Networks: Structure and Action

This thesis explores the opportunities to build a structural policy network model that is rooted in social network theories. By making a distinction between a process of steering in networks, and a process of steering by networks, it addresses the effects of network structures on network dynamics as well as on the production of policy outputs. Proceeding from actor-based models of network dynamics, it hypothesizes on the relations between initial network structures and their structural outcomes. The thesis also presents a set of hypotheses that describe which structural characteristics of policy networks are most likely to produce policy outputs, and what the utility of such outputs might be for both individuals in the network and for governments.

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CHEPS/UT

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Steering in and Steering by Policy Networks

Adrie Dassen

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NETWORKS: STRUCTURE AND ACTION

STEERING IN AND STEERING BY POLICY NETWORKS

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Preface

It is hard to believe my days as a PhD student are over and that these are the last pages to be written. After four years of hard, but rewarding work it is time to thank those that have played a crucial role in the process leading up to the completion of this thesis.

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Adrie Dassen
Enschede, December 2009

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1 Introduction

1.1 Background of the Study

Public policy makers face increasing pressures from developments in modern societies. Substantial degrees of functional differentiation within society make societal governance a challenging task. Stakeholders' interests transcend sectoral boundaries whereas society is increasingly organised in specialised subsectors. Such specialisation results in a situation where societal actors become both more independent and interdependent at the same time (Mayntz, 1997a; Scharpf, 1978, 1992). Furthermore, both the legitimacy and validity of policies produced by bureaucracies is sometimes questioned which results in the challenging of implementation processes. The classic instruments available to governments appear not to be up to the task of dealing with these developments. The policy problems created by hierarchical command and control, and the negative effects associated with market failure have been pointed out in many empirical studies (Sørensen & Torfing, 2007b). Hierarchical policy-making is often not effective or efficient because bureaucracies lack capacity to acquire all the necessary information and resources for effective and efficient policy making. At the same time, the strategy of increasingly using the market to deal with public policy issues has had ambiguous results. New public management has not only resulted in a situation where market failures arise due to imperfect competition, but it has also failed to reduce the need for state regulation. These societal developments according to some scholars have precipitated a need for a shift from government to governance (a.o. Marin & Mayntz, 1991; Mayntz, 1997a; Scharpf, 1978).

Associated with a shift from government to governance is the employment of a specific policy instrument. Policy networks are increasingly employed as platforms where actors from various sectors and subsectors interact with the aim of increasing the effectiveness and efficiency of public policy making. Policy networks have not only become more important in an empirical sense. The

academic world has also paid increasing attention to this (arguably) new mode of governance (e.g. Klijn & Koppenjan, 2000; Marin & Mayntz, 1991; Mayntz, 1997b; Rhodes, 1988; Scharpf, 1978, 1994; Sørensen & Torfing, 2007a).

The policy network literature argues that policies are no longer solely the result of governmental efforts , but rather subject to negotiations between a heterogeneous group of actors (Sørensen & Torfing, 2007b, pp. 3-4). Policy networks imply a certain degree of interdependency between these public and private stakeholders. The inclusion of different stakeholders, Mayntz (1997b) argues, helps to overcome functional differentiation, thereby making the policy process more effective. Furthermore, the inclusion of different actors might enhance policies' legitimacy (Sørensen & Torfing, 2007b). The extent to which policy networks might be a more effective and efficient mode of governance than hierarchies and markets is often considered to depend upon the characteristics of those networks. These characteristics and their effects on the policies resulting from networks have been one of the primary foci of the policy network literature. The outcomes of these efforts are, however, rather ambiguous and the explanatory power of the policy network approach is debatable.

