Several reasons can be specified for selecting Greater Manchester as a case study. An important reason is that developments in Greater Manchester have been numerous. Manchester has changed from a small regional city, towards a large industrial region. The rapid development of the city has influenced the rural-urban relationship developments and has thus exerted 'industrial' pressures onto the peri-urban area. Consequently, due to the process of deindustrialization, it transferred itself again and focussed on the commercial and service sector. Hence, the potential for clear transitional periods in the past is intrinsically present. Indeed, since Manchester was a prototype of the industrial city it was also expected that Manchester "[...] was to illustrate the transition towards the post industrial state in an advanced form" (Rodgers, 1980; p.35) Bearing this in mind, it is expected that a post-industrial society has also triggered rural-urban relationship changes. Of

importance is also the way how the region is dealing with economical and demographical developments.

1.4.2 Greater Manchester

Manchester is often termed as the first industrial city in the world. The process of industrialization emerged in the United Kingdom in the middle of the 18th century and Manchester was a key leader in this process. The industry was the manufacture of cotton. The city of Manchester became the commercial hart of the industry, affecting the whole county of Lancashire (Hall, 1998). Between 1760 and 1830 the whole region changed from a pre-industrial society (agriculture and trade) to an industrial society (production). This development has ultimately changed the relationship between the city and its region. Consequently, Manchester was heavily affected by the industrial decline or deindustrialization in the second half of the 20th century. Meanwhile, the economy in the peri-urban area switched from an industrial oriented economy towards a commercial and service economy. In addition the peri-urban area became more residential area. These developments resulted in the transformation of the peri-urban area into a multifunctional system.

1.5 Structure

The next chapter will contain the theoretical framework. The theoretical framework will embed the case study analysis through various concepts. Especially since both the peri-urban area and the complex system perspective of this study are rather vague and novel, the theoretical framework is of utmost importance. It incorporates rural-urban relationships, non-linear dynamics and various concepts of transition. Chapter three entails the methodology in which the choice of methods and is explained. After having established the proper methodological tool and contemplated about the how to retrieve appropriate data, results on the peri urban area of Greater Manchester will be laid out in chapter four. In the chapter, first a short description of the region is given. The latter part will contain an analysis of the fundamental changes, and will be made clear by using concepts from the theoretical framework. The study will be concluded by a synthesis (chapter six) in which theory is linked to the results. Here, important implications and recommendations for future planning strategies will be discussed. The research will end with an overall conclusion.

2 Theoretical Framework

2.1 Introduction

Until recently, spatial development has been seen as a straightforward kind of change characterized by causal relationships (see also section 1.2.2). This study assumes, regarding the contemporary peri urban area with an extensive and dynamic context and a great degree of uncertainty, that relations are not causal but non-linear. Furthermore, several authors believe that urban systems, i.e. cities or in this case; the peri-urban area, are not the result of top down spatial plans but instead evolve rather autonomously (Batty, 2007; Portugali, 2000; Allen, 1997). The features of autonomous development and non-linear behaviour give rise to the notion of complexity. This alternative perspective could enhance our understanding in order to comprehend developments in the peri-urban area. This chapter entails several concepts that deal with complexity and the uncertainty of non-linear systems.

At first, an overview is given on the rural-urban relationships and the various levels at which the developments are at interplay. This so called 'multilayered perspective' attributes a key role to the notion of context. System theory, consequently, addresses this notion and uses it to distinguish several levels of complexity. In section 2.3.1, the peri-urban area is described as a system with a large unpredictable context with non-linear behaviour and is therefore depicted as a class IV system. The concept of self organization is introduced in section 2.3.2 in order to understand the 'autonomous' development of the peri-urban area and how the context influences the system. Furthermore in section 2.3.3, it is suggested that transitions are essential in understanding non-linear fundamental change of the peri-urban area. In section 2.3.4, the concept of transition is subdivided into stratigraphic and furcative models of change with the aim of gaining more insight in the understanding of transitions. The chapter will conclude with a synthesis of these abovementioned concepts of complexity and its use for analyzing developments in the peri-urban area.

2.2 Rural-urban relationships

The dynamic peri-urban area can be considered as the spatial consequence of the changing rural-urban relationships. Thus, in order to understand the peri-urban area it is important to address theoretical issues regarding the rural-urban relationships. According to Bertrand & Kreibich (2006), the rural-urban relationships can be divided into structural relations and functional relations. 'Structural relations deal with how land is used, urban organization and the spatial distribution of the population. Functional relations refer to socio-economic processes concerning diversification of

land the interconnections between various local functions' (Bertrand & Kreibich, 2006, p.7). Structural relations are considered to be slow moving processes and are altered due to a change in the, ever fluid, functional relations. Bertrand & Kreibich (2006) state that the functional relations are under constant flux and are evolving into new functional systems; consequently shaping the structural spatial patterns. In this study, with an emphasis on the changing rural-urban relationship, it is crucial to focus on the interplay between these structural and functional relations and their influence on the peri urban area.

In addition, when analyzing rural-urban relationship changes, several authors have suggested adopting a multileveled point of view (Rotmans et al., 2001; McGranahan et al., 2001; Rip & Kemp, 1998). Regarding the rural-urban relationships three different levels can be distinguished: micro, meso and macro. Firstly, the micro level relates to individual actors and local practices. In a transitional period, elements on the micro level deviate from the status quo, resulting in emergence and self organization (see section 2.3.2). Secondly, the meso level relates to dominant practices, rules and beliefs (functional relations) and the urban pattern of the peri urban area (structural relation). The meso level is furthermore characterized by the explicit spatial manifestation of the concept of holism. It is on this level that interdependent developments on various levels (= parts) create a fundamental change which eventually emerges into a 'new order' of the peri-urban area (= sum). Finally, the macro level relates to a range of contextual elements such as material infrastructure, political culture and coalitions, social values, worldviews and paradigms, economy, demography and natural environmental (Rip & Kemp, 1998). It is the context in which the meso and micro elements operate.

Moreover, Hudalah & de Roo (2007) have suggested supplementing the multileveled perspective by adding three dimensions - functional, organizational and institutional - and consequently altering it into a multi-layered perspective. Functional changes consist of physical changes (land use, infrastructure development), urban and regional dynamics (population, economy etc.), catastrophic events (war, disasters). Organizational changes concern changes of actions, cooperation and coordination of

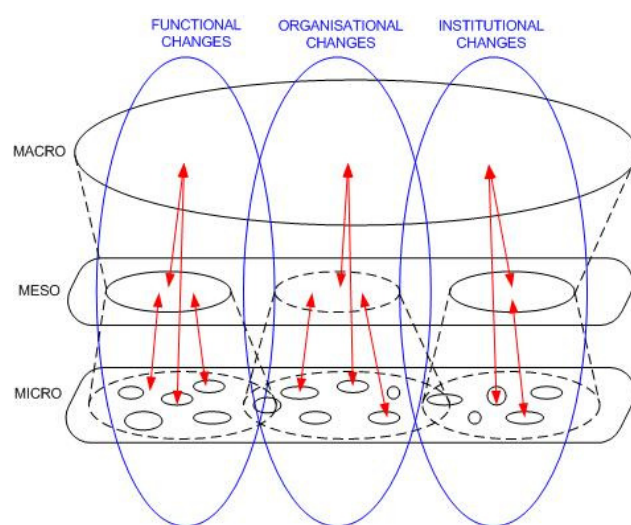


Figure 2-1 A schematic representation of the multilayered perspective (modified from Rotmans et al., 2001)

influencing stakeholders/actors (economic actors, political and governments, non-governmental organizations). Institutional changes consist of altering frameworks of meaning and rules of conduct (cultural values, formal and informal rules and ideological forces) (Hudalah & de Roo, 2007). Figure 2.1 envisages how the micro, meso and macro developments relate to the functional, organizational and institutional changes.

The multilayered perspective, as shown in fig. 2.1, will be used to identify different changes in the peri-urban area. It will furthermore increase the comprehension of the interrelated aspects of a transition. This research deplores a transition in the peri-urban area by assuming that it involves fundamental changes on every part of the multi-layered spectrum.

2.3 Complexity theory and non-linear dynamics

The understanding of complexity theory originates from the physical and biological sciences and diffused into the social sciences. Thus, the study of complexity has essentially been concerned with studying the general attributes of evolutionary natural (Garnsey & McGlade, 2006). The science on complex societal systems is relatively novel and looks at systems as being organized from the bottom up and gives '[...] particular attention to structural change driven by non-linear dynamics as well as explorations of the propensity of complex systems to follow unstable and chaotic trajectories' (Garnsey and McGlade, 2006, p.1).

With reference to the peri-urban area of Greater Manchester, the use of aggregate complexity is essential. Aggregate complexity studies how individual elements working concurrently (in a multilayered perspective) create complex systems. The complex systems have an internal structure and are relating to a surrounding environment (context), and can also exhibit learning and emergence (Manson, 2001). Aggregate complexity thus comprises the bottom up development and emergent behaviour of a system with a non-linear trajectory. Relating to the peri urban area, this means that the combination of local rural-urban relationships changes result in an aggregate outcome or context which is fundamentally different than could be a priori expected. In addition, the contextual developments in turn influence the local rural-urban relationships.

A focus on aggregate complexity does not necessarily mean the endorsement of new analytical tools, but rather represent an ontological shift that changes our notions of causality (McGlade, 2003). For this study it means the rejection of simple linear mathematical functions in order to analyze changes. Instead a holistic approach should be adopted. Holism conveys the thought that the whole is greater than the sum of its parts and the idea that systems have emergent properties which are not to be understood by reductionist analysis of the systems into lower order components (Garnsey and McGlade, 2006). Furthermore, the properties of a system cannot be understood from

the structural attributes of system components alone. Contextual thinking is necessary to understand how properties not apparent at the local level emerge at the system level. De Roo and Voogd (2004) furthermore state that the grade of complexity is dependent on the contextual degree of the system. This notion will be further laid out in the next paragraph.

2.3.1 Systems theory

In urban planning, systems theory is intrinsically linked with the degree of context. And context is subsequently linked with aggregate complexity. Hence, systems theory could be useful for understanding complex systems.

Systems theory, in short, accepts that cities and regions are complex sets of connected parts which are in constant flux (Allmendinger, 2002). Depending on the degree of context and causality, several classes can be depicted (Waldrop, 1992). Class I systems are closed systems and are characterized by a relatively stable context or one that has no influence on the system. The effects of interventions in a closed system are easy to forecast. Class II systems are circular feedback systems and are characterized by a higher degree of contextual influences. Various stakeholders have different interests thus making the outcome less predictable than in class I systems. Class III systems are open network systems and are strongly influenced by its context. Opposed to class I and class II systems which are relatively stable, class III systems are dynamic and complicated. Remote causality and opposing interests of many participants makes the predictability of the outcome of interventions difficult.

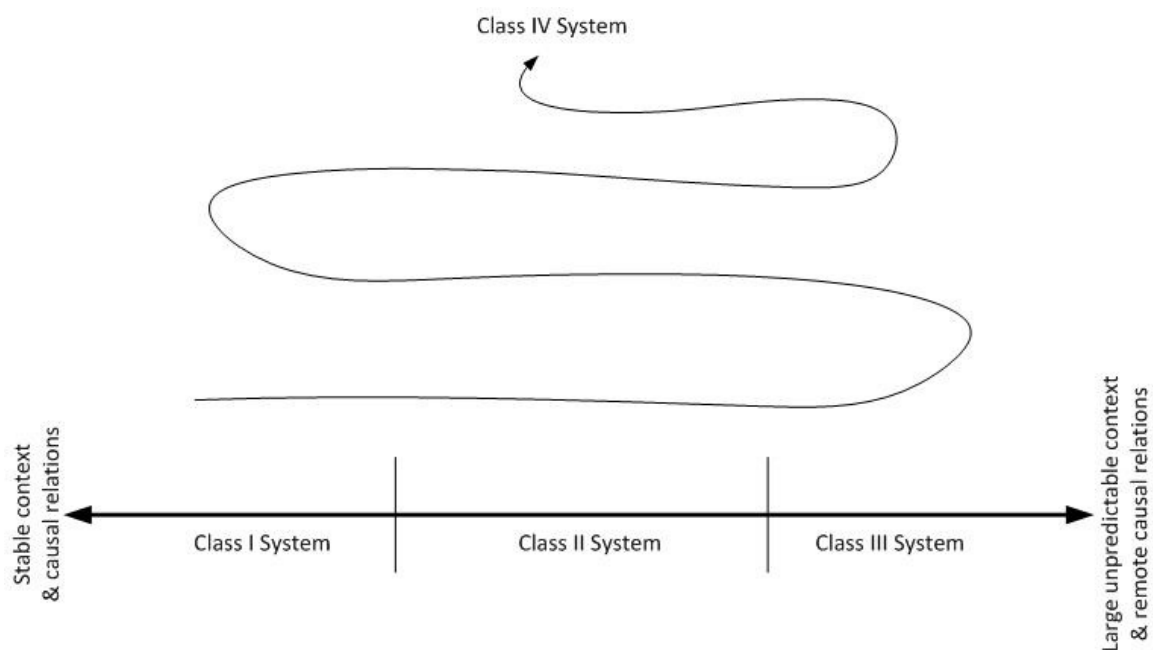


Figure 2-2 Class IV emerges out of Class I, II and III in a schematic representation (modified from Rauws, 2009)

Class IV systems are complex systems with non-linear adaptive behaviour. They move in time, depending on their contextual degree, along the class I to III continuum (see fig. 2.2). Hence, complex adaptive systems follow a non-linear trajectory; sometimes the context is stable and relations are causal, while other times are characterized by a large and unpredictable context with remote causal relations. Class IV systems are complex and due to the concept of emergence not suitable for a reductionist explanation i.e. the whole is greater than the sum of its constituent parts. The context of a class IV system is in constant flux and it is therefore impossible to isolate individual parts.

Another key process in the functioning of class IV systems is the role of feedback. In class IV system, the output of a process can act back to affect the input (circular causality). Negative feedback is feedback whereby an event of process acts to maintain system equilibrium. Positive feedback leads to self-amplification leading to system transformation or collapse (Urry, 2004). Figure 2.3 is a visualization of a complex adaptive system. It shows how local self organizational processes can emerge into complex adaptive behaviour under the influence of a context in flux. The feedback loops are included to clarify the amplifying and dampening effects.

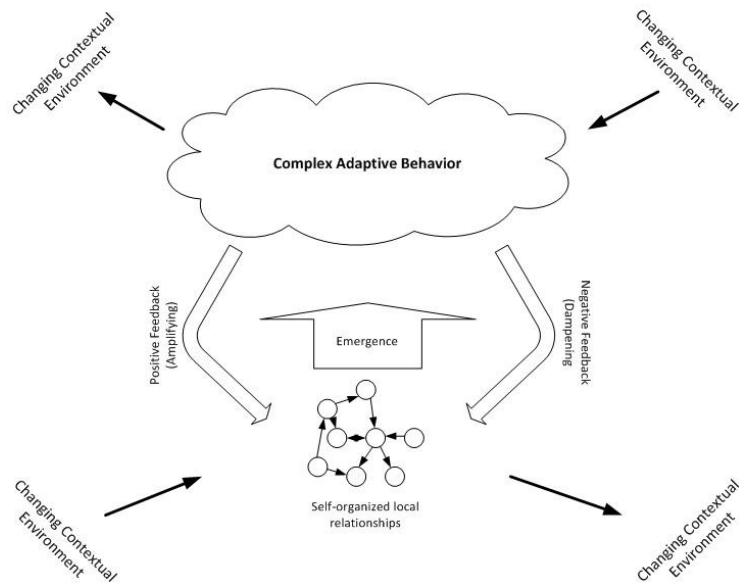


Figure 2-3 Schematic representation of a complex adaptive system (Lewin, 1992)

This study views the peri-urban area as a complex adaptive system and consequently regards the rural-urban relationships as non-linear relations. The understanding of these class IV systems is fundamentally different than that of closed systems. There is remote causality and isolating subsequent parts of the system would lead to erroneous results. Various variables in different aggregation levels influence peri-urban developments in a circular causal way, with the notion of negative and positive feedback. The peri-urban area is forced to constantly adapt to these changes

and believed to self-organize itself. The concept of self-organization will be further explored in the next section.

2.3.2 Self organizing systems

When analyzing a fundamental change in the peri-urban area of Greater Manchester, the contextual developments are believed to be of importance. This notion of context has been incorporated in the multilayered perspective (section 2.2) and was also mentioned in the systems theory section above.

The external forces acting on the system however do not directly determine or cause its behaviour but instead trigger an internal and independent process by which the system is said to spontaneously self-organize itself (Portugali, 2000). Haken (1978) and Prigogine (in Prigogine & Stengers, 1990) are most noteworthy for their work on self-organizing systems and its non-causal chaotic behaviour. Their ideas are best described by the Bénard experiment which has since become the classical example of the principle of self-organization (see textbox 2.1).

Portugali (2000) has extracted several features of self organization out of the Bénard experiment. Firstly, that a complex system that is open and part of its environment (context) can attain a spatiotemporal structure, having both spatial extension and temporal duration, and maintain that structure in far from equilibrium conditions. It is believed that this fluidity or far from equilibrium state is a consequent of a sufficient flow of energy and matter. Thus a constant input from external conditions will maintain far from equilibrium states in constant flux. Secondly, these external inputs are considered to trigger or 'create' novel structures and new modes of behaviour. This can be seen as an emergent property of the system (see also fig. 2.3). This creative characteristic of a self organizing system conveys the notion of holism. Thirdly, self organized systems exhibit complex relations in two ways; (1) in the way that their constituent parts are so numerous that there is no technical approach to establish causal relations among them; (2) self organized systems are furthermore complex in that their components are interconnected by a complex network of feedback loops (see again fig. 2.3). There is a circular causal relationship.

Summarizing, self organizing systems are characterized by a spatiotemporal structure in constant flux. The system is influenced by external conditions that trigger creative structures and cause emergent behaviour. Relationships are furthermore non-linear. Several authors have translated these main features of self organization to cities and have explored their usefulness in the field of geography, planning and urbanism (see amongst others: Portugali, 2000; Haken, 1978; Batty, 2007; Allen, 1997). Of great importance are the insights of Haken's concept of Synergetics.

Textbox 2.1: The Bénard Experiment

The Bénard experiment describes a liquid in a vessel heated from below. In the beginning, when the temperature difference between the bottom and the top is low, the heat is being transferred by conduction and no macro-motion can be observed in the liquid. As the temperature difference increases and a certain threshold is reached, the movement of the liquid particles becomes chaotic and unstable, yet form a remarkably pattern. The molecules of the liquid which were first moving in a randomly order, suddenly express a consistent macro movement. This pattern is the outcome of the movement of the hot liquid which rises through the center of the cells, and of the cooler liquid which falls along their edges. The spatial order of this pattern emerges out of self organization. (Portugali, 200)

Synergetics is a theory of self organization with an emphasis on the interaction, interrelations and synergy among the many components of the system and its overall structure and behaviour. Since a fundamental change of the peri-urban area is believed to be the result of many developments on various levels, the concept of synergetics could be of use for understanding the relationship between these developments and therefore the 'behaviour' of the peri-urban area. Haken (1978) based the ideas of synergetics on the laser paradigm, which exemplifies the following: In a laser many atoms release their light waves independently of each other and with different wave lengths. Each of these atoms might get support from the other triggered atoms. In this way a kind of Darwinian competition among the light waves for the energy resources of the triggered atoms begins. Competition is won by the light wave which grows fastest, this light wave is said to describe and prescribe the order of the system and is named the order parameter. It furthermore dominates the movement of the individual particles as if by enslaving them to move in its own rhythm; slaving principle (Haken, 1978). The transition from chaos into order is quite sharp and occurs at a critical strength of the power input by the flow of electric charge into the laser. Thus the alternation of a single, unspecific, parameter may cause a systematic phase transition, consequently called the control parameter.

Urban and regional dynamics can express the same features. For instance, in the case of Manchester in the early 19th century an analogy can be made between the characteristics of synergetics and the development of Manchester as the industrial capital of the world. The (macro) process of industrialization has resulted that the region of Manchester (due to particular advantages on the meso and micro level) has specified in the manufacturing of cotton. The whole region became involved in the manufacture of cotton through the putting out system (refer to section 4.2.1 for a description of this historical development of Manchester) and can be regarded as the order parameter. Spin offs of the cotton manufacture resulted in a large industrial base ultimately enslaving surrounding factories or other developments (micro) in the area and 'forcing' them to join this revolution. The process of industrialization can be regarded as a macroscopic manifestation

which has ultimately been triggered by inventions of individuals. These individuals are in turn determined by the process of industrialization, enslaving them in their order parameter, thereby relating in a circular causal way. For a fundamental change of the peri-urban area, the concept of synergetics is of importance due to the fact that it brings together the concepts of self organization and transition, pertaining to non-linear behaviour, while including a multilayered perspective.

2.3.3 Transitions

Priogogine & Stengers (1990) regard cities as self organizing systems and postulate that the order of those self organizing systems emerges out of chaos. Following their line of thought and in the search for the emerging properties of chaotic systems one should address the concept of transition. Like open and

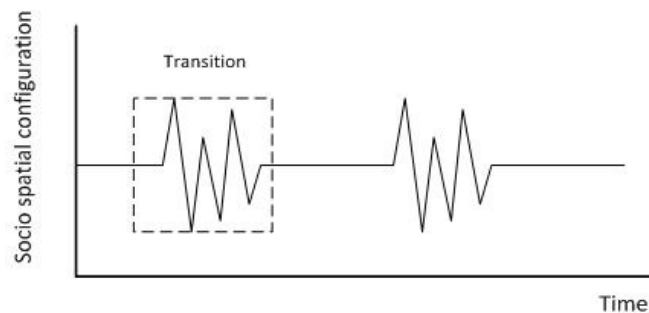


Figure 2-4 Stability and instability (transition) in a self organizational complex system (Portugali, 2000)

complex systems, the evolution of self-organizing cities show a very distinct and routinized path; a long period of 'steady state', followed by a short period of strong fluctuations and chaos, from which the system re-emerges to a new level of structural stability (Fig. 2.4). The short termed turbulent phase can be described as a transition. This transitional phase is considered as an interesting element in understanding the non-linear dynamics of the peri-urban area. It is at this point that developments are very dynamic (see textbox 2.1) and that an outcome is hard to predict. The concept of transition could help in understanding why developments, in this transitional phase, have occurred and which 'causes' could be identified.

An urban system is far from stable and evolves constantly. Within this gradual development or period of 'steady state', sudden fundamental changes can be discovered. These fundamental changes are seen as transitions (Rotmans et al., 2001). A transition has preceding developments or conditions that force its sudden change. Lundberg (1984) has researched the driving forces for the transitional type of change and distinguished four conditions:

1. Permitting conditions, which are aspects of the internal system which allow a transition to occur. For example a surplus of resources and the willingness of the dominant group to change.
2. Enabling conditions, which are external conditions that increase the likelihood for transitions. For instance, a changing institutional context such as globalization.
3. Precipitating conditions, which are immediate causes such as a crisis, growth or decline trends and dissatisfaction with internal and external actors.

4. Triggering events, which could be environmental calamities or opportunities, mass movements, unresolved conflicts and management change.

It can thus be said that a transition is the result of the combination of several conditions. The peri-urban area of Greater Manchester will be analyzed by using these four conditions. Furthermore, these conditions can be seen as a set of connected changes that reinforce each other but take place in several different areas such as technology, economy, demography, culture, ecology, institutions etc. Rotmans et al. conclude that a '[...] successful transition is a spiral that reinforces itself. In other words, there is multiple causality and co-evolution caused by independent developments' (2001, p.2).

Rotmans et al. (2001) have furthermore analyzed the concept of transition and divided the process into four main phases: predevelopment, take off, acceleration, and stabilization (see Figure 2.5). The predevelopment phase conceptualizes a stable system, yet incorporating its dynamic features. During this phase, the status quo does not change visibly. However, underneath the surface autonomous processes emerge (permitting and enabling conditions). In the take off phase, autonomous processes of the multilayered perspective reinforce each other causing the system to shift its equilibrium. The system gets out of balance and shifts from the old level of stability towards a tipping point. This tipping point is not a phase but a unique, crucial, and fundamental moment in the transition process (Hudalah & de Roo, 2007). After this fundamental transitional moment, the system arrives in the acceleration phase. This phase spreads the effects of the interplay of the various autonomous and structural developments. The acceleration phase is characterized by collective learning, diffusion and embedding processes (Rotmans et al., 2001). The process of transition ends with the stabilization phase, in which the speed of change decreases and a new dynamic equilibrium is reached. Robust elements maintain a new level of stability. In the analysis of the peri-urban area of Greater Manchester

(chapter 4) this phase division will be used to indicate and separate the various developments and their occurrence through time.

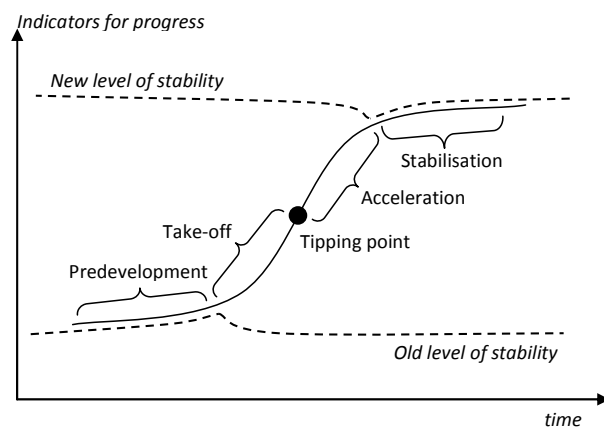


Figure 2-5 A representation of the four phases of a transition (Hudalah & de Roo, 2007)

Silva (2009) has stated that the transient phase is of great importance in understanding complexity, especially when dealing with geographic complex systems (peri-urban area) where self organization happens on various scales and through time. Thus with regards to the peri-urban area it is imperative to focus on this transient phase. In order to comprehend developments in complex system Silva makes a distinction between phase-transitions and bifurcations. The next section contains a discussion on the concept of bifurcations.

2.3.4 Bifurcations

The concept of bifurcations entails some sort of branching process in which the object of study alters due to the fact of changing parameters on which the object depends (Crawford, 1991). In the previous paragraphs, the change of parameters has been widely discussed. It is the branching process that has not been touched upon, and which differentiates bifurcations from transition. A transition or 'phase transition' is characterized by a change in the state of a system (i.e. water and its two states; fluid or solid) whereas a bifurcation entails a change of the fundamental 'being' of a system (i.e. a change from migrant to sedentary societies). A fundamental change in the peri-urban area can thus be regarded as a bifurcation. In the rest of this section, two forms of bifurcations will be discusses; stratigraphic and furcative change.

2.3.4.1 Stratigraphic change

In the case of bifurcations the need for fundamental change is so high that take off occurs bifurcating the old equilibrium and advancing into two separate branches. Portugali (2000) has coined this change a stratigraphic change, in which a system moves from one stable state to another. In the process of bifurcations, with every evolutionary move, the previous and alternative steady states die or disappear. A transition will lead to a new higher leveled steady state, while disintegration will lead to destruction or a lower level of stability. Thus the system moves, via

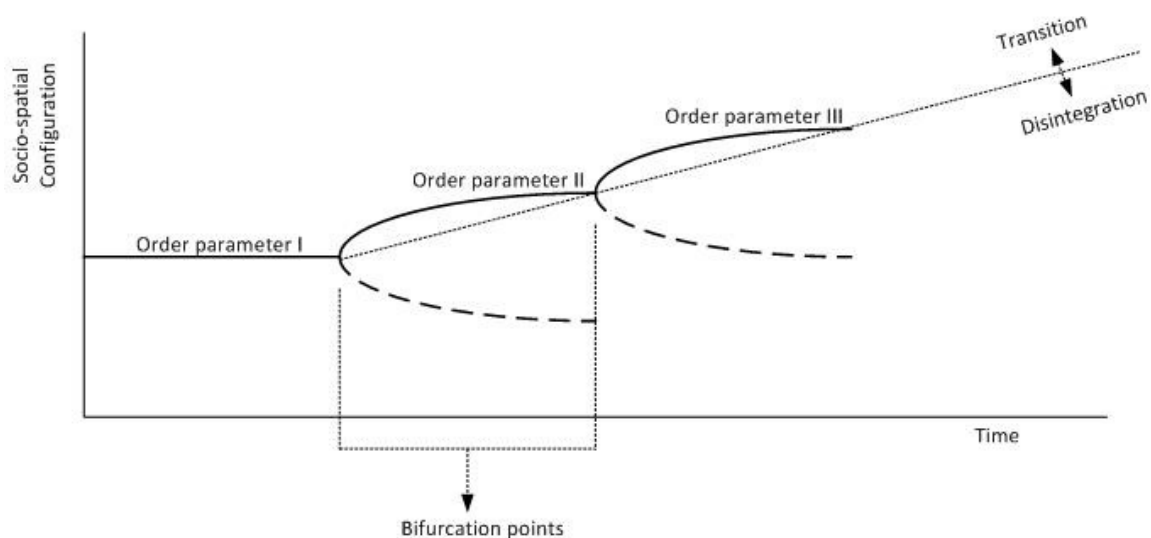


Figure 2-6 Stratigraphic change with transition and disintegration (modified from Portugali, 2000)

bifurcations, from one stratum to another. Portugali has furthermore incorporated Haken's concept of synergetics (1978), with an emphasis on order parameters, into the bifurcation diagram. Order parameters are the dominant forces controlling the new levels of stability or stratum (fig. 2.6).

Every bifurcation thus entails a new order parameter and in this study results in a new socio-spatial configuration of the peri-urban area. This process implies a unique evolutionary path to every peri-urban area and the rural-urban processes are thus dependant on historical developments. Past developments are important in the sense that they played a significant role in creating the current state, but (since the change is stratigraphic and previous or alternative routes die) they are not part of the present state of the peri-urban area (Portugali, 2000). The dismissal of this geographical path dependency does not fully fit the behaviour of the peri urban area. On the contrary, preceding elements are very important in understanding current developments as has been shown by the transition phases. We therefore need to address a form of systematic change that does include this feature; furcative change.

2.3.4.2 Furcative change

In a furcative change, there is no single evolutionary path that leads to transition. With every stage of branching (furcation) the system becomes more and more complex in the sense that the old or alternative states do not disintegrate but continue to develop, yet as the enslaved order. Portugali (2000) has incorporated this self organizing principle from the synergetics theory of Haken (1978). It means that the system beholds a certain memory and evolves out of previous developments (Fig. 2.7). History is therefore codetermining current conditions of peri-urban development. A good example of a furcative change is the Neolithic revolution, also known as the first agricultural revolution. From the perspective of self-organization this revolution (or evolution) can be interpreted as a bifurcation in which society moves from one state to another (higher) state.

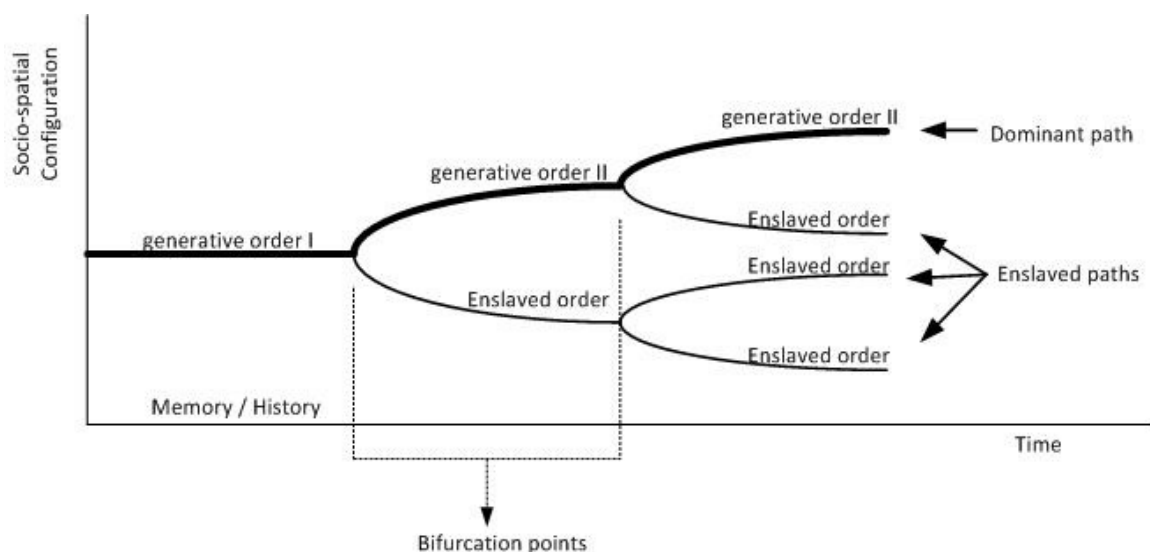


Figure 2-7 Furcative change with dominant order and enslaved paths (Portugali, 2000)

Consequently this shift could be seen as a furcative change; agriculture undeniably enslaved hunting and gathering but did not eliminate it. Agriculture ultimately made hunting and gathering a non-dominant form of food production. The same can be said about the urban revolution throughout the world. In this study, fundamental change in the peri-urban area is seen as a furcative change. Developments are path dependent and sequential phase transitions are believed to be self-organizational and adaptive.

2.4 Conclusion

In this thesis, the rural-urban relationships are viewed from a multi-layered perspective. This represents that forces on the macro level interact with elements on the micro level, consequently shaping novel rural-urban relations. The rural-urban relations in turn influence macro, meso and micro developments. In the case study analysis, this perspective will be used to differentiate developments and structure the interplay of these developments. It has furthermore been suggested the contextual environment is of great influence and that the peri-urban area will be regarded as a complex system that is constantly adapting to this changing environment. As a result, negative and positive feedback (circular causality) is causing the peri-urban area to constantly adapt and self organize itself. This process of self-organization initiates a bottom up development with far from equilibrium conditions, making the peri-urban area a system which is in constant flux. In addition, the concept of synergetics has been introduced to envisage that self organizational behaviour eventually results in a macroscopic movement (i.e. the order parameter) which in turn enslaves the other developments and consequently dominates the system. When an order parameter replaces another order parameter, a transition occurs. Whereas synergetics represents a simplistic view on transition, Rotmans et al. (2001) phases of transition gives more insight in the underlying forces of a transition. Several development stages have been distinguished and will be used to delineate the developments of the case study analysis. In addition, furcative change has been introduced to show that historic developments are conditional for current conditions and helps to increase the comprehension of the interrelated aspects of transition. Overall, the introduced concepts will function as a frame of reference and a way of looking towards the developments in the peri-urban area of Greater Manchester. Before analyzing those developments, the next chapter will contain the chosen methodology of the research.

3 Methodology

3.1 Introduction

The University of Groningen is a participant in a European research project called PLUREL; Peri-urban Land Use Relationships. As a result several researchers within the Faculty of Spatial Sciences have been analyzing developments through various case studies. Examples of the case studies are: Warsaw (PL), Montpellier (FR), Vienna (AU) and Haaglanden (NL). All of the cases have been studied in depth using qualitative methods. This study can be seen as an extension to these earlier conducted cases, only this time with the instruction to focus on exploring quantitative ways in order to support the qualitative analysis. This initial assignment has led to an exploration of appropriate quantitative methodologies that are in line with a complex epistemology. Concepts from the theoretical framework were directive in this exploration. This chapter is a result of this exploration and contains a description of the use of a qualitative case study analysis, a quantitative modelling approach and the possibility of a combination of the two. At first the qualitative case study approach will be discussed. Following, a quantitative way to uncover non-linear developments in the peri-urban area will be delineated. At the end, the chapter will conclude -considering both the possibilities of the two approaches and practical limitations- with a choice of method for this study.

3.2 Qualitative case study analysis

As noted in the previous chapters, this study has its focus on the developments in the peri-urban area of Greater Manchester. The objective is to analyze which developments have caused fundamental changes in the peri-urban area. Furthermore, it is hypothesized that these developments are not straightforward but instead follow a non-linear trajectory. This has ultimately raised the question whether this process could be best understood by using the concept of transition and whether this could result in a new perspective on spatial planning strategies.

The concept of transition, in various forms, has been widely discussed in the theoretical framework. The notion of context is considered to be of great importance for a transition. Thus, a study on the transitional behaviour of areas cuts into various themes, layers and levels (see also fig. 3.1). This is especially true for spatial systems which are characterized by a lot of external factors on various scales. This multi-disciplinary and multi-layered aspect is accounted for in this study as can be seen in the conceptual scheme (fig. 3.1). This scheme envisages a multilayered perspective. The red arrows show the interdependent relations between macro, meso and micro developments that relate in a circular causal way and are ultimately assumed to stimulate a fundamental change of the

peri-urban area. The interplay of developments are believed to result in a fundamental change of the peri urban area and its move from one 'order' of relative stability (or dynamic equilibrium) in the past to a new level of relative stability in the future.

One of the possibilities to 'uncover' this transition is by analyzing the contextual developments or -as has been pointed out in the theoretical framework- the permitting, enabling, precipitating conditions and triggering events. A qualitative case study that incorporates in depth interviews and supportive qualitative data is an appropriate method for retrieving both contextual information and micro developments in the case study area itself. According to Yin (2003), explanatory case studies can be used to analyze 'systems' or cases that are characterized by a high contextual degree, where a holistic and in depth investigation is necessary. As has been described in the theoretical framework, aggregate complexity is believed to be a result of a large and unpredictable context. Hence, the peri urban area, when regarded as a complex system, could accordingly be analyzed by means of a qualitative case study. Furthermore, changes in complex adaptive systems (see section 2.3.1) do not follow stable trajectories. Instead developments are characterized by adaptation and self organization. It is difficult to define clear causal relations; a change in complex adaptive systems is considered to be non-linear (Waldrop 1992, Hudalah & De Roo, forthcoming). This means that it would not be apt to expect a new order of socio-spatial configuration of the peri-urban area by means of induction. On the contrary, nonlinearities and self organization imply that qualitatively new dynamics can emerge due to stochastic shocks or threshold effects. A qualitative case study is not necessarily bounded by linear causality or a induction, but instead aims to look at the 'bigger picture' and has a holistic approach aiming to uncover the emergent properties.

Allen (in Frijters et al. 2004) has furthermore stated that *'in order to describe or to intervene in the new field [ed: complexity] we need representational techniques that engage time and change, shifting scales, mobile points of view and multiple programs. In order to map this complexity, some measure of control may have to be relinquished'* (p. 62). Thus, in order to understand the developments in the peri-urban area we need to look at changes over a long period of time, at several scales and through various viewpoints and programs. For instance, the macroscopic mechanisms of change at one period of time (e.g. the industrial revolution) are different than a the context in a postmodern world. Throughout time, several different contextual 'orders' could trigger various different changes within the peri-urban area. These contextual developments are important and need to be accounted for in the research. A qualitative case study is an appropriate method of choice since it is not fixated on one theme but on instead it is an intensive approach with a focus on one case (study area) and multiple themes (See also Manson & O'sullivan, 2006).