One of the factors affecting the explanatory value of policy network approaches is found in the 'Babylonian variety of policy network concepts and applications' (Börzel, 1998, p. 253). The policy network literature does not possess a basic definition of the concept of a policy network. Furthermore, the applicability of policy network concepts remains a primary topic of discussion. Policy networks are associated with steering, but the question of who steers and who is steered, and the extent of that steering remains as yet unanswered. One reason underlying this conceptual confusion could be found in the tendency for policy network approaches to underestimate the importance of structural factors (Scharpf, 1978, p. 353). Scharpf considers these structural factors to be 'facilitating or impeding the employment of specific influence strategies'. Scharpf thus points to a process of steering between actors within a policy network, whereas the policy network literature focuses primarily on the process of steering by policy networks. Such steering by networks refers to the extent to which the policies resulting from policy networks are more suitable for governing society than the policies resulting from other modes of coordination.

There thus appears to be some conceptual ambiguity surrounding policy networks in general, and the processes of steering in and steering by policy networks in particular. The policy network literature has for these reasons yet to formulate a theory of policy networks. Research has mainly focused on empirical networks, and the outcomes of these networks have been attributed to the interactions within the policy network *ex post*. This lack of general theory has made the policy network approach vulnerable to criticism. Some have argued that policy network concepts serve as heuristic devices rather than as an explanatory framework. These authors have pointed to the need for a conceptually and theoretically more rigorous approach to policy networks (Bressers, O'Toole, & Richardson, 1994; Dowding, 1995; Peters, 1998). Such an approach, Peters (1998) argues, should be rooted in social network analysis. This latter task is what the current study aims to address.

1.2 Research Objectives and Questions

The ambiguity surrounding policy networks implies that questions concerning who steers and who is being steered need to be answered. The basic premise that actors in a policy network are interdependent is more or less agreed upon by all, but the extent to which the degrees of interdependence are equal for all actors remains a topic for discussion. Furthermore, the relationships between the characteristics of a policy network and its utility as a policy instrument for steering society is problematic. This thesis aims to clarify these issues by developing a framework that includes both the horizontal steering between interdependent actors within a policy network and the vertical process of steering by policy networks. Furthermore, it aims to develop theory-based hypotheses that point to the relations between the structural characteristics of policy networks and the outcomes of both the process of steering in policy networks, and the process of steering by policy networks. The main research question is therefore:

To what extent can a theory be developed that captures both the process of steering in policy networks and the process of steering by policy networks?

In order to analyse this research question in more detail, it is necessary to first clarify the conceptual confusion surrounding policy networks. Furthermore, it is necessary to have a better understanding of what the social network literature offers in terms of concepts, variables and theories that might prove valuable for the development of a policy network theory. The first sub-question is therefore:

1. *Which concepts and theories of the network literature are relevant for the processes of steering in networks and steering by networks?*

Since the policy network approach and social network analysis converge in terms of some concepts and variables, but diverge in terms of others, the development of a policy network theory that is rooted in social network analysis requires a reconceptualisation of the variables identified. Furthermore, a policy network model requires that the causality between such variables is identified. The second and third sub-questions are therefore:

2. *Can a model be developed that links the structural characteristics of a policy network to the structural outcomes?*

3. *Can a model be developed that links the structural characteristics of a policy network to the policy outputs?*

The development of a model that describes the process of steering in policy networks, and the process of steering by policy networks is a first step towards a policy network theory. That is, however, not sufficient. In order to enhance the explanatory power of the policy network approach, the relationships between the characteristics of policy networks and the characteristics of policies resulting from these networks need to be addressed. Furthermore, the utility of policies with certain characteristics for both network actors and governments is crucial. Hence, the final sub-question that is addressed in this study:

4. *What are the implications of the processes of steering in networks and steering by networks for:*
    a. *the utility of a policy network for network actors?*
    b. *the utility of a policy network as a policy instrument for government?*

1.3 Outline of the Study

The design of this study closely follows the research questions. The first part of this book introduces the policy network literature in chapter 2, and social network analysis in chapter 3. It reviews the utility of the different network approaches, and point to the important concepts, variables, and theoretical perspectives that form the basis for the modelling in subsequent chapters. Chapter 2 is structured along the lines of the development of the policy network literature. It elaborates upon the emergence of policy networks as a topic, and the efforts to advance the explanatory power of policy network analysis over the past four decades. Chapter 3 elaborates upon the theoretical anchors that spurred the development of social network analysis in the early 1950s. Furthermore, chapter 3 elaborates upon the concepts and variables upon which social network analysis builds, and introduces the models and theories that aim to explain the interactions between structure and action.