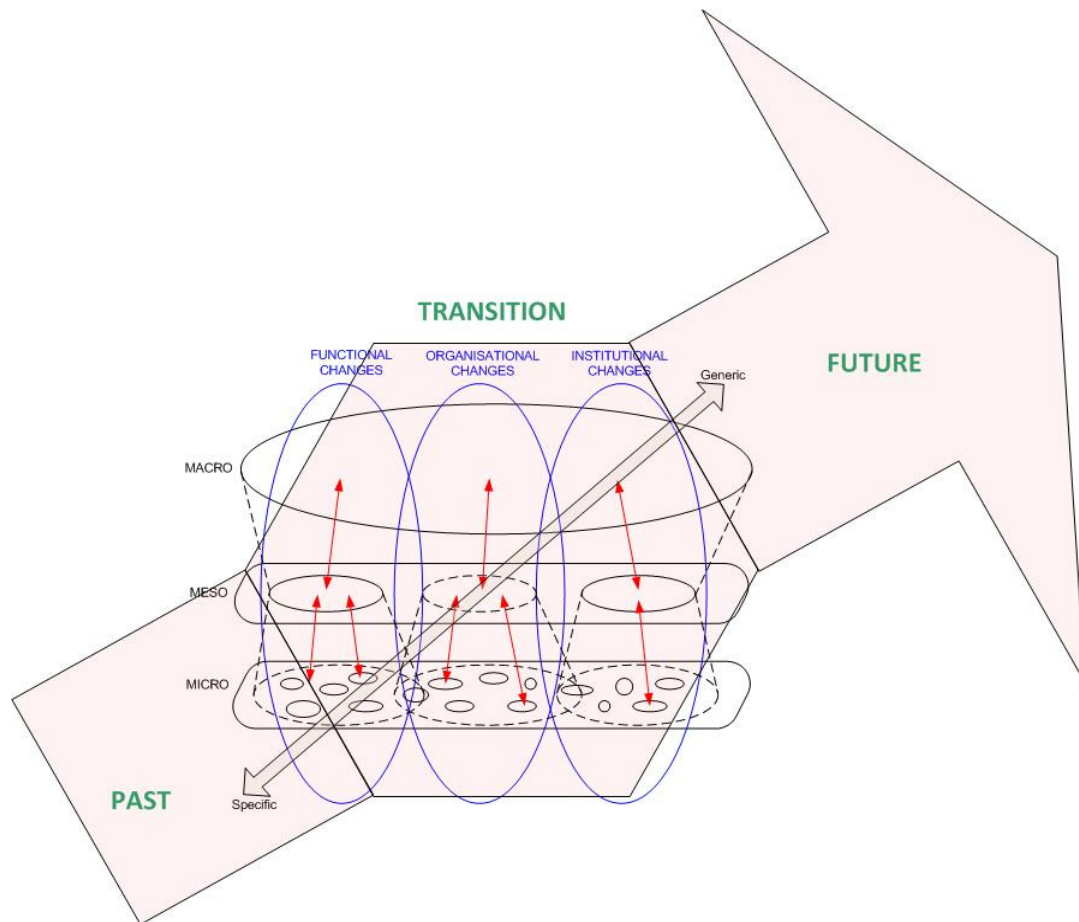


Figure 3-1 Conceptual scheme of qualitative analysis

Apposed to this qualitative approach towards peri-urban dynamics, several authors have postulated that it is also possible to understand these dynamics through quantitative methods (Batty; 2007; White & Engelen, 1997; Irwin et al, 2009). One of the most used quantitative methods regarding urban systems and nonlinear dynamics is an artificial or computational modelling approach. This approach pertains to concepts such as nonlinearity, self organization and emergence and will be discussed next.

3.3 Exploring the use of quantitative modelling

Up till this point, the methodology of the qualitative approach has been described. It has been shown that a qualitative case study analysis can give an insight into the developments of the peri-urban area by representing the developments as qualitative transitional phases. Due to a focus on in depth interviews it will mainly lack substantial quantitative data. Several authors (Batty; 2007; Openshaw & Abrahart, 2000; Silva, 2009) consider this narrative or idiographic approach as

insufficient and have suggested a quantitative or nomothetic approach that is capable of analyzing developments of complex systems; a quantitative artificial modelling approach.

Manson and O’Sullivan (2006) state that due to a focus on many entities and their relationship, computational (artificial) modelling is the dominant epistemology of complexity science. Modelling however refers to many methods. In the realm of aggregate complexity in the peri-urban area modelling methods are commonplace as a means of understanding interactions among large numbers of entities (Manson & O’Sullivan, 2006). This quest for methods capable of modelling complex phenomena has led to an understanding of methods from different fields of science; from biology to physics. Among these ‘complexity’ methods are evolutionary models (genetic algorithms; neural networks), cellular models and agent based models. Arthur (1994) has argued that the use of such models is essential because they allow researchers to understand how emergent phenomena result from the interactions of many entities. This contrasts with the ‘normal’ statistical methods that simply reduce systems as a collection of ‘weakly’ interaction aggregated components or variables. For this study, only one of the several methods that have been applied in (peri-) urban modelling has been explored; cellular automata. The method of Cellular automata is the most widely used method when addressing complexity in urban systems (Batty, 1997). This method has been assessed if it -taking the non-linearity perspective in mind- is able to provide an ‘added value’ for understanding peri-urban change. A result of this assessment can be found in Appendix A.

In Cellular automata traditional mathematical functions (with a priori knowledge of the relations) are replaced by rule-based procedures. This rule based procedure fits very well the way complex systems in general and the peri-urban area in particular are believed to develop. In essence, the state of a cell changes or develops if something does or does not change in its neighbourhood (context). This principle can be stated in its most general form by the ‘if-then’ principle (batty, 1997):

IF	something happens in the neighbourhood of a cell
THEN	some other thing happens to the cell

To give this principle specific meaning for the peri-urban area; the cells could be defined as peri-urban sites prone for developments; the ‘things’ as states or types of development either due to self organization or as an indirect result of some kind of action at a distance (macro influence); and the neighbourhood as the areas in the peri urban area where development might take place. Although deterministic in essence, this principle should be able to model complex (holistic) systems. A model

of cellular automata can furthermore be combined with a GIS interface to give it an explicit spatial dimension.

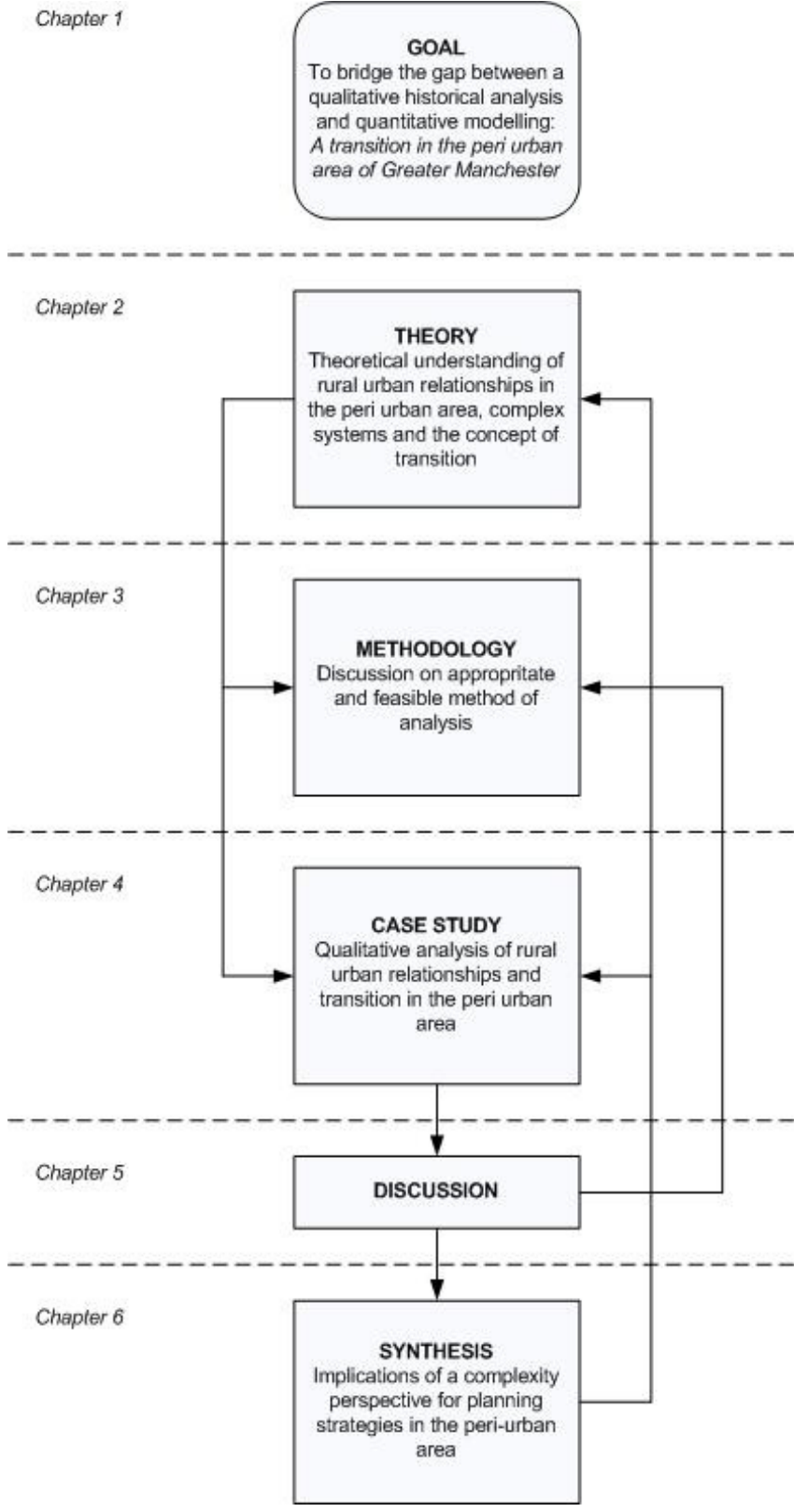
There are however some practical, yet very important, difficulties of this quantitative approach. Firstly, a GIS structured cellular automaton requires a vast amount of spatial micro data. Especially in the case of a transition of the peri-urban area of Greater Manchester over a long period of time, sufficient and reliable (spatial) data is very hard to retrieve. Secondly, a CA model that can accurately simulate or predict urban development based on empirical data must be custom built. Building a CA model requires insight into programming and advanced mathematics, this will take time and effort as well as expertise that go well beyond the scope of this research. Another difficulty, on a more theoretical or subject mattered note, lies in the provision of proper parameter values or rules of transition so that realistic results can be generated (Xi & Yeh, 2001). The peri-urban area is a 'real' and complex system with a large context. This requires the use of many spatial variables in a CA-model. Each spatial variable makes a contribution to the simulation and its influence is determined by its associated parameter. The main difficulty lies within defining these parameters. And since there are many ways to define the parameters or rules of transition, Lui & Phinn (2003) point out that it is essential to focus on the calibration of the parameters (a complete discussion on this can be found in appendix B). One of the ways to calibrate (or validate) a CA-model is by empirical information gained through qualitative in depth research (again, over a longer period of time). Each phase is characterized by different parameters and this can be made clear through a qualitative analysis. In this way and in order to properly understand the linkages between a new dynamic pattern of the peri-urban area and its underlying process, a quantitative modelling approach can be regarded as a supplement to the qualitative analysis. A combination of the two approach will improve the reliability of the results.

3.4 Conclusion

Conclusively, in order to better comprehend the non-linear dynamics of the peri-urban area and the processes that underlie those dynamics, it has been suggested to combine a qualitative case study -through the concept of transitions- and a quantitative modelling approach. For this study, the choice has been made to merely make use of the qualitative case study analysis. Several notions have been put forward. First, a case study analysis is a method that beholds in depth interviews and generates a vast amount of data on a relatively small topic area (qualitative micro data) while at the same time accounting for contextual influences. Its holistic nature makes it apt for analyzing complex relationships. The narrative characteristic of a qualitative case study analysis makes it more apt to delineate dynamic developments and consequently mark them as being conditional for a possible transition. This is much more difficult in a quantitative analysis. Mainly due to practical

limitations, a quantitative modelling approach is beyond the reach of this study. As mentioned above, a substantial amount of spatial micro data is necessary for analysis. Although many improvements have been made in the availability and accessibility of both spatial and digital data, it remains very difficult to retrieve the right data for a specific case study area (i.e. Greater Manchester). Even if the data had been available, a simulation of empirical data could have only been reached through a custom built CA-model. Building one's own CA-model is not only beyond the scope of this thesis it is beyond the scope of this entire Master programme. These practical limitations makes it simply too difficult to use quantitative modelling as method of analysis. In addition, a possible outcome of a CA-model (i.e. the observed evolution of macro dynamical variables) is just one of multiple paths. Irwin et al. (2009) accordingly state that qualitatively new dynamics can emerge in response to stochastic shocks or threshold effects. This means that the pattern dynamics of the peri-urban area that evolve in the future in response to, for instance, a policy change may be fundamentally different than those that of the past. This last point could be overcome by a qualitative case study analysis in which the underlying processes are highlighted. In depth interviews are more appropriate in delineating the processes at play than the quantitative analysis. Hence, although a quantitative modelling approach could be useful and insightful, a qualitative case study analysis is more apt or should at least precede a quantitative modelling approach (see also appendix B).

In order to analyze the peri-urban area of Greater Manchester qualitative data had to be gathered. Primary data was mainly collected through in depth interviews (see for an indication of the question, appendix D and for the list of interviewees, appendix E), while secondary data helped to confirm the results of the interviews. A concise description of the research design and the methods used for the qualitative analysis can be found in appendix C. Figure 3.2 envisages final research design, while simultaneously functioning as a reading guide.



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4 Case study: the peri-urban area of Greater Manchester

4.1 Introduction

After a prosperous existence from the 17th century, Manchester became the first industrial city. Its hinterland was greatly affected by this and became a region of industry and growth. However, after the Second World War the region was struck by the process of deindustrialization and has been characterized by a demographic decline from the 1970's onwards. Consequently this has altered the appearance of the peri-urban area. In this chapter, the developments of the peri-urban area of Greater Manchester will be analyzed. This chapter is structured according to the before mentioned multilayered perspective. First, an overview of macro developments will be given; this includes a brief description of the historic, urban, demographic and economic development as well as a short introduction to the British planning system, mainly focusing on the concept of green belts. The next section will entail an analysis of the developments in Manchester's peri-urban area, using the theoretical concept of transition. It will contain an analysis on how developments on the macro, meso and micro level have influenced rural-urban relationship changes in the peri-urban area by distinguishing the different phases of transition. This chapter will end with a conclusion in which the use of the concept of transition for understanding developments in the peri-urban area will be discussed.

4.2 Macro developments

The development of the peri-urban area of Greater Manchester, and consequently the macro developments that help shape the peri-urban area, will be understood in respect to the development of the urban history of Greater Manchester. Most developments are geographical path dependant. Hence, an overview of the urban history of Greater Manchester can be found next. In addition, this section on macro developments includes a short overview of the British planning system.

4.2.1 Historical developments

The city of Manchester lies in the North West of England, situated just southwest of the Pennines. It originates from a Roman settlement (Mamucium) in the first century/ Medieval Manchester was not an important town, not even regionally. It was surpassed by more prominent places such as Preston, Lancaster, Liverpool and Wigan. For comparison, those towns were all Royal Boroughs, while Manchester only gained its independent status, with Borough Corporation and parliamentary representation, in the 19th century (Kidd, 1993).

From the 15th until the 18th century, before the industrial revolution, Manchester developed from a local unimportant town into a regional giant and the capital of south east Lancashire. Much of this development had nothing to do with politics or local government, but was merely a consequence of a flourishing economy (Kidd, 1993). In the 16th century Manchester was merely a local manufacture and market centre for woollens and linens. It was the introduction of new materials and manufactures that raised Manchester and its region to new heights of development and especially due to the manufacture of a fustian cloth, a mixture of cotton and linen (Kidd, 1993). Hall furthermore adds that the region of Manchester was typified by proto-industrialization. Proto-industrialization is a phase in the development towards an industrial economy, in which certain conditions were created for the establishment of a fully industrial society (Hall, 1998). In the case of Manchester these conditions were marked by the increasing involvement of agrarian families in market oriented craft production in small towns, mainly through the putting-out system organized by merchant capitalists in the city. This putting out system, where small workshops in the region functioned as subcontractors for a large contractor in the city, resulted in strong linkages between Manchester and its hinterland. The growing centralization of Manchester was accompanied by a developing specialization among the regional merchants, some where even giving up manufacturing and concentrating on selling alone (Hall, 1998). Although Manchester was at the centre of the system, it still was not a large place (Figure 4.2.a). In fact, most of growth of Lancashire in the 18th century was due to a thickening of the countryside (Hall, 1998). The thickening of the countryside and the putting out system both represent that the peri-urban area has strong relations with the city, mainly through the manufacturing process.

During the industrial revolution, a phase of rapid change occurred. Manchester was to become the first industrial town (Hall, 1998). Due to innovations relating to cotton manufacture, Manchester developed external economies of scale. Over a long time period it had developed a whole infrastructure of specialists who imported and sold cotton, provided credit facilities and engineered specialized machinery. By the end of the Industrial revolution, Manchester has expanded significantly both in terms of economy as well as in terms of population. This resulted in an

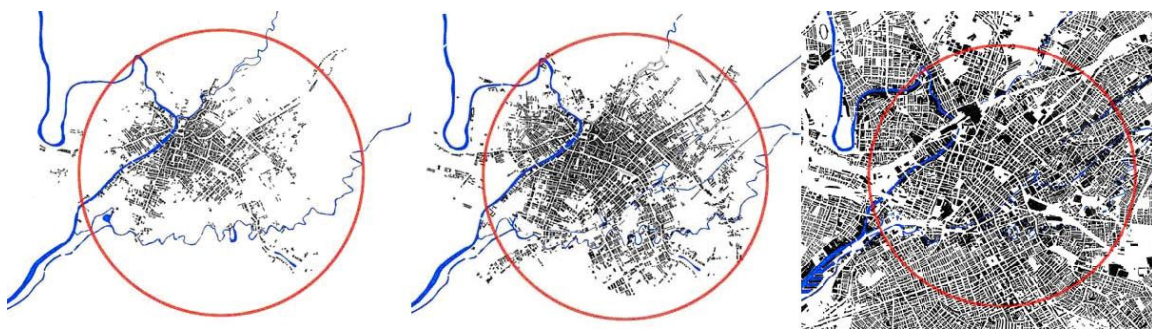


Figure 4-1 The urban expansion of Manchester in 1774, 1842 and 1924 (Rudlin, 2000)

enormous urban growth, as can be seen in figure 4.1

This enormous growth did not solely take place in the city; consequently the region was also affected. Several free-standing towns in the peri urban area evolved and became important industrial towns in the regional cotton industry and its related activities. The various economic enterprises generated linkages that formed the basis of an industrial region, furthermore the growth of the towns and its proximity caused an urban coalescence on a large regional scale (Law, 2000). The city of Manchester functioned as a hub, and was surrounded and served on all sides by towns specialising in diverse branches of textile manufacturing (Hebbert & Deas, 2000). The peri-urban area of Manchester had thus specialized in the manufacturing of industrial products, mostly linking to the textile industry. Figure 4.2 shows that the peri-urban area of Manchester was largely involved in manufacturing.

The strong economic linkage between Manchester and its hinterland was for a large reason due to transport developments in the region. One of these developments was the invention of the canal system. This changed the relation between water transport and the economy. The canals strengthened the relation of Manchester with its hinterland and strengthened the regional economy as a whole. In addition, the opening of the Manchester Ship Canal in 1894 gave the city direct access to the Irish Sea for cargo liners and made Manchester a port city, thus enlarging its sphere of influence.

The other transport development that had a large impact on the relation between the city and its region was the development of a railway network. Apart from the economical perspective, the railway made it also much easier to transport persons out of Manchester and especially for those who could afford to live at a distance from their place of business (Patmore, 1964; Kidd, 1993). From the 1804's onward the railway network expanded rapidly. Overall, the development of an extensive canal and railway network consequently shaped the developments in the 19th century peri-urban area by making it a region of industry.

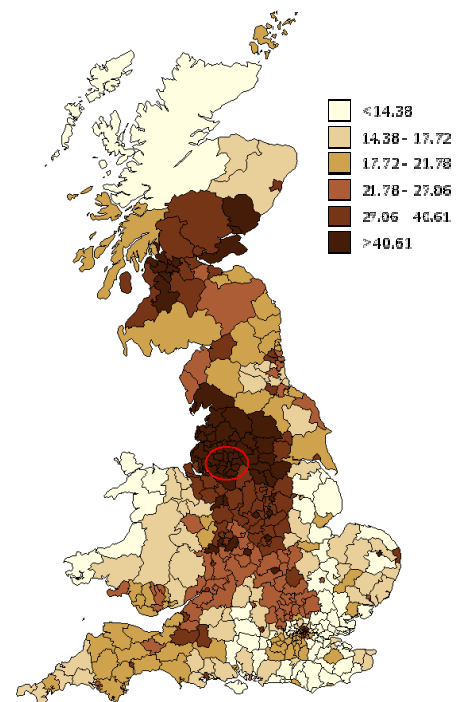


Figure 4-2 The percentage of people in the manufacturing industry in 1894 (GBHGIS, 2010)

During the ages of deindustrialization, Greater Manchester became less a manufacturing city and more a commercial city. Meanwhile, the manufacturing industry was differentiating into various sectors. Kidd (1993) notices however that Manchester had never been solely a factory town. From the beginnings of the industrialization it had been a warehouse town with factories. The town's financial significance grew to consolidate its commercial position. Manchester banks established branches in the cotton towns, and later mergers with London firms produced national banks. Manchester developed a financial infrastructure appropriate to its status as mercantile metropolis.