After the identification of the most important concepts, variables and theories, part two of the book develops step-by-step a policy network theory that includes both the process of steering in and the process of steering by networks. firstly, chapter 4 indicates which concepts and variables are employed in the remainder of the study. Furthermore, chapter 4 defines how the variables of both steering processes relate to one another. The framework resulting from these efforts forms the basis for the theoretical elaborations that are presented in chapters 5 and 6. Chapter 5 theorises on the process of steering in networks. It explores the effects of the structural characteristics of a policy network on the capacity of actors to steer in the network. Furthermore, chapter 5 elaborates and hypothesises on the effects of steering in policy networks on the structural characteristics of the network. Chapter 6 theorises on the structural capacity of policy networks to produce policy outputs. It links the characteristics of local structures within a policy network, and the characteristics at the global network level, to the capacity to produce policy outputs. The hypotheses presented in chapter 6 therefore describe the relationships between differently-structured policy networks and the effectiveness of these networks in terms of the production of outputs. The last

chapter of part two elaborates upon the interlocking of the processes of steering in networks and steering by networks. It illustrates that a multi-level network analysis is necessary to hypothesise upon the utility of policy outputs for, on the one hand, individual network actors, and on the other hand, governments.

Part three concludes the study. Chapter 8 summarises the preceding chapters and reflects on the main research question. Furthermore, the chapter reflects on the choices for particular theories and assumptions and their implications for the theory of steering in and steering by policy networks. In conclusion, chapter 8 points towards the opportunities for further research based on the findings of this study.

2 Policy Network Perspectives

2.1 Introduction

Policy networks have become a key concept for both policy makers and the public sector since the 1970s. In response to the empirical emergence of policy networks, the scientific community has also increasingly focused on analysing and evaluating policy processes and the policy outcomes of these networks. Two observations are generally considered to mark the conceptual emergence of policy networks. firstly, Heclo (1978) elaborated on issue networks that served as a mode of representation of stakeholders' interests in the United States (US) while others characterised the interactions between public and the private sector in the United Kingdom (UK) as policy communities (cf. Rhodes, 1988). At the same time, German scholars observed a new mode of social coordination, which differed from hierarchies and markets. These observations of interactions between public and private actors mark the starting point of the policy network literature. In this body of literature a variety of concepts, typologies and models that aim to capture the structures, interactions, and outcomes of policy networks have been developed.

Since the 1990s the body of policy network literature has expanded significantly. The policy network literature focuses on the diverse ways in which public and private actors are involved in policy processes. Despite the increasing amount of attention paid to policy networks in general, some have argued that the explanatory value of the models developed within this body of literature is limited. One of the main points of criticism on policy network analysis is voiced by Dowding (1995). Dowding argues that a network perspective implies that relations between the various actors in a network matter. However, these relations were often not included as a variable in the policy network models that were developed throughout the 1990s. In a similar vein, Bressers et al. (1994) argue that the lack of explanatory value of policy network models can be

attributed to a misconceptualisation of policy networks. Such a misconceptualisation of policy networks leads to a situation where the formulation of hypotheses on the relations between policy networks and the outcomes of these policy networks is severely hampered.

The criticisms of the typologies and models developed stimulated some scholars to introduce new elements into the policy network models (e.g. Borras & Olsen, 2007; John & Cole, 1998; Kalfagianni, 2006). Some applied a managerial perspective on policy network analysis, and introduced the dynamic aspect of networks into the equation. Others took the decision to fundamentally reconsider the conceptual anchors of policy network analysis. These authors took up the task to address the issues surrounding the omission of relational variables in policy network analysis and draw on social network analysis to strengthen the policy network perspective. Despite some major steps forward, this chapter illustrates that the policy network literature has as yet not been able to develop a policy network theory that consistently links the characteristics of a policy network to the characteristics of the outcomes resulting from these policy networks.

Notwithstanding the reservations of some scholars regarding the theoretical validity of policy network analysis, the literature does point to some issues that are important for this policy instrument. This chapter aims to provide an overview of the policy network perspectives developed since the 1970s. It attempts to identify the variables and concepts upon which policy network analysis builds. The chapter argues that policy network analysis developed in three distinct cycles that have made a number of important contributions to the conceptualisation of policy networks and the identification of relevant variables. Policy network perspectives offer a conceptual point of departure for the development of a policy network theory.

The chapter is structured along the lines of the three cycles of policy network literature. Section 2.2 presents an overview of the literature that introduced policy networks as a concept into the literature. Next, section 2.3 focuses on the second cycle of policy network literature where a more managerial and dynamic element was introduced in the models. Section 2.4 then focuses on the most recent developments in the policy network literature. This literature questions the conceptualisation of earlier policy network approaches and proposes a different perspective. The chapter's final section reflects on the theoretical contributions of

the policy network literature, and on those issues related to policy network models that remain as yet theoretically unresolved.

2.2 The First Cycle of Policy Network Literature

The first cycle of policy network literature has developed primarily around a single debate. The question central in the early policy network literature was whether policy networks were merely heuristic tools to describe the specifics of interactions between the public and private sector, or real and existing structures that affect policy processes (Börzel, 1998; Thatcher, 1998; Thompson & Pforr, 2005). Those that argued that policy networks were mostly a heuristic tool to analyse the interactions between a variety of stakeholders, mainly focused on the identification of several distinct dimensions along which policy networks vary. The analytical models that have developed within this interest intermediation literature are therefore best characterised as typologies (e.g. Atkinson & Coleman, 1989; Jordan & Schubert, 1992; Marsh & Rhodes, 1992; Richardson & Jordan, 1979; Van Waarden, 1992). Others argued that policy networks more than just a platform that facilitate interactions between a collection of public and private stakeholders. These researchers generally conceptualise policy networks as a mode of governance distinct from hierarchies and markets (e.g. Kenis, 1991; Kenis & Schneider, 1991; Mayntz, 1997b; Scharpf, 1978, 1994; Schneider, 1992). Within this governance strand of literature, policy networks are often viewed as a synthesis of other modes of coordination (e.g. Mayntz, 1997b; Thorelli, 1986).

This section focuses on both policy network perspectives found within the first cycle of policy network literature (hereafter referred to as 'first cycle literature'). It firstly expands upon the conceptualisation of policy networks and the various dimensions identified within the interest intermediation literature. After that, the section focuses on the conceptualisation of policy networks as a mode of governance. The section additionally points to the strengths and weaknesses of the models developed within the first cycle perspectives. It ends with a brief summary of the main contributions and the main problems related to the models developed within the interest intermediation school and the governance school respectively.

The interest intermediation approach to policy networks developed to describe the relations between the state and society more adequately than could models with their origins in corporatism or pluralism (Börzel, 1998). In the United States (US), Heclo (1978) developed the concept of issue networks to describe the interactions he observed between the state and industry. Heclo argued that dominant concept in the literature of iron triangles failed to denote the specifics of the existing patterns of relations between industry and government. Rather than being characterised by closure and segmentation, issue networks displayed fragmentation and openness (Börzel, 1998; Heclo, 1978; Thatcher, 1998).