4.2.2 Economy and demography

In the previous paragraph several historic developments have been described. This paragraph will contain an overview of the most important macroscopic developments that have been at play during the hypothesized transition period. The only aim here is to shortly mention the most important economical and demographical developments; their ultimate impact on the developments in the peri-urban area will be dealt with in meso analysis later on in this chapter.

Firstly, globalization has created a web of linkages for national and regional economies on a global scale (e.g. Sassen, 1991). Furthermore, due to shorter working hours and a more purchasing power -especially in the western world- leisure activities have become more and more an important factor in economic activities (Tribe, 1995). Another important macroscopic driver and of great relevance to the peri-urban area is the increasing use of the motorcar. The use of the motorcar supports piecemeal development and is intrinsically linked to suburban sprawl (Sheller & Urry, 2000). The rise of the service economy is another macroscopic development that is believed to have impact on the development in the peri-urban area. Throughout the western world, the service sector is rapidly increasing while the manufacturing industry is decreasing. Concurrently, during this period of economic differentiation, the population of Greater Manchester has decreased. As table 4.1 shows, the population in the region in between 1930 and 2001 has decreased from 2.7 million to 2.5 million. Furthermore, household sizes have also decreased (Weeks, 2005). Moreover, Population not only decreased but also decentralized (Kidd, 1993). Especially in the western world, where

Population totals for Greater Manchester							
Year	Population		Year	Population		Year	Population
1801	328,609		1871	1,590,102		1941	2,693,775
1811	409,464		1881	1,866,649		1951	2,688,987
1821	526,231		1891	2,125,318		1961	2,699,711
1831	700,486		1901	2,357,150		1971	2,729,741
1841	860,413		1911	2,617,598		1981	2,575,441
1851	1,037,001		1921	2,660,088		1991	2,569,700
1861	1,313,550		1931	2,707,070		2001	2,482,352

Table 4-1 Population Greater Manchester 1801 – 2001 (GBHGIS, 2010)

people left the inner cities for less expensive and better accessible places surrounding the city.

4.2.3 Governmental structure of England

In order to understand how macro developments help shape the peri-urban area and possibly impact regional of spatial policy it is worth describing the government structure of England.

England does not have its own government but exists under the rule of the United Kingdom of Great Britain and Northern Ireland. Manchester is located in the region North West England, which exists, in its current shape, from 1994. The North West England region is furthermore subdivided into counties, either metropolitan, like Greater Manchester, or non-metropolitan (shire or unitary). Counties are furthermore subdivided into districts or boroughs. Greater Manchester consists of ten metropolitan boroughs, including Manchester itself. Finally the lowest units of government, featuring as local administration entities, are comprised of civil parishes.

Moreover, Greater Manchester contains ten local governments, and since England does not have a devolved government structure (for instance, provinces like in the Netherlands) each of these local governments are unitary elected authorities in their respective territories. This means that there is no effective power on the regional and county level. This pattern is relatively new however, and has been subject to two important reorganizations in the past 35 years. In 1974 a two tier structure of government was established where many local authorities disappeared due to mergers.

In this reorganization, Greater Manchester became a metropolitan county, containing ten metropolitan boroughs. The following reorganization of 1986 was short and simple. It effectively abolished the Greater Manchester County and transferred the functions to the district authorities or to inter-district arrangements.

Spatial planning policies have largely followed the overall development in governmental reorganization. Local plans (borough level) and structure plans (county level) have been replaced by Local Development Frameworks and Regional Spatial Strategy (regional assembly level) in 2004. Contemporary spatial planning in England still mainly stems from the Town and Country Planning act of 1947. The roots of that act lies in the distress in response to industrialisation and urbanisation. There were specifically concerns relating to urban sprawl and ribbon development. Consequently, the peri urban area has been shaped by this planning policy, most specifically by the implementation of the green belt. The green belt policy is the country's urban containment tool, implemented in 1955, in order to prevent or control unwanted sprawl. The policy is essentially a land use designation act to retain areas of largely undeveloped, wild, or agricultural land surrounding neighbouring urban areas (Gallent et al., 2006), however nowadays many people view green belt areas as areas of

outstanding beauty that have to be protected at all cost. The Greater Manchester peri-urban area has a large percentage of protected green belt areas. The scope of the green belt in GM was established in the Greater Manchester Structure Plan in 1981 and has since been incorporated in several documents up to the recent Local Development Frameworks. The green belt of Greater Manchester is predominantly associated with agricultural usage and covers 58% of the land in the metropolitan county (eco-region, 2010). How the green belt has effectively influenced the peri-urban area will be furthermore dealt with in section 4.3.4.

This paragraph conveyed the most important macro developments that have served as the contextual changes influencing the peri-urban area of Greater Manchester. The economical and demographical changes in this paragraph will be seen in the light of the historical development of Greater Manchester, with Manchester as its biggest proprietor. Furthermore, government reorganizations have altered and rearranged the institutional boundaries. In addition, the green belt policy has been an important instrument shaping the developments in the peri-urban area. In the next paragraph, the peri-urban area will be analyzed and it will become clear how these macroscopic developments have impacted and initiated a possible fundamental change.

4.3 Meso level: the peri-urban area of Greater Manchester in constant flux

In this section, the peri-urban area of Greater Manchester will be analyzed in order to answer the following questions; to what extent do developments in the peri-urban area entail features of self organizational behaviour and can these development changes in the area be regarded as transitions? The macro developments of the previous section will be analyzed more extensively in the way they have impacted and shaped the peri-urban area. The developments are explained through the lens of a multilayered perspective; macro developments give rise to self organizational elements on the micro level, which in turn influence macro developments and ultimately having its effect on the meso level.

This section is structured according to the concept of transition and the phases depicted by Rotmans et al. (2001); predevelopment, take-off, acceleration, stabilization and a tipping point. The phases are consequently marked by periods of time (years) in order to give a structured historical and chronological orientation. It should be noted that these divisions are less sharp than might be perceived and there is more likely to be an overlap on developments within the several phase-periods.

4.3.1 Predevelopment: The end of the cotton industry: 1930 - 1950

During the industrial revolution, Manchester had grown from a medium sized regional town (less than 100.000 inhabitants) to a big industrial city of global importance with a population of 750.000

in the 1930s (Hall, 1998). Consequently, as explained in section 4.2, the peri-urban area has changed into an industrial region with strong manufacturing linkages due to the putting out system. The towns in the peri-urban area had specialized in manufacturing, either directly by producing textiles in mills or indirectly by exploiting collieries. Because of this 'industrialization' of the peri-urban area, agriculture in Greater Manchester has been pushed to the margins. Less than two percent of the workforce in the peri-urban area of Greater Manchester was employed in agriculture in 1950 (GBHGIS, 2010). This does not indicate an absence of a rural society. On the contrary, there was a large society living rural areas. Only with large numbers of 'rural' workers partly employed in mining, manufacturing and services. This indicates that a large area of peri-urban Greater Manchester was industrialized. The labour force in the peri-urban area was thus already showing characteristics of 'urban' work. This has ultimately created a region that is greatly dependent on one economy. The structure of the peri-urban area can thus be regarded as mono functional. This mono functional characteristic of the peri-urban area makes the system unstable and hence prone for disintegration by respectively macro and meso drivers.

On the macro level, globalization -in terms of more integrated regional economies on a global scale- has led to a worsened competitive position of Lancashire in the cotton industry. Former British markets were developing their own textile industries and had an advantage due to the access to cheap labour and novel machinery (Sandberg, 1974). Meanwhile, a leisure revolution took place in the western world. The first half of the 20th century was a period of advancing living standards, shorter working hours and increased leisure. Purchasing power was increasing and leisure and its uses were becoming a central part in the growing service economy (Nazareth, 2007). Furthermore, the rise of the automobile and its motorways were slowly replacing transport via rail networks and waterways on a global scale (Spence & Linneker, 1994). These macro developments can be seen as changing contextual developments that, although not clearly visible and still missing a spatial manifestation in the peri-urban area, could be considered to be an enabling condition for a fundamental change of rural-urban relationships in the peri-urban area.

On the meso level there were declining outputs in the industrial sector. For example, in 1913, the heyday of Lancashire cotton industry, the regional cloth exports totalled over 7.000 million linear yards comprising 65% of the world's production (Kidd, 1993). By 1940 production dropped to one fifth of the total in 1913. Due to the mono functionality of Greater Manchester's economy, the rural urban relationship in this period is unstable and the peri-urban area is disintegrating (opposed to the stable structure proposed by Rotmans et al., 2001). However, following the reasoning of Lundberg (1984) this decrease in industrial outputs could be seen as a permitting condition for fundamental

change of rural-urban relationships. Despite a decline in production, the peri-urban area remained 'putting out' for the city and was still a producer for the textile industry as well as other sectors within the manufacturing industry.

The peri-urban area, being part of the industrial regional network, was consequently affected by the abovementioned developments. Recapitalizing, the cotton industry declined and the industrial region differentiated towards other manufacturing industries. The city of Manchester ultimately lost more and more manufacturing jobs and slowly focussed on trades and services. These were the first signs of the restructuring of the local economy from manufacturing toward the service sector (Kidd, 1993). This was however only the case in the city. The rural-urban relations in the peri-urban were disintegrating and remained dependent on manufacturing.

Another driver which had its effect on the peri urban area was the sign of a demographic decline of the Manchester and Salford inner cities. The city of Manchester, for instance, lost 8% of its population between 1931 and 1951 (Lever & Young, 1997). This decrease of population growth, as can be seen in figure 4.3, is partly a result of atrocious living conditions in the inner city. The industrial city was a very unhealthy city to live in, especially in the 'slum' areas (Kidd, 1993).

Slums were areas of terraced housing mostly containing families below the poverty line. The Greenwood Act of 1930 laid the foundation for slum clearance which ultimately resulted in housing developments in the peri-urban areas, known as overspill estates. Parallel to these movements was the erection of the first garden city in the peri-urban area; Wythenshawe. Wythenshawe was a product of the garden city

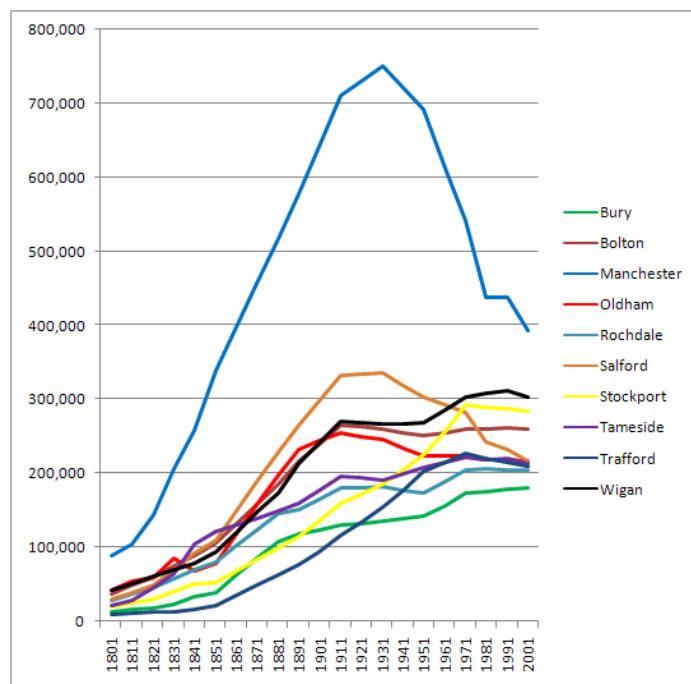


Figure 4-3 Population of city of Manchester and rest of Greater Manchester 1801 – 2001 (GBHGIS, 2010)

movement started by Ebenezer Howard and was conceived as a

satellite town deliberately planned to cover a large district including houses, parks and a factory area. The population of Wythenshawe was partly working in Manchester and partly in the new built up area (Kidd 1993). Developments of this kind were the first signs of decentralization.

This notion of decentralization implies that the peri-urban area slowly became a region for residential purposes. This, together with a deteriorating manufacturing industry reveals the first signs of an 'opening up' of the peri-urban area. Rural-urban relations are becoming less dependent on the traditional manufacturing economy and more on residential and commuter linkages. In addition, during the beginning of the 20th century Manchester's position as a major centre of higher education and learning was being enhanced (Kidd, 1993) and although this had little effect on the peri-urban area in this period, it did establish the foundation for a large university precinct in the future (Horlock, 1980).

To conclude, in the predevelopment period there was incongruence in developments. On the one hand, macro developments and a declining cotton industry worsened Greater Manchester's mono economy and made it prone for disintegration. On the other hand however, decentralization processes caused an influx of residential developments from the urban core into the peri-urban area creating a possibility for a new economical subsistence. How this process of decentralization and other developments reshaped rural urban relationships will be discussed next.

4.3.2 Take off: The era of decentralization:1950 – 1974

The years that followed the short reconstruction period after WWII were characterized by a fundamental change of the rural-urban relationships. These were driven by some radical changes of the economy, accompanied by a change in the spatial distribution of both the economy and the population. Rodgers has recapitulated the period by stating: "if one had to summarise the changes of the last two decades [ed: late 60's until mid 80's] in the Manchester conurbation in a single word, decentralization would provide a fair summary" (p.28, Rodgers 1980).

4.3.2.1 Take off due to new housing developments (demography)

During the aforementioned pre-development stage, Greater Manchester was characterized by a stagnating population. The population in the inner cities was declining rapidly, while numbers in the peri-urban area were still increasing. Thus, the peri-urban area was typified by demographic growth within an overall region of population stagnation. This

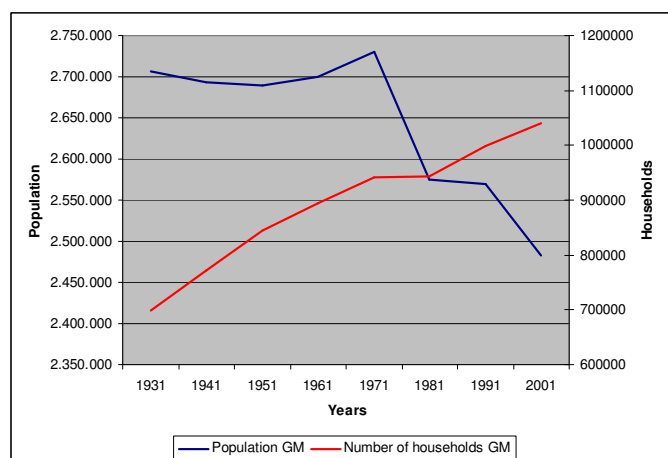


Figure 4-4 Number of households in GM compared to population decrease (GBHGIS, 2010)

development continued and intensified in the 1960s and 70s. The growing population in the peri-urban area was mostly due to new housing developments, which moved from the inner cities into the peripheries. The dispersal of the population, although in a declining population, was possible due to the fact that household sizes decreased (see fig. 4.4). The overall increase of households was due to a shrinking of the size of the households and was part of an international trend in the Western world (Weeks, 2005). This trend resulted in more households and therefore a larger demand for housing in the peri-urban area. The increasing number of households can be regarded as an enabling condition for a transition to occur. It is a changing macroscopic context. Housing ultimately moved towards the peri-urban area (see fig. 4.5) because people preferred to live in a more rural area, away from the dirty slums in the city (Interview B; Kaczmarek & Allman, 1997; Champion & Townsend 1990). The spatial structure of the peri-urban area altered from an industrial region of workshops to rural place to live. The function changed from working to living

This process of suburbanization was later helped by legislation that allowed slum clearance on a large scale. This change, initiated by legislation, meant that housing had to be provided for those people who had been displaced by the clearance. This can be seen as a precipitating condition; an immediate cause for growth to occur. A large number of overspill estates in the peri-urban area were the result. The function relation

between the peri-urban area and the city core changes in due course. The peri-urban area became less involved in production and more in consumption (residential).

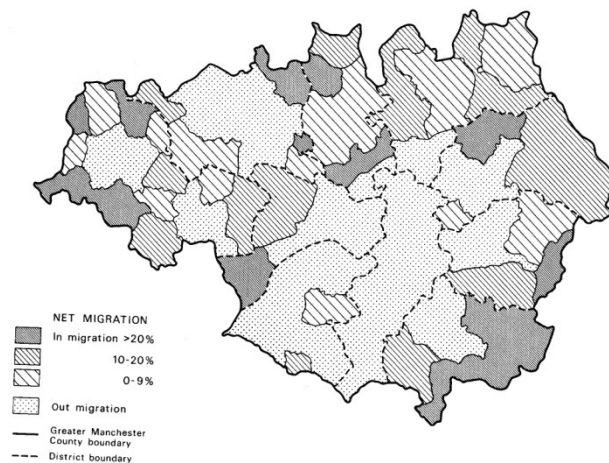


Figure 4-5 Net migration in Greater Manchester 1966 – 1971 (Bridges & Lodwick, 1980)

4.3.2.2 Take of due to economy

Several economic meso and macro drivers can be distinguished that have ultimately changed the rural-urban relationships. Firstly, the definite end of the cotton industry and the failure of an anticipated 'new industrial revolution', followed by a process of sharp industrial decline in the

Greater Manchester region. Secondly, an increasing services sector and lastly the extensive development of a motorway network.

In the beginning of the 1950's the process of decline in the cotton industry continued. Occupations in textile manufacturing halved between 1950 and 1960. The government tried to stimulate the industry by enacting legislation to help modernise and amalgamate it (Cotton Industry Act 1959). The Act was designated to apply " [...] massive surgery to the atrophied and moribund parts of the industry" and helped to scrap "half the equipment in place in mills [...] almost instantly" resulting in the closure of "[...] the weakest firms and the oldest, least efficient mills [...] in their hundreds" (p.30 Rodgers, 1980). This reorganization of the cotton industry was coincided by an industrial diversification. The engineering, metal and chemical industries, originally spin offs from the cotton industry, evolved in into diversifying sectors. Thus, with a reorganization of the textile industry and a diversifying manufacturing industry, Greater Manchester's manufacturing economy seemed to be flourishing again.

However by the late 1970's this progress had been arrested and even reversed. The cotton industry act had resulted in a survival of the fittest, only the strongest firms and best equipped mills survived. This was amplified by the macroscopic process of globalization; companies shifted their manufacturing to lower-cost locations and were operating in a global economic scale (Barlow, 1995). Furthermore, raw materials were quickly changing; from cotton to synthetics and man-made fibres (Kidd, 1997) Productivity levels were increasing and smaller plants had to close down, this led to a massive loss of jobs. The shrinkage of the manufacturing industry was partly due to the process of constructive rationalization from which a slimmer, technically more efficient and commercially stronger industry arose (Rodgers, 1980) New major investments in the manufacturing industry were attracted away from the Greater Manchester region (Rodgers, 1980; Mason, 1980; Barlow 1995) due to both globalization effects as well as decisions made by transnational corporations. To conclude, the manufacturing industry declined rapidly and has lost a significant amount of jobs. The industrial crisis, regardless of its cause, can be regarded as a precipitating condition. The industrial region, the city and its peri-urban area, lost its previous dominant economic base with the destruction of the putting out system. The peri-urban area was no longer a place that was serving and supplying raw materials and industrial products and due to a change of the rural-urban relationships the spatial structure of peri-urban area had altered.

Meanwhile, losses in manufacturing have been accompanied by a growth in service occupations. The first sign of an increasing service sector was noted in the metropolitan region of Manchester and not so much in the peri-urban area. Within the service sector the low skilled and low paid jobs such

as transport and distribution were declining while finance, administration and other professions which needed special educative training were increasing (Rodgers, 1980). Within the city of Manchester, several educational developments effectively resulted that in the mid 1980s 73% of the service sector was employed in public and scientific services (health and education) (Kidd, 1993). A large university precinct and a hospital complex became one of the largest employment clusters (Rodgers 1980). Although these service developments are not directly spatially present in the peri-urban area, they do represent an overall change from manufacturing towards services.