At the same time in the United Kingdom (UK), a rather different type of state-industry interactions was observed. The term policy community was coined to describe the policy processes taking place between inter-dependent actors in segmented sub-systems (e.g. Rhodes, 1988). Within these policy communities, resources were exchanged based on a set of dominant values (Börzel, 1998; Klijn, 1997; Thatcher, 1998; Thompson & Pforr, 2005). These policy communities were characterised by stability and clearly defined boundaries (Thatcher, 1998). In the 1980s and 1990s, these two distinct types of state-industry relationships were taken up by a number of scholars and generally redefined as two poles of a continuum of policy network types (e.g. Atkinson & Coleman, 1989; Jordan & Schubert, 1992; Marsh, 1998b; Marsh & Rhodes, 1992; Rhodes, 1997; Richardson & Jordan, 1979; Smith, 1993; Van Waarden, 1992). Based on these different types of policy networks, the approach developed that conceives policy networks as platforms of interest intermediation (Börzel, 1998).

From an interest intermediation perspective, policy networks are conceived as a meso-level concept. The concept is applied as a generic, overarching framework for the analysis of all kinds of public-private interactions, but in particular relationships between various interest groups and the state (Thompson & Pforr, 2005). Marshall (1995) for example applies the concepts of issue networks and policy communities to higher education policy making in Australia. He describes how the interactions between government, universities, colleges, and a variety of other stakeholders evolved from relatively *ad hoc* interactions to more institutionalised cooperation over the course of a decade. In a similar vein, Rhodes (1988) describes the interactions between government and a wide variety of interest groups in different policy sectors in the UK, characterising these

interactions as policy networks. Similar conceptualisations of policy networks can be found in the studies presented by Cavanagh (1998), Daugbjerg (1997, 1998), and Van Waarden (1992).

Interest intermediation scholars argue that policy making and implementation does not take place in a void, but rather in a multi-actor process where different stakeholders attempt to influence both the process and its potential outcomes. To describe these processes of interest intermediation, typologies were developed to characterise the specifics of the policy process. The literature shows an impressive number of different typologies. Differences between the various typologies are the result of the emphasis placed on several distinct dimensions according to which policy networks differ. One could argue that these differences relate to the models of power distribution, which can be traced back to corporatist or pluralist models embedded within the dimensions of a typology (Börzel, 1998).

One of the most detailed and comprehensive typologies of policy networks was developed by Van Waarden (1992). Van Waarden takes transaction costs models as a point of departure to characterise the various ways in which different stakeholders within a policy network interact to represent their interests. In Van Waarden's view, policy networks emerge because interdependent actors aim to reduce transaction costs. Interest groups save resources by participating in policy networks. Policy networks ensure that stakeholders do not have to gain access and influence for each separate issue. For governmental actors, easier access to information signals such savings. Van Waarden argues that a second rationale can be found for governmental participation in policy networks. The interdependence between actors in a policy network stimulates cooperative behaviour among these stakeholders. The more permanent relationships of trust and resource dependency that develop among both public and private actors in policy networks over time reduce deviant behaviour. In other words, the interdependency between actors facilitates cooperative behaviour between these actors which reduces coordination and transaction costs.

Taking these theoretical considerations into account, Van Waarden then distinguishes seven dimensions along which policy networks vary. Three of these dimensions seem to be of particular importance for both the interactions in a policy network, and the extent to which a policy network is likely to affect the outcomes of the broader policy process. Van Waarden stresses the importance of

the individual characteristics of the policy network's actors, the main function of the policy network, and the balance of power among the various stakeholders within the policy network. These three dimensions largely shape the policy network, and thereby determine its type. Furthermore, these three dimensions affect the extent to which the policy network is likely to affect the outcomes of a policy process.

Van Waarden's typology of policy networks is one of many typologies developed in the interest intermediation school. Such typologies aim to capture two factors. Firstly, they elaborate upon the relative efficiency of policy networks as a tool for the representation of a variety of stakeholders' interests. Secondly, the typologies attempt to grasp the extent to which the costs for actors are reduced due to increased access to information and the stimulation of cooperation in policy networks. A typology similar to that of Van Waarden was presented by Jordan and Schubert (1992). They distinguish between twelve types of policy networks. These different types of policy networks are derived from three dimensions along which the characteristics of policy networks vary. Jordan and Schubert emphasise different dimensions to Van Waarden. According to these authors, one of the main indicators of the type of policy network is the degree of institutionalisation of the network. The stability of a policy network is largely dependent upon the degree of institutionalisation of the norms and values of the policy network's actors. Unstable policy networks lack shared consensus in terms of problem definitions and preferred solutions, due to a lack of shared values and norms. Unstable policy networks are therefore less capable of affecting policy processes and their outcomes.

Next to the degree of institutionalisation of norms and values among the policy network's members, Jordan and Schubert stress the nature of network boundaries as an important dimension. This dimension is closely related to the degree of institutionalisation of a policy network. If new actors can easily enter a policy network, the boundaries of this particular policy network are open. If on the other hand boundaries are closed, stakeholders that aspire to participate in the policy network might not be able to do so. The nature of network boundaries can also be considered an indicator of the degree of institutionalisation of the policy network. Policy networks that are highly institutionalised in terms of shared norms and values generally tend to have network boundaries that are

more closed compared to less institutionalised policy networks. The nature of a policy network's boundaries can therefore be viewed as an additional indicator of the degree of institutionalisation of a policy network.

The third dimension for Jordan and Schubert also relates to the degree of institutionalisation of norms and values and the nature of the boundaries of a policy network. Jordan and Schubert argue that another important characteristic of a policy network is the level at which such a network operates. According to these authors, policy networks that transcend a sectoral level are more likely to gain the attention of a wider variety of interest groups than sectoral policy networks. This variety of stakeholders, and therefore potential actors, results in increasing pressures on the policy network's boundaries. The extent to which norms and values become institutionalised might be affected by such increased pressures on boundaries. Policy networks that transcend the sectoral level therefore might hamper the development of shared norms and values, and limit the extent to which consensus and shared problem definitions are likely to emerge.

Perhaps the best known, and most often applied, typology of policy networks is the classification of networks developed by Rhodes (1988) and later refined by Marsh and Rhodes (Marsh, 1998b; Marsh & Rhodes, 1992). Marsh and Rhodes' fivefold typology builds on the concepts developed in the late 1970s of issue networks and policy communities. They argue that policy networks differ along a continuum, ranging from issue networks to policy communities. The five types of policy networks distinguished by these authors vary along three dimensions. Similar to Van Waarden (1992), Marsh and Rhodes argue that network membership is an important indicator of the type of policy network. Both the number of actors involved in the network, and the characteristics of these network members, are important. In other words, besides the size of the policy network, the characteristics of the actors involved in it form an important indicator for the particular type of policy network.

Second, in line with Jordan and Schubert (1992), Marsh and Rhodes emphasise the importance of the degree of integration that a policy network displays. The frequency of interactions among network actors is one important indicator of integration. In addition to the frequency of interactions between actors, Marsh and Rhodes stress the degree of continuity in terms of problem definitions and

possible solutions. The importance of the degree to which norms and values are shared among network members is an important dimension along which policy networks can differ.

Finally, similar to Van Waarden (1992), Marsh and Rhodes' typology focuses on various policy resources as a dimension. One important difference must be underlined between Van Waarden's typology and Marsh and Rhodes' perspective. Van Waarden particularly stresses the power distribution within a policy network. By contrast, Marsh and Rhodes acknowledge the importance of the relative power of actors, but add other policy resources to this dimension. These resources could be tangible resources, but also intangible resources. The inclusion of policy resources besides power relates this third dimension to the first dimension (i.e. network membership). Policy resources other than power and trust can be attributed to individual actors within a policy network. Power and trust on the other hand only exist in the relations between pairs of actors. Individual policy resources are therefore a characteristic of network members rather than of pairs of actors. The third dimension only differs from the network membership dimension through the inclusion of relational policy resources.