4.3.2.3 Take off due to decentralization

Apart from a shift towards the service economy, businesses also moved from the centre to the periphery, thereby resulting in a change of the peri-urban area. The central business district of Manchester especially suffered from the decentralisation of office development from the 1960s until the 1980s. Due to problems of inner city parking, the city became less attractive. Better motorway access and lower rents, provided the peri-urban area with advantages. As a result new office blocks arose across the southern suburbs (Kidd, 1993). Examples of early development of office decentralization are office parks in Cheadle Hulme and offices in the Trafford District (Sale, Altrincham). The suburbanization of offices was less severe than the outward movement of the before mentioned households. For instance, in the period between 1951 and 1961 the Manchester-Salford-Trafford core lost 74.100 people and the peri-urban area gained 102.300, while the core lost 7.600 jobs and the peri urban area only gained 2.600 (Law, 1980). It can be concluded that jobs were decentralizing less intense than population, making the peri-urban area more commuter dependent on the core. In this vein, the rural-urban relationships have also changed. The peri-urban area became better accessible and more integrated with the city of Manchester. Residential and business developments represent the autonomous developments that may cause a transition in the peri-urban area.

Summarizing, the take-off period that precedes a fundamental change of rural-urban relationships is characterised by decentralisation. Household size decreased, resulting in an increase in the numbers of households. An urge for suburban living in combination with government policies of slum clearance led to a mass movement of suburbanization. In addition, the obsolete cotton industry and eventually the whole manufacturing industry were in rapid decline. Concurrently, employment in the service sector was increasing. Greater Manchester found itself on the verge of becoming a post industrial society. Offices left the inner city and new development were more and more settling in the peri-urban area. The outward movement of both people and offices was consequently assisted by massive motorway developments. However, in the mean time the greater Manchester region was still embedded or enslaved by an outdated but strong industrial base. Figure

4.6 represents this exhibitory effect of the old industry, while at the same time indicating the dominant forces that stimulate a change towards a transition. The developments from the predevelopment and take off phase have been explicated through a model of furcative change (see fig 2.7). Noteworthy is that figure 4.6 does not represent one big transition, but instead envisages a concatenation of developments. Moreover, following the typology of Lundberg (1984) the developments can be marked as enabling and precipitating conditions for a fundamental change of rural-urban relationships to occur. In the next paragraph, developments that can be regarded as triggering events will be described,

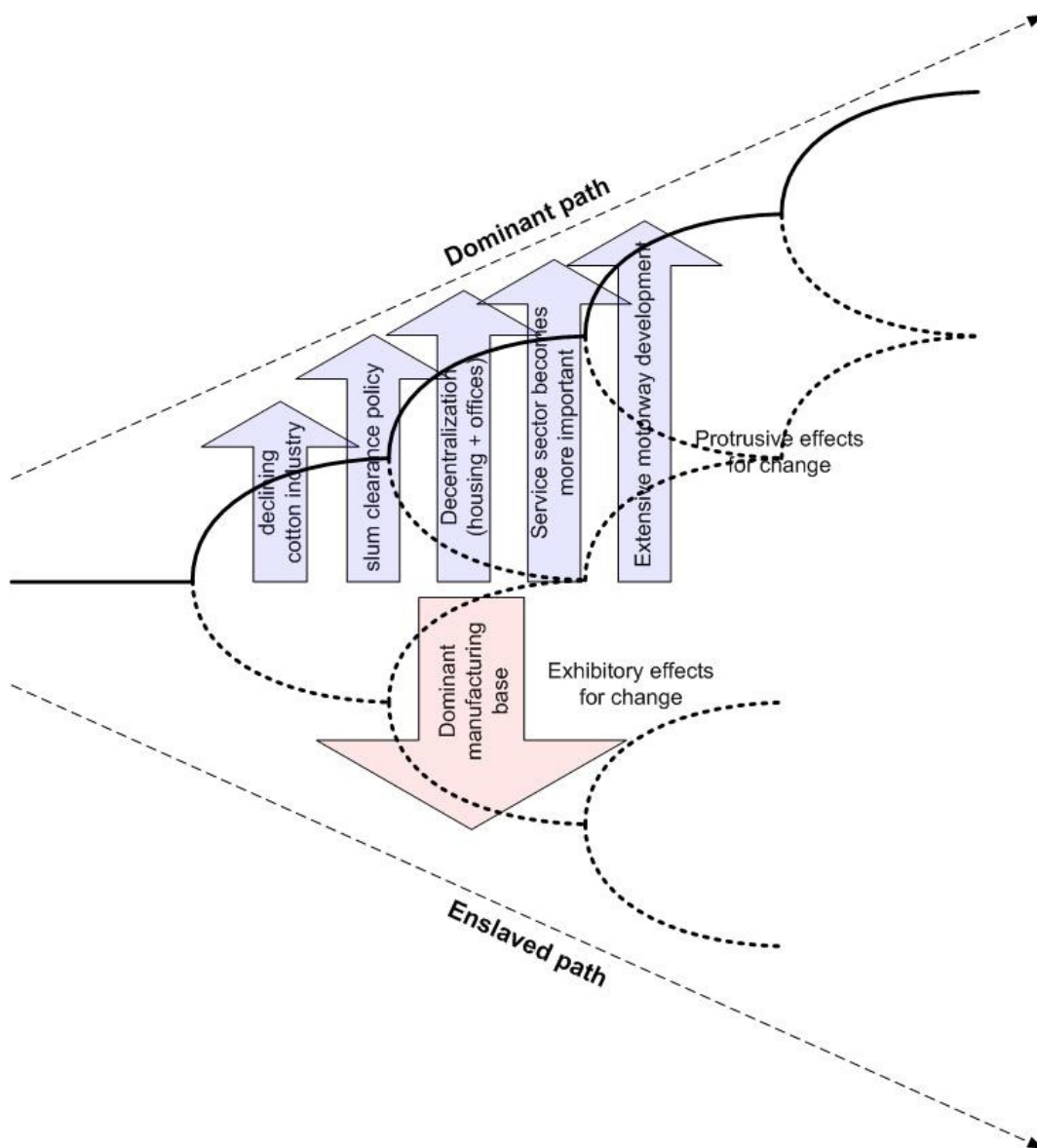


Figure 4-6 Concatenation of developments in a model of furcative change

4.3.3 Tipping period: triggering events: 1974 – 1979

In chapter two, a tipping point was introduced as the demarcation between the take off period and the period of acceleration towards a new 'order' of the peri-urban area (fig. 2.6). In the case of Greater Manchester it is not so much a single point but rather a tipping period in which several triggering events occur simultaneously.

In the case of Greater Manchester, a new national government came into office in 1979, resulting in the new right movement of Margaret Thatcher. This government enacted neo-liberal legislation that relaxed planning policies. Lundberg (1984) has specified that a new 'manager' or a 'management team' can function as a possible triggering event. The policies ultimately resulted in less planning restrictions and less government aid and indirectly stimulated more development in the peri-urban area of Greater Manchester. This Thatcherism became a significant agent of change, resulting in a fundamental change of the peri-urban area. A new national government can be regarded as a macro development, influencing autonomous development in the peri-urban area. Its effects will be further elaborated in section 4.3.4.

Another triggering event is legislation that caused a disadvantaged competitive position. Because of Manchester's (false) signs of industrial rejuvenation (the deferred new industrial revolution mentioned in section 4.3.2) it did not qualify for special assistance from the regional policy legislation (Barlow, 1995). British regional policy was a combination of stick and carrot policies. The stick has been the use of the Industrial Development Certificate control which had enabled the government to stop new industrial growth in areas of low unemployment. The carrot has been a range of incentives offered in designated assisted areas (Law, 1980). The designated assisted areas were comprised of Special Development Areas, Development Areas and Intermediate areas. The region of Greater Manchester (excluding Wigan) fell in between the prosperous zones of the stick policy and the assisted areas of the carrot policy (Law, 1980), although it did become an Intermediate Area in 1972. The exclusion of regional policy intervention has ultimately disfavoured Manchester's competitive position, especially in relation Merseyside and North Wales. This ultimately resulted that manufacturing investments were deflected and paved the way for developments in line with a post industrial society. The peri-urban area was ultimately opened up for a range of developments in the residential and service sectors.

4.3.4 Acceleration 1979 – 1994: Towards a post-industrial society

The decades following the 1974 reorganization are typified by an acceleration of a fuller integration between the urban and rural dynamics, triggered by an interplay of developments. Autonomous macro developments induce micro processes and are becoming embedded in institutional changes. Institutional and organizational changes consequently shape the economic

drivers by wielding influence on the peri-urban area. A couple of drivers that speed up the process towards a new 'order' of the peri-urban area can be distinguished here. Firstly, the neoliberal government of Margaret Thatcher enabled free market housing policies which in due course opened up the peri-urban area. Secondly, emerging regional shopping centres created a fragmented retail distribution/pattern. Thirdly, transportation developments are an example of policy initiatives that opened up the peri-urban area. Concurrently, a countermovement, in the form of green belt policy, was advancing and somewhat halted fractal development in the peri-urban area. These four developments will receive further attention below.

4.3.4.1 Rural gentrification

Margaret Thatcher became the leader of the conservative party in 1975 and served as Prime Minister from 1979 until 1990. She advocated a neo liberal philosophy and introduced economic policies with an emphasis on deregulation and privatization. One example of the legislative changes was in the field of housing. In accordance with the ideals of Thatcherism, central government decided that the provision of grants to local authorities for the provision of rental housing should be reduced, that the rents charged to tenants should no longer be subsidized and that individual

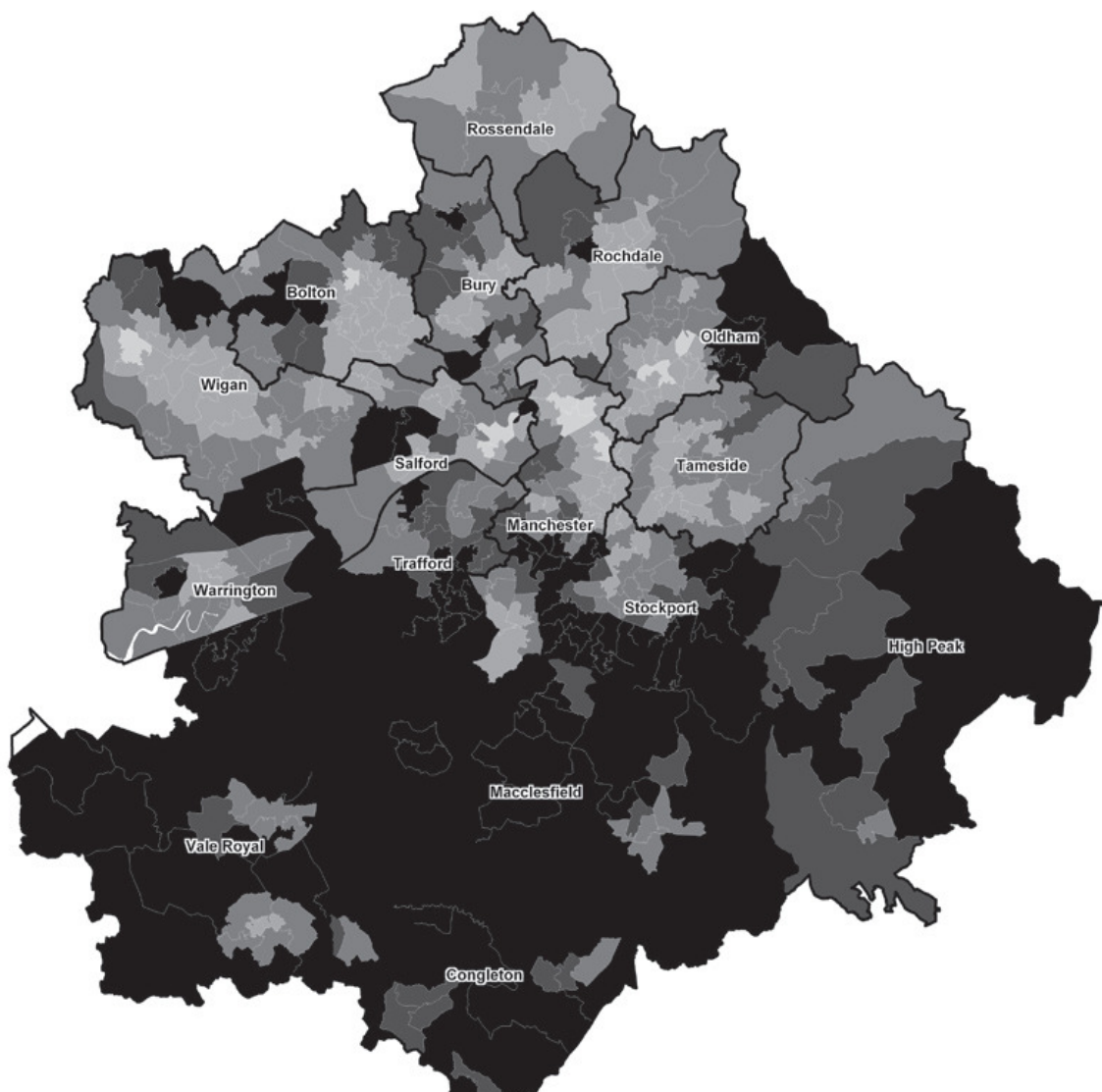


Figure 4-7 Housing prices in Greater Manchester; dark-high, light=low (GHBGIS, 2010)

households should be encouraged to provide their own accommodation (Hay, 1992; Marsh & Rhodes, 1992). A vast majority of the housing development was carried out by private property developers and on a speculative basis in Greater Manchester (Interviewee E; Lever & Young, 1997). Private companies invested in the construction of the properties and sold them to the open market. As a result, developers were more likely to build more exclusive housing in order to maximize profits. The peri-urban area was a perfect setting for these developments and thus saw the erection of a large amount of 'executive estates'. These expensive houses were mainly built in the southern peri-urban areas of Greater Manchester (see fig. 4.6). Executive estates are typified by "... an area of detached or semi-detached houses in a rural setting aimed at affluent commuters" (p.241; Lever & Young, 1997). Hence the peri-urban area was subject to a rural form of gentrification (Clope, 1987; Robert & Randolph, 1981). This is a fitting example of a macro development (legislation changes) that has induced micro processes (more exclusive housing) that through self organization (gentrification) had a spatial impact on the peri-urban area. Summarizing, the peri-urban area was more and more becoming a residential area for the more affluent people commuting to the city. Housing, however, was not the only major development in the fringe. Retail developments will be described next.

4.3.4.2 Retail developments: out of town shopping

Neo-liberal initiatives in the 1980s also resulted in the relaxation of planning policies. This policy relaxation, together with a rise in car ownership and high inner city property costs, consequently fuelled a nation wide rapid growth of out of town retail centres (Fernie, 1996). More car ownership and car dependent travel was an international phenomenon (Sheller & Urry, 2000). A survey by Hillier Parker on shopping developments in the UK showed that from 1976 to 1992, 294 out of town shopping centres were opened compared to 384 inner city centres (Lowe, 2000). The retail decentralization in Greater Manchester started with the development of superstores and hypermarkets. Superstores and hypermarkets also tended to locate off centre, mainly due to the advantages of accessibility and cheaper land (Bridges & Lodwick, 1980). An example of such developments in Greater Manchester was the opening of a Tesco superstore at Irlam in the mid 1970s (see figure 4.7). These out of town Superstores were a big success throughout the nation. Due to the recession of the 1970s people were attracted to cheap and easily accessible one-stop bulk shopping (Bridges & Lodwick, 1980). The recession was another macroscopic condition that caused an acceleration of the peri-urban area towards retail development. For Greater Manchester this resulted that by 1979, 10 stores were located in the peri urban area covering 153.000m² of gross floor space. Figure 4.9 shows the distribution of superstores in Greater Manchester, a distinction was made between outlets within established centres and outlets outside established centres, i.e.

peri-urban. The peri-urban area thus became more a place for shopping, resulting in a scattered development of shopping locations and more and more transportation developments.

By the beginning of the 1990s planners and retailers were becoming aware of the negative effects of out of town retail developments. The retailers in the inner cities were losing business and planners saw their redevelopment schemes threatened (Interviewee D, Bridges & Lowick, 1980). Another issue was the realization that the rate of growth of individual motorcar transport was detrimental to both town centre and countryside. In the case of greater Manchester, the development of a light rail transit system, Metrolink, can be seen as a development implement to tackle such an issue. The impact of Metrolink on Manchester and its peri-urban area will be discussed next

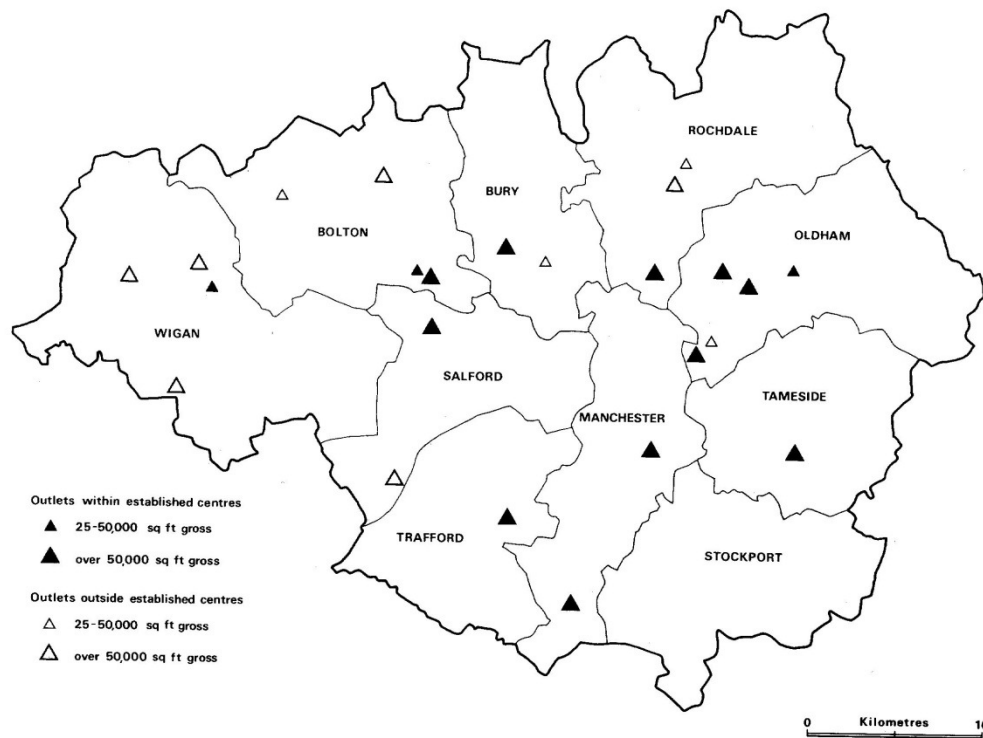


Figure 4-8 Distribution of outlets in Greater Manchester (Bridges & Lodwick, 1980)

4.3.4.3 Transport infrastructure

In section 4.3.2 motorway developments were described as a precipitating condition for a fundamental change of rural-urban relationships in the peri-urban area. For Greater Manchester, the developments were extensive and resulted in a near-complete orbital motorway. Apart from

motorway development, Manchester also developed secondary trunk roads, which strategically connected the city with the national motorway network. This extensive road network has led to congestion problems, making the peri-urban area less accessible. In 1983 the Greater Manchester Council (effective 1974-1986) decided to develop a light rail network; Metrolink. The aim was to provide rapid public transport free of congestion and to support economic development in the city centre and other urban centres and inner areas. The first phase of Metrolink, between Bury and Altrincham, was completed in 1992. A second line, completed in 2001, extended the network to the west (Eccles). Current constructions and future developments will extend the network (eastwards to Ashton, northwards to Rochdale and southwards to the Airport and East Didsbury) intensifying the connection between places in the peri-urban area and the city centre (see Figure 4.8)



Figure 4-9 Future developments in the Metrolink light rail system (GMITA, 2010)

The development of Metrolink enabled better non-car dependent accessibility between the city centre and its hinterland. Hence, it increased the attractiveness of the peri-urban area as a place of residence and business, while explicitly integrating rural-urban relationships. Yet, this integration is mainly focussed on the dichotomy core-periphery and does not connect between places within the orbital peri-urban area. And according to interviewee E most transportation is currently moving between off centre locations within the peri-urban area. As such, the car remains the most attractive mode of transport.