The typologies of policy networks so far described all share some similarities in terms of which dimensions are considered important for the identification of the type of policy network. Differences between the various typologies are the result of the emphasis that is placed on the various dimensions identified, rather than an indicator of different policy network perspectives. The emphasis placed by Jordan and Schubert (1992) on the level at which a policy network manifests is also stressed in the policy network typology developed by Atkinson and Coleman (1989). Similarly, Wilks and Wright (1987) pay particular attention to the dimension that both the typologies developed by Van Waarden (1992) and Marsh and Rhodes (Marsh & Rhodes, 1992; Marsh & Smith, 2000; Rhodes, 1988, 1997) stress as a key dimension along which policy networks vary. In line with these two previously mentioned typologies, Wilks and Wright specifically focus on the degree to which the actors within a policy network share norms and values. Furthermore, these authors elaborate upon the extent to which shared norms and values facilitate consensus building on both the problem definition and the preferred solution.

The typologies developed in the interest intermediation literature share two ideas. Firstly, the typologies have a common understanding of policy networks as 'power dependency relationships between government and interest groups, in which resources are exchanged' (Börzel, 1998, p. 256). Secondly, the interest intermediation literature acknowledges that policy networks might influence and facilitate policy processes and the production of outcomes, but the policy networks are not considered as producing those policy outcomes (Marsh, 1998b). The typologies emphasise how policy network structures affect the interactions between interdependent actors. Furthermore, they attempt to capture the extent to which the structural characteristics of policy networks affect policy processes and policy outcomes.

Besides these interest intermediation approaches, the first cycle literature includes a second policy network perspective. This strand of literature does perceive policy networks as a potential policy instrument to produce policy outcomes. The term policy network refers in this perspective to a specific mode of governance (a.o. Börzel, 1998; Klijn, 1997; Thatcher, 1998; Thompson & Pforr, 2005). The governance approach to policy networks differs from the interest intermediation approach because it views policy networks as an alternative to other modes of governance, such as markets and hierarchies (e.g. Klijn, 1997; Mayntz, 1997b; Sørensen & Torfing, 2007b). The governance school builds in general from a perspective that argues that the combination of functional differentiation and the growing importance of formal organisations in modern societies have resulted in a shift from government to governance (Mayntz, 1997a; Scharpf, 1978). Where government is generally associated with hierarchical command and control, governance is generally viewed as a more cooperative and interactive form of steering (Marin & Mayntz, 1991; Scharpf, 1978, 1992). The increasing degrees of functional differentiation within modern societies result in relationships between public and private actors that are characterised by interdependence. The problem-solving capacity of governments is disaggregated 'into a collection of subsystems of actors with specialised tasks and limited competences and resources' (Börzel, 1998, pp. 259-260). Due to the growth in the number of interest groups, government is no longer able to communicate directly with societal stakeholders (Kenis & Schneider, 1991; Koppenjan, de Bruin, & Kickert, 1993). Under these circumstances, policy networks develop to provide

interest groups with an opportunity to have some influence on policy processes. At the same time, such policy networks offer government an opportunity to gather political resources (Mayntz, 1997b). According to Börzel (1998), the governance school thus considers policy networks not just as a new mode of governance, but also as an indicator of the changed relationship between the state and society.

In the view of Kenis and Schneider (1991, p. 36), policy networks are best understood as 'webs of relatively stable and ongoing relationships which mobilise and pool dispersed resources so that collective (or parallel) action can be orchestrated towards the solution of a common policy'. Kenis and Schneider (1991) argue that policy networks should be conceived as specific structural arrangements employed by governments in policy processes. This notion of policy networks is exemplified amongst others by Schneider and Werle's (1991) study of the German telecom sector. These authors conclude that over the course of several decades, the German telecom sector evolved from a hierarchically structured subsystem to a networked form of governance.