Another development that altered the rural-urban relationships in the peri-urban area is the growth of Manchester Airport. The airport has been under a great deal of discussion in the late 1990s whether or not it should develop a second runway. Manchester Airport opened in 1938 and functioned as a small provincial facility for a limited market handling 3.869 passengers (Caruana & Simmons, 2001). By 1978 the airport had had expanded rapidly as it was handling 2.904.000 passengers to and from an extensive international network. In 2001 the Airport opened up a second runway, increasing its capacity. By the 1980s Manchester Airport had already become the biggest airport in the UK outside London and functioned as the international gateway to the north of England (Cuarana & Simmons, 1995). The developments of Manchester Airport have ultimately

impacted the city and peri-urban area (interviewees B, C, D, E, G and H). The growth of the airport has attracted businesses to its direct vicinity and more importantly to the whole peri urban area. It has accelerated the establishment of offices in the peri-urban area, embedding the region in the south of Greater Manchester and north of Cheshire in a high tech area (Ravetz, 2008). Hence, a change in the nature of economic development has taken place in the peri-urban area.

4.3.4.4 Green Belt policy

The opening up of the peri-urban are has resulted in various developments; from residential to business. These developments have, in turn, been supported by large transportation developments and resulted in a scattered pattern of development (Interviewee B, C, D, E, G, H). In order to curtail these scattered developments in Greater Manchester, green belt policy has enacted. Green belt policy is a planning instrument to stop unwanted and fractal development. Local authorities are encouraged to consider protecting land around their towns and cities by a formal designation of clearly-defined green belts. Greater Manchester has a long established history of green belt designation. In 1974 it contained approximately 52.245ha of land designated as green belt (Elson, 1979). Figure 4.7 shows the current pattern of green belt policy for the Greater Manchester metropolitan county. The green belt in Manchester has effectively deflected localised population dispersal by restricting housing or office developments. It has also led to leapfrogging (Interviewee B) in which housing movements passed the green belt and settled in region even further from the metropolitan core. This has especially happened to the south of Greater Manchester, resulting in a focus on towns in Cheshire, including Macclesfield, Poynton, Alsager, Wilmslow and Knutsford (Lever & Young, 1997). Wilmslow and Knutsford form, together with Alderley edge, the so called ‘golden triangle’ and are home to Manchester United and Manchester City’s football players (Interviewee B). This shows that the Green Belt does not only effectively stop unwanted sprawl but at the same time adds a quality to the peri-urban area. By keeping it ‘open’ and ‘green’ it intrinsically gives the peri-urban area an incentive for green leisure activities and countryside living.

Moreover, there is a growing pressure between the developers’ wish to exploit the peri-urban in combination with the dominant suburbanization trend and the wish to preserve open land through green belt policy. Due to changing rural-urban relationships, the green belt has also changed. It is becoming more and more an area of leisure, with ‘horsiculture’ and golf courses (Interviewee A; Ravetz, 2009).

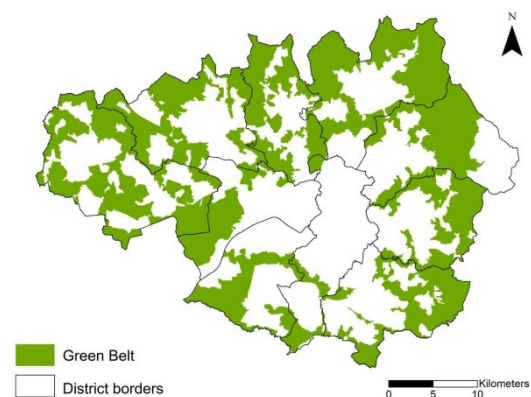


Figure 4-10 Green belt in Greater Manchester (Kazmierczak, forthcoming)

Reflecting on the acceleration phase, the free market policies of the Thatcher government and the recession of the 1970s are macro developments that have resulted in a series of developments on the meso level; superstores and out of town shopping centres were a physical manifestation of retail decentralization. Furthermore, government incentives have resulted in a rural gentrification of the peri-urban area. Moreover, an extensive growth in transport developments has accelerated the opening up of the peri-urban area and ultimately altered its rural-urban relationships. Green Belt policy has somewhat halted further development yet stimulated green values in the peri-urban area and can be seen as the beginning of the stabilization period in which policy is becoming more embedded and incorporate over a bigger area.

4.3.5 Stabilization & embedding: 1994 - now

Over the last five decades the peri urban area of Greater Manchester has changed considerably. In terms of economy, the tertiary and quaternary sectors have replaced the dominant secondary sector. In addition, transport developments have increased extensively. This has ultimately resulted in a qualitative change of the peri-urban area. A transition has occurred in which the peri-urban area has moved from an industrial region that was putting out for the city to a gentrified residential area and a habitat for the service and high tech industries. The take-off and acceleration periods, in which rapid developments took place, has slowed down and developments that will be described in this section are typified by a period of stabilization. The stabilization phase is characterized by a new dynamic balance. In the case of Greater Manchester, the peri-urban area becomes embedded in an overarching organizational structure with metropolitan governance. Further embedding of the peri-urban area of Greater Manchester is enhanced through the newly adopted city region project. Both can be seen as more stabilizing elements that have enforced or are enforcing the new order of the peri-urban area.

4.3.5.1 Association of Greater Manchester Authorities (AGMA)

The AGMA was established in response to the reorganization of local government. This reorganization was a result of the neo-liberal reforms enacted by central government. It effectively abolished the Greater Manchester County and transferred its functions to the 10 separate districts. Although the metropolitan level of government was abolishment, requirements were given to devise arrangements for joint responsibility. This ultimately led to the creation of the Association of Greater Manchester Authorities. The AGMA consists of the ten district authorities of Greater Manchester and mainly functions as a consultative body (Interviewee C, E; Barlow 1995).

The increasing complexity of the rural-urban relationships required a more coherent body capable of a coordinate and integrated view to the whole region. The creation of AGMA fulfilled this requirement to a certain degree. It resulted in less piecemeal fringe developments, overcoming the

relative importance of districts' influence in planning and development caused by the 1986 reorganization. The peri-urban area was no longer fragmented among the 10 districts and several free standing cities, but instead it could be directed more coherently by one overarching government structure. AGMA consists of seven strategic commissions. With regard to the peri-urban area the Commission for the New Economy, the Planning & Housing commission, Transport commission and Environment commission are especially important. The Planning & Housing commission, for instance, prepares strategic plans for the whole region surpassing district boundaries and considering the influence that a development in one district can exert on an adjacent district (Interviewee G). In addition the Transport commission is responsible for strategically implementing the aforementioned region wide light rail network Metrolink. Both are examples of an integrated region wide approach, in which the AGMA coordinates the interrelated policies between several urban cores and their peripheries. Thus, institutionally the peri-urban area has become less fragmented. In recent years, the formalization of region wide governance has expanded even further by the designation of Greater Manchester and its peri urban area as a statutory city region.

4.3.5.2 Statutory City Region

In 1994 a strategic alliance was initiated between the three northern regional development agencies called The Northern Way. The Northern way was a strategy aimed to transform the economy of the North of England in order to bridge the gap between the North and the South East of England. The gap comprised three elements: unemployment, productivity and market size. One of the initiatives to bridge the gap was through the creation of several city regions (Northern Way, 2006), Manchester was one of them. The Northern Way (2006) described the Manchester City Region as follows:

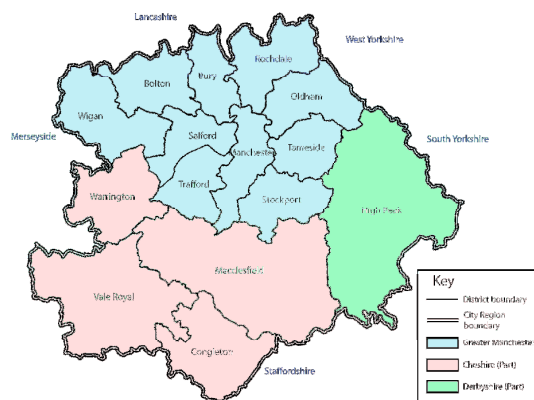


Figure 4-11 Statutory city Region (Northern Way, 2006)

“The Manchester City Region features geographical areas of very high economic performance and affluence alongside areas with lower levels of economic activity/output and high levels of deprivation. This mix gives the City Region a unique profile and set of challenges in driving economic growth. To realise the full potential of the MCR, local, regional and national partners and Government will need to exploit the asset base locally and also address barriers to development in order to generate increasing levels of growth across the entire area, whilst ensuring the regeneration and sustainability of deprived communities. It is only through this comprehensive approach that the

City Region will achieve long term, sustainable growth and positively contribute to the overall performance of the North of England” (p.6 Northern Way, 2006)

The complex relation between the urban and the rural is thereby incorporated in this comprehensive approach of the city region. The city region does not only entail the ten authorities of AGMA but extends to the south including the High Peak district, Macclesfield, Congleton, Vale Royal and Warrington (Fig 4.11). The Manchester City Region is the first strategy that includes areas outside of the AGMA region and thus formally recognizing a great deal of the peri-urban area. In recent years, the city region concept has become a popular concept to stimulate economic growth in the region. The central government recognized the importance of city regions to future growth and adopted the concept in the 2009 Budget (HM Treasury, 2009) by assigning pilot city regions. Greater Manchester was announced as one of two such pilot city regions. This formal appointment by central government did reduce the city region to the original ten counties of the Association of Greater Manchester Authorities. It enforced that the ten councils joined together as a combined authority (a statutory framework for city region activity) to pool resources over skills, housing, transport and economic development (HM Treasury, 2009). One of the first things initiated by AGMA under the newly established city region was the proposal of a congestion charge. The ten authorities worked together on a proposal to introduce a road congestion charge. The proposal suggested two rings, an inner ring directly circling Manchester city and Salford and an outer ring covering the greater conurbation. The proposal was however rejected by referendum (78,8% were against) and could thus not be implemented. Nevertheless, it showed that the ten authorities were able to put aside their own priorities for an aggregated outcome. If the proposal had been accepted it would have had great consequences for the peri-urban area. The congestion charge would have resulted in less car use, furthermore the government would have had invested considerably in an enlarged expansion of the Metrolink system (Interviewee G). The rejection of congestion has resulted that the use of the motorcar has not been disfavoured. The peri-urban area will thus, since it relatively better accessible compared to the city (Interview B), continue to serve as a zone for future economic and residential developments.

4.3.5.3 Stabilization or new period of dynamic developments?

Whether the period of stabilization is really a period of stability can be disputed. A dynamic equilibrium might be a better term. Several nuances need to be made. Although the creation of AGMA and the city region pilot are initiatives that can help embed the developments of the acceleration phase, their effectiveness remains to be seen. According to interviewee D, the several boroughs in Greater Manchester remain divided and AGMA has difficulties in overcoming problems that span local boundaries. For instance, with the enactment of region wide policies, boroughs do

not simply accept that important developments are attracted away from their territory for the 'greater good' of the region. Especially the poorer boroughs have a strong own political agenda.

Furthermore, new developments are already arising in the region of Greater Manchester. In the light of current global developments in environmental awareness, Greater Manchester has been designated (by central government) as UK's first Low Carbon Economic Area (LCEA) for the Built Environment. This designation broadly means that the city of Manchester as well as the peri-urban area is favoured and stimulated in implementing strategies and plans for reducing the emission of CO₂ with a special focus on the built environment. According to a policy document on this topic; "*[the] programme will deliver a new industrial revolution, one based around a low carbon economy helping other cities and regions in the UK compete more effectively. We will achieve this through innovation, leadership, investment, and upskilling creating a blueprint for mass low carbon retrofit*" (MIER, 2010). The interesting point on this LCEA for the built environment is that it is already embedded in policy documents. One can even make the argument that it is induced by policy strategies or at least that it has quickly adapted to the macro development of environmental awareness and carbon neutral trends. Hence, the system is not as stable as proposed by the model of Rotmans et al. There are already new developments 'boiling underneath the surface' making their way towards a possible new transition. Instead of a period of stability, the system is better characterized by maintaining its dynamic equilibrium.

Below, in figure 4.12, the developments have been envisaged that ultimately occurred after the stipulated 'tipping period'. Again, as in fig 4.6, the developments have been visualized through a model of furcative change. There is a concatenation of accelerating effects that occur, eventually pulling the peri-urban area towards different 'orders' of a spatio-economic development. The dominant path represents the move towards transition, while the dashed curves embody disintegration or enslavement.

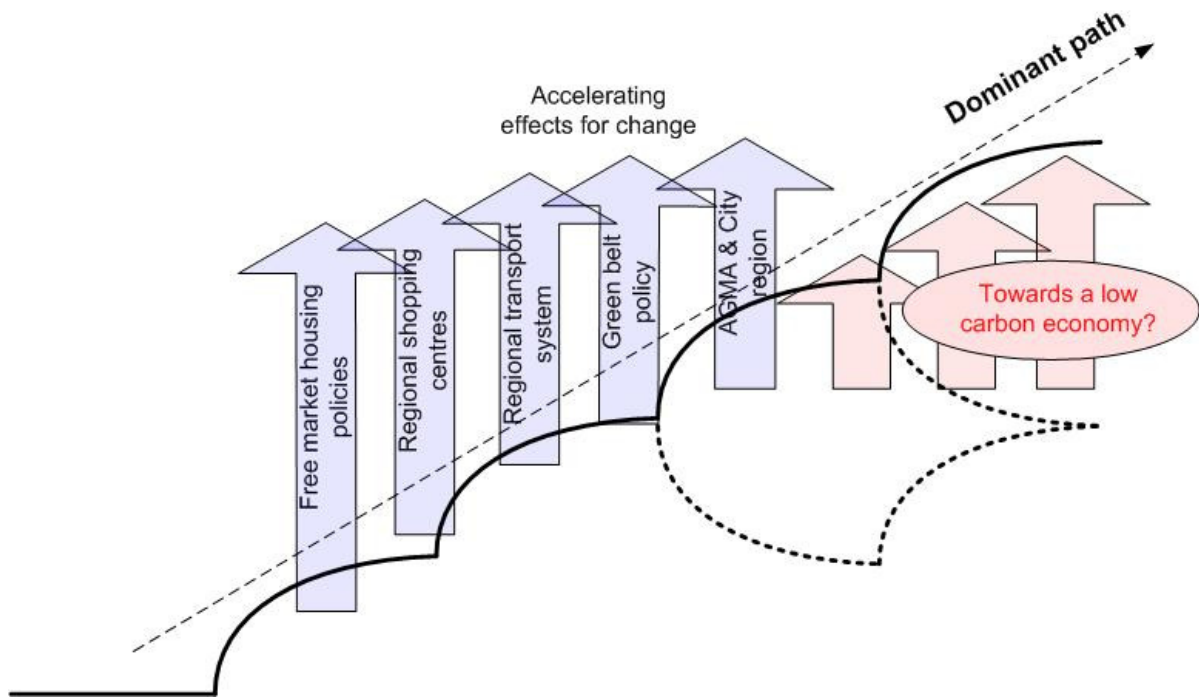


Figure 4-12 Accelerating effects of a transition in a model of furcative change

4.4 Conclusion

In this section, the transition of the peri-urban area of Greater Manchester is concluded. It is argued that the developments in the peri-urban area could be considered as non-linear, giving rise to self-organizational processes. The concept of transition, and its differentiated phases (predevelopment, take-off, acceleration and stabilization) and conditions (permitting, enabling, precipitating and triggering) are useful concepts and ways of describing developments in this non-linear development and the peri-urban area of Greater Manchester.

The peri-urban area has developed from an area of 'dichotomized' rural-urban relations (especially marked by the putting out system) towards a comprehensive city region with 'integrated' rural-urban relationships. Macroscopic elements such as economic and demographic changes are dominant drivers of the transition process, but cannot be depicted as direct causes of changing rural-urban relationships. In order to uncover how these drivers have ultimately resulted in change, transitional phases have been distinguished. In the predevelopment phase, the traditional cotton industry is declining but still very much present. The industrial revolution has made Greater Manchester almost solely dependent on industry and thus very fragile. Meanwhile, shorter working hours and increasing leisure activities are becoming a central part of a global economy. These processes are believed to 'pave a way' for a fundamental change. A strong economic decline in the manufacturing industry and deindustrialization processes in the late 60s consequently result in a

take-off and demarcate the beginning of a transition. The development of a service economy and the increase of motorcar related developments are considered to be macroscopic drivers for a fundamental change and accelerate a change towards a new economy in the peri-urban area. However, despite decentralization movements and massive transport developments, the city and the peri-urban area remain largely divided. This partition changes due to developments in the tipping period. A new central government and the absence of regional help result in the 'opening up' of the peri-urban area. The developments in the tipping period are initiated or induced by central government policies; they are however no direct results from the macroscopic change but consequently a result of local actions (self organization). As a result, residential and commercial development increases. Local policies enhance this decentralization movement. Within the acceleration phase the peri-urban area becomes a low dense 'gentrified' residential area. The services and commercial sectors of the economy undergo a strong growth. Out of town shopping centres are developed, business parks emerge and a light rail tram system is developed to connect rural and urban, although surpassing and not connecting important places within the peri-urban area. The peri-urban area becomes more or less an area of integrated urban-rural relationships. Finally, the stabilization phase is characterized by several institutional developments. The integrated rural-urban relationships becomes anchored in an institutional framework; AGMA and later on the statutory city region are founded to develop a more integrated, coherent and regional governance able to deal with the increasing connectedness between rural and urban. Its effectiveness, however, remains to be seen. In addition, due to a changing context, new developments area already emerging –the low carbon economic area for the built environment- and possibly undermine the stability of a system. This gives us reason to believe that a dynamic equilibrium is a better term for this phase than stability.

On a more general note, the development of the peri-urban area of Greater Manchester is featured by the characteristics of the transition concept of Chapter 2. Transitions are believed to be non-linear, giving rise to self organizational rural-urban relationships. These self organizational developments, such as the decentralizing movements of both families and business, are influenced by multileveled and multidimensional aspects of transition. The multileveled aspect of a transition is exemplified by the reasoning that a declining industry (cotton crisis on macro level) and decentralizing residential developments (on the micro level) influence the developments in the peri-urban area. The multidimensional aspect relates to the functional, organizational and institutional changes. In a transition, where developments are non-linear, the functional rural-urban relationships have altered due to institutional changes, resulting in an adaptation of organizational changes. In the

case of Greater Manchester, this has been represented by the settlement of commercial business in the peri-urban area (changing functional relations), which was in turn a result of globalizing effects.

Conclusively, the concept of transition has clarified that developments that have changed the rural-urban relationships are not straightforward or causal. The several phases have made a distinction between the degrees of effect that developments have and the degree of dynamics of developments at play. It has helped to conceptualize peri-urban dynamics in Greater Manchester.

5 Synthesis & Discussion

5.1 Introduction

In this chapter, the results of the case study analysis are linked with the theoretical concepts of chapter 2. The objective of this chapter is to provide insight to what extent the posed theory could be useful for understanding and analyzing developments in the peri-urban area. The structure is as follows; the relation between the peri-urban area and its context will be handled first, with a specific focus on characteristics of complex systems such as non-linear behaviour, adaptation and self-organization. Second, the distinguished phases of peri-urban development in Greater Manchester are compared to the assumed phases of transition. Third, several implications of the complexity perspective with regard to spatial planning will be described. Finally, some concluding remarks will be made.

5.2 The peri-urban area of Greater Manchester as a complex adaptive system

In the study, the peri-urban area of Greater Manchester has been regarded as a complex adaptive system. A complex adaptive system is characterized by a non-linear trajectory in which stable periods are interchanged with a period of dynamic developments. In this period of dynamism, the developments are being influenced and adapted by an ever changing contextual environment. In the case of Greater Manchester, macroscopic changes in terms of economy and demography have influenced the rural-urban relationship. For example, due to the internationalization of local economies and the decline of the manufacturing industry, the rural putting out system –a system that has effectively shaped rural-urban relationships in Greater Manchester for several decades- was consequently affected. The rural community in peri-urban area was no longer processing cotton but instead adapted and self organized itself in order to produce for a differentiated economy. This process of self organization did not emerge directly but was procrastinated due to the fact that the system was still enslaved by ‘industrialization’. The macro change can be viewed as an autonomous development, while subsequently the micro developments can be regarded as adapting in response to these macro changes creating a complex pattern on the meso level.

Various concepts of non-linearity and complexity can be depicted from the analysis on the developments of peri-urban Greater Manchester. For instance the increased use of the motorcar and the extensive motorway developments relate to each other in a circular causal way. An increasing car usage has ultimately lead to a demand for a more extensive road network, while an ever expanding road network provides more incentives to make more use of the motorcar. Both

developments move in a circular causal relationship, both modulating and perpetuating the other. In addition, both developments have influenced the opening up of the peri-urban area. More peri-urban locations became accessible for both commercial development and residential projects. This in turn increased car dependency and therefore car usage. This circular causal relationship can be regarded as positive feedback loop, where the output of a process acts back to affect the input leading to self amplification. The commercial and residential developments in the peri-urban area are, in this vein, considered as self organizing developments. I.e. the external forces (the enactment of neo-liberal policies) acting on the system do not directly determine or cause its behaviour but instead trigger this internal and independent (or remote causal) process (more residential development in the peri-urban area. Through this notion of self-organization, although not entirely autonomous, new structures can emerge in the peri-urban area. In the case of Greater Manchester this new structure encompasses the more commuter dependant role in rural-urban relationships and the peri-urban area as a 'rural gentrified residential location'.

5.2.1 Complex behaviour and spatial development

A complex adaptive system is that stable periods are interchanged with dynamic periods. In the case of Greater Manchester, a dynamic period is differentiated between two periods of relative stability. In this dynamic period, spatial developments are less organized and it is difficult for spatial planners to coordinate action with trends. Hence, it seems as if the peri-urban area is evolving autonomously (i.e. without the interference of planning strategies). Moreover, old structures are under pressure, such as the manufacturing industry, and are becoming enslaved by a new dominant order. In the case of Greater Manchester, the service sector slowly becomes the dominating order. In the more stable phase, i.e. when the system reaches a point of relative stability, there is an adaptation of spatial strategies and policies. In Greater Manchester this could be identified from the 1990's onwards, when institutional and organizational dimensions of spatial development have been adapted to spatial development. A good example of this is the new regional light rail transportation system. This system is more in line with transportation movements that belong to a service economy. The designation of Greater Manchester as a low carbon economic area for the built environment can be seen as a forerunner with regard to this process of adaptation.

The perception that the peri-urban area has adapted and self-organized itself stipulates important implications for spatial planning strategies. Adaptation and self-organizing on the meso and micro level, influenced by -but not as a direct result of- the macro environment, means that developments are non-linear and thus hard to predict. This uncertainty makes it difficult to create apt planning strategies that are in line with developments. Rotmans et al. (2001) therefore suggest that when dealing with uncertainty and nonlinearity spatial planning should focus on implementing

a“[...] gradual transformation of an existing system, instead of the planned creation of a new system” (p.11). Spatial planning strategies should furthermore “[join] in with ongoing dynamics rather [force] changes” (ibid). The concept of transition used in the study has helped to give us a better understanding of these dynamics, but what can we actually learn from this? An evaluation of the concept of transition will be given next.

5.3 Transitions in complex adaptive systems: multiple curves

In the previous section it has been established that the peri-urban area of Greater Manchester can be viewed as a complex adaptive system characterized by dynamic developments. In this section, we discuss whether the observed results in this period of high dynamism could be better understood when regarding it as a transition. By doing this, an attempt is made to evaluate the first sub question of this research: “To what extent is it possible to distinguish different phases of dynamics in the rural-urban relationship and can these be considered as transitional phases?”

As noted in chapter two, a transition can be represented in several phases. The case study of Greater Manchester distinguished a predevelopment, take off, tipping point, acceleration and stabilisation phase which were mainly similar to the concept of transition explained by Rotmans et al. (2001). This has been visualized in figure 5.1.

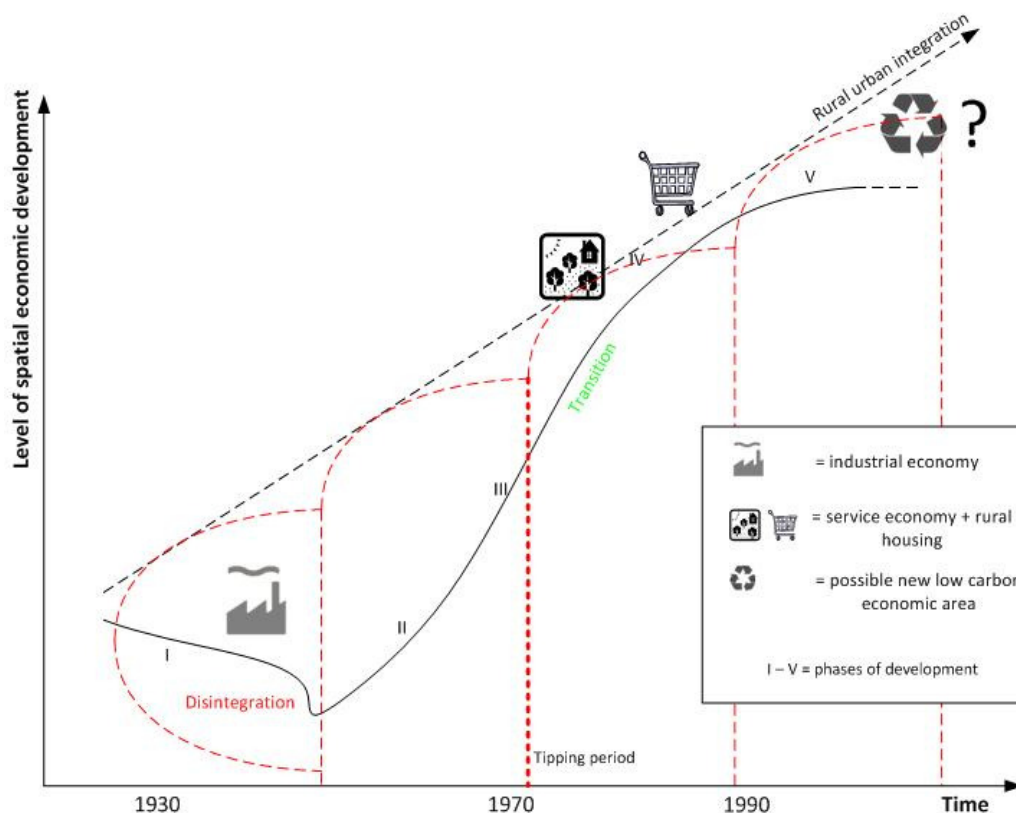


Figure 5-1 Schematic representation of the (economic) peri-urban transition of Greater Manchester

An important nuance of the model is that during the predevelopment phase the peri-urban system is more moving towards disintegration than towards a transition. The peri-urban area of Greater Manchester was greatly dependent on its mono-economy of the manufacturing industry. Hence, the peri-urban area can not be regarded as a stable system in this point of time but as a frail system ready for disintegration. Due to continuously retaining to the ever declining manufacturing industry, the peri-urban area created some sort of negative lock-in. The manufacturing industry was dominant and had enslaved the peri-urban area. Eventually, yet later than could have been the case, the peri-urban area differentiated. The argument is made here that a decline, although moving towards disintegration, can stimulate a transition but only when a system innovation takes place. When there is no system innovation, the system remains to be controlled by the old 'order parameter' and due to the process of geographical path dependence will result in a lock-in (Martin & Sunley, 2006). In the case of Greater Manchester the decline or disintegration was reversed and turned into a boost. This was mainly due to a rise of the service sector and substantial decentralization developments in housing and business (= system innovation). Other studies have also found a period of decline within or preceding the predevelopment phase (Klieverink & Kuiper 2009, Rauws, 2009; Beeftink, 2009). Thus, a period of decline could result in disintegration when the system is locked in its geographical path dependence. However, a period of decline could also make a possible move towards a fundamental change more urgent and could hence be regarded as a stimulator for a transition. To avoid a lock-in and stimulate a transition, system innovations are essential. This will be further elaborated in section 1.4.

Another nuance needs to be made with regards to the represented transition in fig 6.1. The curve only demarcates the most important economic developments of Greater Manchester. This is, of course, not a just representation of the developments that have been put forward in the case study. Besides economical change, demographical, institutional and cultural changes are also considered to be relevant for a fundamental change. The spatial economic innovation curve is however a simplified method to delineate important developments of a transition. An extended overview of development, one that is in line with the multi-dimensional and complex nature of a transition is given in table 5.1

Period	<i>Predevelopment</i>	<i>Take-off</i>	<i>Tipping period</i>	<i>Acceleration</i>	<i>Stabilization</i>
Peri-urban	predominantly industrial putting out system	deteriorating manufacturing industry	Switch from industry to other economies	Overflow area for housing, businesses and services	City region pilot, AGMA, regional transportation system
<i>Economic state</i>	industrial economy	differentiating industrial economy		Service economy, with a bigger focus on leisure activities	<i>Towards a low carbon economic area?</i>
<i>Functional state</i>	small workshops, mining and other spin offs from manufacturing industry	urban expansion and deteriorating manufacturing economy		rural gentrification, regional shopping centres, out of town businesses	<i>Towards a fragmented yet multifunctional urban region?</i>
<i>Structural state</i>	Monofunctional cluster	Doughnut town		fragmented urban growth	<i>Developments coordinated on city region level?</i>
<i>System</i>	stable yet fragile	increasingly changing		towards new	<i>dynamic equilibrium?</i>

Table 5-1 Transition of the peri-urban area of Greater Manchester

In addition, the concept of synergetics (see section 2.3.2) can be helpful in a fuller understanding whether disintegration or stimulation is taking place. In synergetics, the new and old dynamic equilibrium are analogous to the order parameters. The order parameter dominates the movements of the system's many components. It can be regarded as a macroscopic movement that enables micro processes. These micro processes should be accelerated by co-evolving planning strategies and should accordingly 'stimulate' and 'accelerate' the developments towards its new dynamic equilibrium, as will be explained in the next section. In figure 5.2 the transition curve of greater Manchester is synergized with the model of furcative change (see also fig. 2.7) and clarifies similarities between the model of furcative change and the mimicked developments in Greater Manchester. The model envisages the order parameter and the enslaved parameter with relation to the actual development of Greater Manchester and its way from the 'old level of stability' towards a 'new level of stability'. The implication of this enhanced understanding of peri-urban non-linear developments for spatial planning strategies and policy frameworks will be explained in the next paragraph.

Conclusively, to answer the question that was stated at the beginning of this paragraph; can the depicted phases be considered as transitional phases? It is possible to depict phases to a certain degree -there is a difference in the degree of dynamics- but perhaps not as clear as one would have thought. In addition, there is no single overall transition but a concatenation of several small transitions that eventually change the rural urban relationships in the peri-urban area. This has been exemplified by the model of furcative change and is envisaged by the halve parabola sketches in figures 5.1 and 5.2.

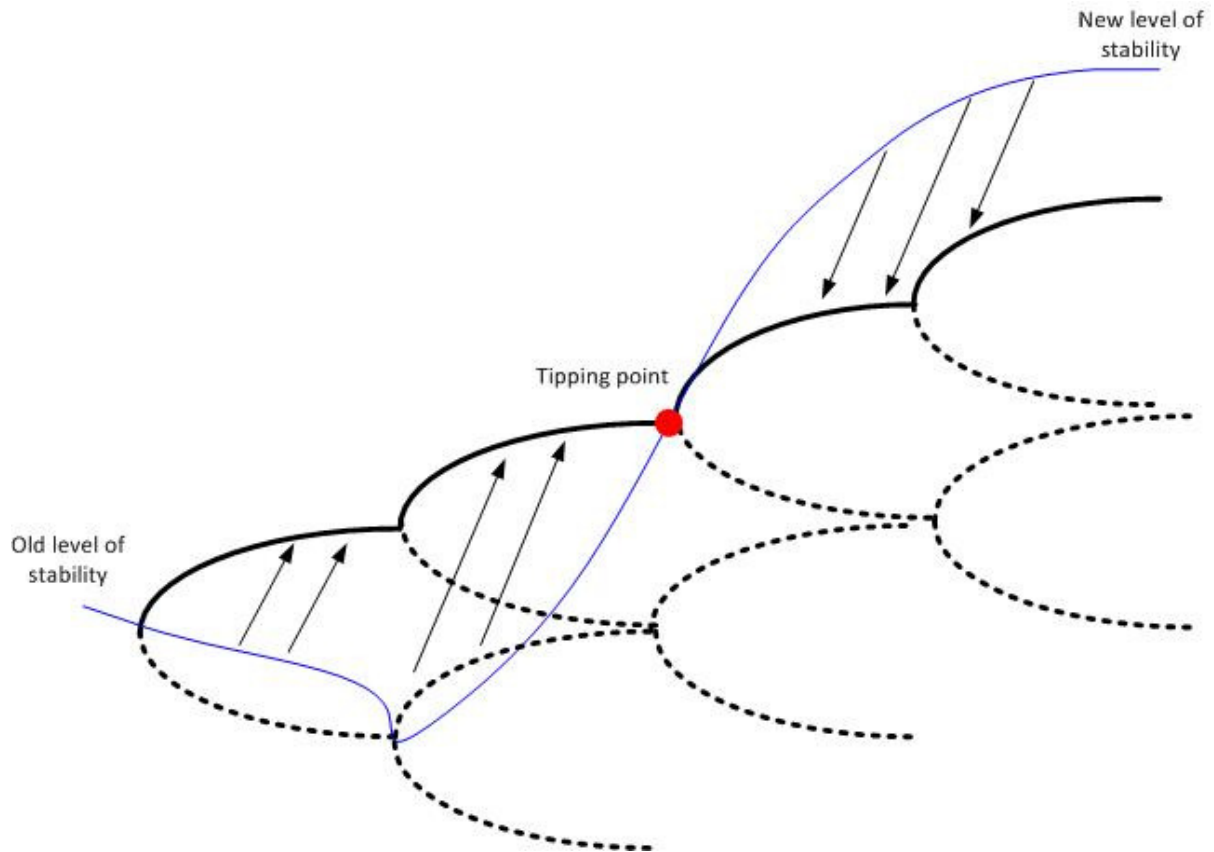


Figure 5-2 Transition in Greater Manchester and synergetics combined in one curve (modified from Portugali, 2000)

5.4 Implications and recommendations for spatial planning

When regarding the peri-urban area as a complex adaptive system, it becomes evident that non-linearity should be considered as a reality in spatial development processes. For the planner, principally involved in prospective spatial developments, this brings up an important notion; how to deal with unexpected and unanticipated developments (non-linearity)? In this study it has been shown, that although non-linear development is not predictable it can be understood. The concept of transition provides a framework for the understanding developments in complex adaptive systems. In the case of spatial management of complex adaptive systems, the aim should not be to try and invent new directions of dictate a new future, but instead it should focus on anticipating on emerging development and adapt to these partly autonomous processes. The spatial planner does not dictate spatial plans but instead anticipate on change and become a transition manager.

Hence, important implications for spatial management are the following;

1. *Acknowledge non-linearity in spatial development and regard peri-urban areas as complex adaptive systems. Through the usage of transition, one can better understand the dynamics and possible trajectories of these complex urban systems.*

Having established that developments in the peri-urban area are characterized by a non-linear trajectory and that it is possible to distinguish several phases, one can, through the model of furcative change, depict several points of transition or disintegration. It is at this moment in time that a spatial planner should focus to;

- 2. Deflect a (negative) lock in and focus on system innovations (fore runners) in order to stimulate developments towards a possible transition.*

In the case of Greater Manchester, a decline of the industrial economy has initially led to a lock in and a move towards disintegration. There were no system innovations to make an early move towards a possible transition. For this reason it is advised that a planner should focus on deflecting a negative lock in and try to stimulate system innovations that can help the peri-urban area move towards a transition. In addition, multiple paths are possible, so there can also be multiple future transitions. Transition management can be helpful in this attempt to stimulate a move towards a specific (desired) transition. Rotmans and Loorbach (2009) have explored the possibilities of transition management in complex adaptive system and advice to 'create space for niches in so called transition arenas' (p.189). These arenas originate from complexity theory and indicate that a small change in the system may have a great impact of the system in the long run; thus resulting in emergent structures (Rotmans & Loorbach, 2009). A niche is a new structure, a small core of agents, that emerges within the system and that aligns itself with the, as has been postulated in this study, new order parameter. This implicates that spatial (transition) management should focus on the forerunners in this process and empower new niches (Ibid). This is the more short termed focus of transition management. Furthermore, in the long run spatial planning in the peri-urban area should be aimed at;

- 3. Anticipate on future trends and developments and try to accelerate these developments by co-evolving and adapting strategies and policies towards the new dominant order of the peri-urban area.*

Because developments are partly autonomous, traditional planning strategies are inadequate when dealing with complex adaptive system. A key strategy of transition management is therefore to anticipate on future trends and developments. Adaptation of spatial strategies means adjusting while the system (i.e. peri-urban area) is changing. According to Rotmans & Loorbach (2009) this requires adequate insight into the dynamics of a complex system. This insight should be reached by managing at the system level. Hence, on a more general note, it is recommended throughout the whole process of transition management to;

- 4. Manage developments at the system level to include the holistic features of a complex adaptive system*

Positive and negative feedback (see also fig. 2.3) can lead to emergent structures and possible unintended side affects. These can only be recognized at the system level. A system level perspective helps to get a better insight into the behaviour of complex adaptive system within its context (Romans & Loorbach, 2009). This implies management at various scales; the multilayered perspective (see also fig. 2.1). By looking at developments at multiple scales one can have a better understanding of possible trajectories, thus more capable of implementing step 2 and 3.

To conclude, in the case of managing non-linear development in the peri-urban area, the aim should not directly be to predict or dictate future development but instead spatial management is advised to stimulate system innovations or fore runners of developments towards a transition and deflect a lock-in towards disintegration. In addition it is advised to anticipate on future developments and adapt spatial management towards these changes. Fig. 5.3 visualizes both recommendations throughout the transition curve of Greater Manchester and clarifies the points in time these actions are preferred.

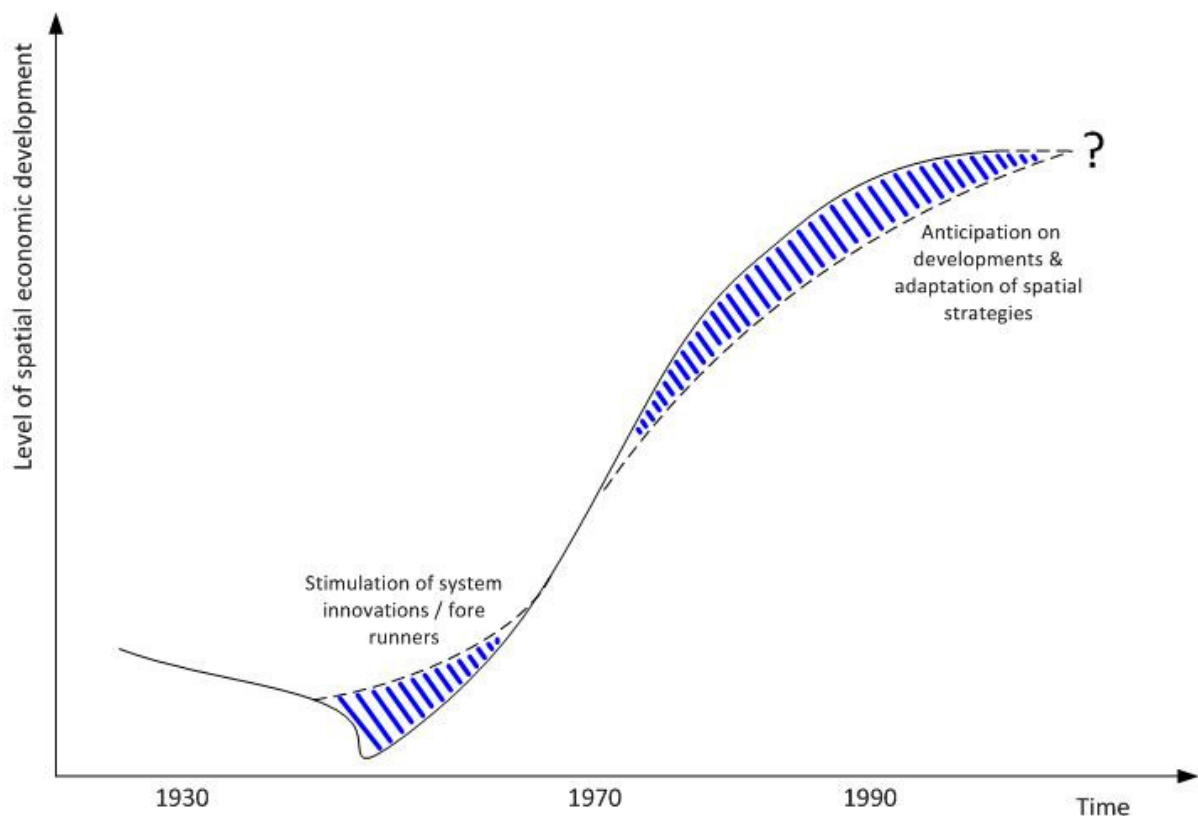


Figure 5-3 Recommendations for spatial strategies in a transition curve

5.5 Conclusion

The notion of transition has enhanced our understanding of spatial development in the peri-urban area. Non-linearity may be regarded as a reality to which planners have to respond. Complex systems feature characteristics of self-organization and emergence, which are influenced by autonomous drivers. This ultimately changes the role of spatial planners and the aims of spatial management. Whereas traditional planners often regard themselves as initiators of change and designers of space, the role of the contemporary planner and with regard to the peri-urban area, will be very different. Instead of designing a preferred outcome, a preferred outcome may be reached by a focus on stimulating system innovations and anticipating on future development and adapting to these ongoing dynamics.

Conclusion

The general objective of this research was to examine whether dynamics in the peri-urban area could be explained by the concept of transition. Moreover, it was aimed to explore the possibilities of embracing complexity theory and acknowledging uncertainty in planning. The overall goal was to contribute to a new perspective that can ultimately help planners to deal with non-linear developments. Below, the main conclusions will be summarized.

The rural and the urban are no longer strictly divided but both are amalgamating and changing into an integrated peri-urban area. The rural-urban relationships within this area are becoming increasingly complex. The concept of transition provides a framework in order to improve our understanding of those increasingly complex relationships. It clarifies, through the use of several phases, the dynamics of developments in the peri-urban area. Developments are multileveled, multidimensional, non-linear. The peri-urban area is furthermore regarded as a complex adaptive system, giving rise to notion such as self organization and emergence. Macro developments can be considered as contextual influences that generate or drive a fundamental change. The meso level (the peri-urban area) is featured by a spatial manifestation of these high dynamics in the system. A transition however is mainly initiated and triggered by developments on the micro level. It is on this level, where the autonomous macro level developments induce self organizational processes. Besides the multileveled aspect of a transition, developments are also multidimensional. Functional, organizational and institutional changes occur and are believed to be interrelated and interdependent. Moreover, the multidimensional character of spatial development, combined with a high degree of contextual influences in constant flux, result in self organizing and emerging properties, ultimately causing the system to move in non-linear way. For Greater Manchester this has eventually led that the peri-urban area changed into a new multifunctional area of integrated rural-urban relationships in which new housing, transport en business developments have emerged.

Regarding the peri-urban area as a complex adaptive system gives rise to a new perspective for spatial planners. Uncertainty and non-linearity ultimately revise the role of the planner and have resulted in a new perspective for spatial management. Instead of dictating change, a planner should focus on stimulating, anticipating and adapting to changes. Transition management could be useful in this case. Hence, this study provides the following planning and management recommendations:

- (1) try and deflect negative lock-ins and avoid disintegration by creating diversity and consequently;
- (2) focus on system innovations and stimulate fore runners in order make of move towards a possible transition. Spatial management should furthermore
- (3) anticipate on future trends and developments and try to accelerate these development by the adaptation of policies and create

strategies. On a more general note and throughout the process, a planner should manage developments at the system level in order to have an improved insight of contextual developments.

The framework provided in this study, has helped us to gain a better understanding of how dynamics in a complex spatial system could be analyzed. Moreover, the concept of transition has resulted in an improved comprehension of the general mechanisms that have ultimately caused a fundamental change in the peri-urban area. Future research should aim at exploring a combination between qualitative and quantitative methods and could strengthen the new non-linear perspective on spatial management.

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OTHER

International conference on complexity theory of cities, visited on 25th and 26th of September 2009, Delft University of Technology, Faculty of Architecture. Speakers included amongst others; Peter Allen, Mike Batty, Hermann Haken, Juval Portugali and Gert de Roo.

Appendix A Cellular Automata

Besides a qualitative case study analysis, non-linear developments in complex adaptive systems can also be analyzed by a quantitative modelling approach. With regard to urban systems, a cellular automaton is the mostly widely used method. In order to understand how it works, a short overview is given below.

Several authors have postulated cellular automata (CA) as an appropriate means of modelling complex dynamic-spatial systems (White & Engelen, 1997; Batty, 1997, Batty, 2007; Openshaw & Abrahart, 2000; Barredo et al., 2003; Liu, 2009). It's grid like structure makes it easy to incorporate a spatial dimension and since it follows a rule based procedure and features self organization, it is intrinsically complex and dynamic.

A cellular automaton is a grid like model that consists of four elements; cells, cell status, neighbours and rules of transition. A cell is the most basic element or object and is situated in relation to its context i.e. other cells in the grid. The cell status represents the condition of a cell. In the most simple cellular automaton, this condition is binary (on/off, alive/dead, 0/1 etc.). For the peri-urban it is reasonable to have multiple possibilities of states to represent the constant fluidity (in space and time; spatiotemporal) of the rural-urban relationship changes. The cells that are positioned next or in close proximity to a particular cell are labelled neighbours. This proximity can be defined in various ways and does not necessarily mean direct nearness; instead it is dependant on the scope/range of factors of influence. The factors of influence in the peri-urban area, for instance, are not only microscopic but extend to macroscopic developments. Hence, a cellular automata can be extended to include some sort of multilayered perspective. The rules of transition are the (mathematical) functions that dictate the degree of change in a cell. The degree of change is dependant on (the value of) the cell status of the cell and the relation of the cell with its context (neighbouring cells) (Batty, 2007). The rules of transition are in essence weights of parameters that ultimately trigger a change of status in a cell.

The abovementioned elements form the basis for modelling spatial change. When every element has been defined (cells, cell status and rules of transition) it is possible to run a (computerized) CA-model, simulating the spatial process of change. In this simulation process the conditions or states of the cells are 'automatically' influenced by the rules of transitions and the states of the surrounding cells. Ultimately, through the process of iteration and abiding the rules of transition, a complex pattern is believed to emerge (White & Engelen, 1997). Hence, a complex pattern of the peri-urban

area of Greater Manchester can be modelled. A complex pattern that is not predetermined, but instead from local, self organizational, processes.

The above has shown that simple rules (neighbours and transition rules) pertaining to local circumstances (cells) give rise to a complex pattern. Hence, a cellular automaton is intrinsically complex, featuring characteristics of self organization. It implies that there is no pre-knowledge of a global structure and that any global pattern created by CA is not prescribed or predetermined but rather emerges from purely local interactions (cells, states and rules of transition) (Batty, 2007). Locality is an important characteristic in CA. Local action leads, as explained in section 2.3.2, to global order and emergent structure. The CA-model assumes that local rules which are applied routinely often lead to larger structures that look highly ordered but cannot be predicted from any top-down process or model. So, if we want to understand these complex system dynamics we need to start by simulating their (local) behaviour and interactions. Cellular Automata models are based on the principle that it is possible to describe the complex patterns of natural phenomena (and human phenomena) by modelling/simulating the simple rules that govern the actions of the component parts. Consequently, emergent patterns and properties can be identified.

Appendix B Challenges of modelling complexity

In chapter three, it has been suggested that there are certain capabilities of modelling urban complexity through quantitative approaches. There are however some challenges to be faced, especially concerning the generality of modelling. In this appendix the challenges of a quantitative modelling approach will be described, as well as the possibilities to overcome these challenges.

The term model in complexity science refers to abstract conceptualizations through to mathematical measures of complexity. Particular important are a set of conceptual models which act as generalized templates of complexity (such as CA) and which are considered to be applicable to various systems (Manson & O'Sullivan, 2006). One important claim of complexity theory is that it operates at a too general level. For instance, there are questions concerning the extent to which concepts –particular from the physical sciences- should be applied in the realm of urban planning especially “[...] in a manner that relies heavily on deduction from analogy and pays scant attention to accepted theory and empirical observation” (p.679; Manson & O'Sullivan, 2006). Another important notion that addresses the problem of generalization is the concern that models of complexity treat aspects of human behaviour, such as culture and meaning, as facile algorithmic expressions (Stewart, 2001). For example, when analyzing complex peri-urban land use relationships one must be cautious in determining the rules to which the actors in the system have to abide. The rules are different for every peri-urban area. The overall claim is thus that modelling complexity does not fully comprehend the specific characteristic of the peri-urban area. Relevant to the discussion of the generalization of complexity models is the way the model can be validated. As mentioned in the previous paragraph calibration or validation remains tricky. In order to clarify the validation of complex urban models a distinction is made between pattern and process.

Pattern and process

As stated above, overgeneralization is one of the challenges for modelling complexity. Generalization, however, remains an essential part of complexity research. Since modelling is the dominant epistemology of complexity science, generalization is inevitable. Modelling is a synonym for simplifying reality i.e. the generalization of the attributes of a system. The advantage of generalization is that it becomes possible to make statements that are valid in multiple situations. Manson & O'Sullivan (2006) agree on the essential use of generalization in complexity and have made a differentiation between complex patterns and complex processes in order to clarify the difficulty on the issue of generalizing the specific changes of rural-urban relationships in a particular

peri-urban area. Complex patterns relate to spatial templates such as fractals and to the concept of scale invariance. Fractals are objects whose irregularity is repeated across many geographical scales. A fractal (peri-) urban area is for instance the spatial expression of a complex system evolving and changing to the local rules and conditions ultimately manifesting a more global order across many scales (Batty & Longley, 1994). Complex processes relate to the theoretical concepts of non-linearity (unpredictability), emergence and self-organization (see chapter 2). The key difficulty (in complexity) is linking pattern to process; this is best explained through the concept of scale invariance. Scale invariance is applied throughout complexity sciences, whereby a single process or set of processes operates to produce patterns that are identical or similar across spatial or temporal scales. The key difficulty in this linkage between pattern and process is that archetypal features (patterns) arise from different processes (Manson & O'Sullivan, 2006). Fractals, for example, are both characterized by self organization and deterministic chaos, which are very different manifestations of complexity. Moreover, urban land use (and accordingly the peri urban) is characterized by a fractal pattern, but it remains difficult to realistically link this observation to processes that are accountable for the unpredictability of socio-economic and cultural (macro developments) forces (Batty & Longley, 1994; White & Engelen, 1993). This is termed as the 'equifinality problem' in which many processes can give rise to the same or very similar patterns (Manson & O'Sullivan, 2006). Or even worse, that many patterns can arise from one complex process, meaning that there is no unique relationship in general between patterns and processes. Even so, the strength of complexity is by its very means the ability to link generalized patterns with processes.

In order to make this link, a fuller understanding of the relationship between pattern and process is required. Manson and O'Sullivan (2006) believe that this understanding is most likely to be reached by combining the relative abstract modelling of spatial systems with extensive empirical grounding. In this research the empirical grounding has been established by the qualitative analysis of Greater Manchester. Manson & O'Sullivan (2006) furthermore state that place-and-space based research, i.e. research on the peri-urban area of Greater Manchester, can support a multitude of theoretical and methodological approaches with a growing number of empirical research opportunities, especially those offered by combining a qualitative place-based research (in this research; chapter 4) and quantitative geospatial technologies such as geographical information sciences (GIS). Cellular automata can also be seen as such a quantitative technology and due to its implicit spatial structure (grid frame) it can be easily incorporated in a GIS-system. Hence, the combination of abstract modelling of and a qualitative in-depth analysis of complex urban systems can be seen as a way to surmount the problem of linking pattern to process. Bousquet et al. (1998) have shown this by -when modelling the complex nature of land use- intentionally shuttling between

theory and empirical data; ranging from remotely sensed imagery to qualitative in-depth interviews. Linking pattern to process by a qualitative empirical analysis is consequently an important aspect of model validation, as will be explained in the next.

Model validation

The difficulties of validating complex spatial models (peri-urban CA-model) are diverse and range from the spatiotemporal nature of these complex models through to the complex (non-linear) self-organizational and emergent processes that these systems are believed to exhibit. The processes of self-organization and emergence are non-linear and not easily captured. Miller (1998) states that these processes are anomalous to many standard methods and that there is a need to construct new validation tools. Since non-linear processes are less obvious, it is difficult to validate these processes. For instance, is it only the unexpected emergent properties that can be regarded as truly emergent, or can we also consider the phenomena that were expected as emergent? Or perhaps the opposite, should truly unexpected outcomes be dismissed as irrelevant since they were not accounted for in the theoretical framework?

These questions relate to the combination of generality and modelling and the a priori knowledge or expectations of model results i.e. how do we expect the unexpected? Manson & O'Sullivan (2006) suggest that the answer to these questions lie in triangulation. Validation through triangulation means the application of several viewpoints and shuttling between theory and empirical observations. Furthermore, models which give more attention to detail derived from fieldwork are more likely to gain the acceptance of a broader community of scholars and scientists. In this vein, the suggestion made by Manson and O'Sullivan (2006) is that it is appropriate to validate models in more narrative oriented and qualitative ways and in keeping with the use of these qualitative methods for tying pattern to process. Thus, the qualitative in depth interviews (which are the basis of the historical analysis of chapter four) are considered to be important for validating complexity models and tying pattern to process.

Appendix C Research design

Case study

The case study was preceded by an enhanced theoretical understanding of rural-urban relationships in peri-urban areas and the concept of transition. This was done through a literature research and resulted in the theoretical framework (Chapter 2). The actual case study is comprised of a literature research -in which knowledge about the area of study, i.e. Greater Manchester, was gathered- and in depth interviews with experts of peri-urban development.

The choice for a case study as a methodological tool is versatile. A case study is an intensive approach to one specific case or a few cases. Opposed to a fixation on one theme occurring at several locations (chorology) or at several period of time (chronology) a case study is most suited when dealing with one case (the peri-urban area of Greater Manchester) and several theme's (contextual). Peri-urban developments are considered as an interplay of forces on the macro-level, developments on the meso-level and activities on the micro-level resulting in a holistic outcome (see section 2.3). Yin states that a case study is most suitable in deliberately researching contextual conditions, where a holistic and in depth investigation is necessary (Yin, 2003). And it is exactly this contextual condition that is thought to be highly relevant in this study.

The case study area of Greater Manchester includes the features which are differentiated for case study research (Yin, 2003): First, the researchers have no control over the developments in the case study area. Secondly, the development of the peri-urban area in Greater Manchester is an actual phenomenon within a real-life context. Thirdly, the rural-urban relationships in peri urban areas is not yet clear as well as the relation between transitional phases and peri-urban developments. Summarizing, the historical qualitative approach entails a case study of the peri urban area. The results of the case study will be analyzed in the light of the theoretical concepts gained from the literature research. Two main techniques were used while conducting the case study; in-depth interviews and literature research. Both approaches will be discussed next

Research techniques

In this paragraph, an overview of the techniques used in the case study is provided. A description will be given on the way the in-depth interviews and literature research, or secondary data, was conducted or retrieved. Furthermore, some strength and weaknesses of both approaches will be discussed

Interviews

Interviews were conducted with ten experts on the case study region of Greater Manchester (see appendix B). The region of Greater Manchester was visited from the 26th of January until the 6th of February 2010. The in-depth interviews focused on the developments in the peri-urban area of Greater Manchester and the adaptation of spatial planning to these developments. The interview consisted of eight one-to-one conversations and two interviews in which several experts at once were being interviewed. The experts consisted of representatives of public spatial planning authorities, scientists, urbanists and various civil servants. They all received an indication of the question list (appendix A) and were asked to contemplate about these questions in advance. The participants were selected on the base of their knowledge about developments in and around Greater Manchester. Especially due to contacts at the University of Manchester, relevant actors could be located.

Interviewing is a valid way of gaining information and has both strengths and weaknesses. The strengths of interviews are composed of its focus on one topic and the insightful features it is believed to contain (Robinson, 1998). Interviews are focussed in the sense that they do not require a large sample of data but instead focus on a small group of experts. They are furthermore believed to be insightful due to the fact that information obtained from depth interviews enable motives to be discerned and interpretations to be made. The weaknesses have much to do with the internal validity of the method. Internal validity represents the ability another researcher conducting a similar case study on the peri-urban area of Greater Manchester would present the same results (Swanborn, 2002). Interviews could impair the internal validity in various ways; (1) non-directive interviews may result in bias and poorly constructed questions; (2) interpreter bias of the gained data; (3) interviews are very subjective and open for lot of (unscientific) interpretations; (4) inability of making general statements due to small sample size (Robinson, 1998). In this research, the latter two have not been overcome. The first two however, have been attempted to surmount by the preparation of a standardized question list (see appendix A) and by repeating important conclusion at the end of each discussion. This will respectively, direct the interview towards information that is relevant and useful and surmount the problem of response bias. In order to avoid a loss of information, while maintaining a discussion that is continuous, a tape recorder has been used to register the interviews. Consequently, each recorded interview has been written out the same day in order to conserve the intrinsic elements of the discussion.

Secondary data

In this research, secondary data was also used. Secondary data is not generated by the researcher himself but instead retrieved from other sources. Examples of sources are statistics (censuses and surveys) and literature. A big advantage of secondary data, in contrary to primary data, is its availability. Secondary data saves time that would otherwise be spent in the collection of information. A wide range of material does already exist and can be used (Flowerdew & Martin, 2005). Another advantage of secondary data is that its validity, reliability and traceability have been pre-established and does not have to be re-examined by the researcher (Heaton, 2004). Disadvantages address the flexibility and context of the data. Secondary data is not very flexible; since it is pre-established it may not always cover the same study area. With regard to the peri-urban area of greater Manchester, this was seen by a continuous redrawing of political and statistical boundaries. Certain data in various time periods could therefore not be compared. Another disadvantage is that secondary data should be seen in the context when it was 'created'. Secondary data has been constructed abiding to the dominant beliefs of its own time. This is especially true of qualitative secondary data.

Main secondary data sources that were used in this research are publications of scientists (articles) and policy documents about the history of Greater Manchester. Statistics and policy documents have been used to uncover major trends which might be indicative for fundamental changes in the regions. Secondary data has also been used to explore the possibilities of a quantitative modelling approach to complexity.

Appendix D Indicative question list for interviews

The following questions are an indication of the questions that have been asked during the expert interviews. The list was send to all interviewees in advance.

A. Background information respondent

Name:

Organization:

Relation with the subject/ function:

Time:

Place:

B. Questions

Past

How has the relation between Manchester and its hinterland evolved during the last decades?

- perception
- character
- role

etc.

Could you explain which trends have dominated the development of the urban fringe the last decennia?

- population
- economy and employment
- land use
- environment
- mobility
- culture

etc.

What have been important projects in the development of the urban fringe of Greater Manchester?

- Autonomous or induced development
- Private, public or public-private partnership

etc.

Could you indicate the changing conditions that have influenced the rural-urban relationship changes?

- socio-political change
- behaviour of government, non-government, and private sectors
- particular events

etc.

Present

Which areas in the urban fringe are being developed at this moment?

- Autonomous or induced development
- Private, public or public-private partnership

etc.

Could you give a SWOT analysis of the developments in the urban fringe?

Future

How do you see future developments?

- government
- infrastructure
- housing
- leisure
- sustainability
- current trends

Do you have any other remarks that could be useful for our research?

Appendix E List of Interviewees

1. Interviewee A (2010) University Professor, interview conducted 27 January 2010, Manchester
2. Interviewee B (2010) University researcher, interview conducted 27 January 2010, Manchester
3. Interviewee C (2010) Civil servant, interview conducted 28 January 2010, Manchester
4. Interviewee D (2010) Civil servant, interview conducted 1 February 2010, Manchester
5. Interviewee E (2010) Civil servant, interview conducted 2 February 2010, Manchester
6. Interviewee F (2010) Architect/Urbanist, interview conducted 2 February 2010, Manchester
7. Interviewee G (2010) University researcher, interview conducted 3 February 2010, Manchester
8. Interviewee H (2010) Two university researchers, interview conducted 3 February 2010, Manchester
9. Interviewee I (2010) University researcher, interview conducted 4 February 2010, Manchester
10. Interviewee J (2010) Agriculture expert, interview conducted via e-mail, 9 February, 2010.