The governance approach to policy networks mainly focuses on inter-organisational relations that appear at the sectoral level (Marin & Mayntz, 1991; Schneider & Werle, 1991). This stresses not only the importance of policy network structures, but also the processes through which joint policy making is organised form part of the governance perspective (Börzel, 1998). The policy network concept refers to the horizontal coordination of collective action by public and private actors, and particular emphasis is placed on the inter-organisational relations in policy processes (e.g. Marin & Mayntz, 1991; Scharpf, 1978). Policy networks therefore serve in the governance approach not merely as a vehicle for the exchange of valuable policy resources and the representation of stakeholders' interests (Kenis & Schneider, 1991). They are viewed instead as necessary policy instruments for modern governments to effectively steer society. As Scharpf argues (1978, p. 347), 'it is unlikely, if not impossible, that public policy of any significance could result from the choice process of any single unified actor. Policy formulation and policy implementation are inevitably the result of interactions among a plurality of separate stakeholders, with separate interests, goals and strategies'.

Horizontal coordination among a number of actors with different interests and resources can result in a rather complex policy process. The literature generally refers to two particular challenges that are related to policy networks as a mode of governance (Börzel, 1998). One problem is referred to as the bargaining dilemma, which implies that the pay-off structures embedded within the policy network's structure stimulate uncooperative behaviour rather than cooperative actions (Scharpf, 1992). Individual actors can profit from following a defective strategy rather than a cooperative strategy and free-ride on the efforts of other actors. These pay-off structures can prevent cooperative behaviour and therefore the realisation of policy outcomes. This bargaining dilemma can nonetheless be overcome through a process of voluntary exchange and shifts in policy positions between the actors in the policy network (Kenis & Schneider, 1991). Voluntary exchange of policy resources is considered possible in policy networks because 'unlike 'exchange' and 'strategic interaction', which are based on the maximisation of self-interest through cost-benefit calculations and which are prone to produce bargaining dilemmas, negotiations in policy networks are based on communication and trust and aim at achieving joint outcomes, which have a proper value for the actors' (Börzel, 1998, p. 262).

The second problem that policy networks as a mode of governance encounter is referred to as the structural dilemma (Börzel, 1998). Inter-organisational networks are composed of representatives of organisations. Due to their links back to organisations, these representatives are not completely autonomous in the inter-organisational bargaining process (Benz, 1992). The organisations they represent determine and control to a certain extent the range of actions possible for the actors in the policy network. Intra-organisational structures thus constrain the behaviour of actors in the inter-organisational policy networks. According to Börzel (1998, p. 261), intra-organisational constraints do not only have consequences for the action orientations of representatives. They also affect the 'reliability of their commitments made in inter-organisational bargaining'. This linkage between the intra-organisational structures and the inter-organisational policy network thus results in complex structures that require simultaneous horizontal coordination across several levels. Such complex structures can severely hamper the probability of the production of collective outcomes in policy networks (Benz, 1992; Börzel, 1998).

Despite these two caveats, the governance school considers policy networks to potentially be more effective and efficient than other modes of societal coordination (Kenis & Schneider, 1991; Mayntz, 1997b; Scharpf, 1978, 1992). The governance literature argues that policy networks might be capable of combining the strengths of a range of more conventional governance mechanisms. At the same time, such a form of governance might avoid the negative spill-overs associated with hierarchical command-and-control and market steering. Hierarchies are tightly coupled structures and by definition exclude certain groups of stakeholders from the policy process. Markets produce negative externalities in the form of market failures due to the imperfect conditions under which they operate (a.o. Börzel, 1998; Mayntz, 1997b). Policy networks, conversely, are loosely coupled structures where different societal interest groups interact with governmental or bureaucratic representatives. They are not just a mode of governance that appears somewhere between markets and hierarchies, but rather a synthesis of these two opposing types (Mayntz, 1997b).

The governance school acknowledges that policy formulation processes in policy networks can be quite time-consuming compared to decision making processes in hierarchies, the reason for which being found in the bargaining processes relied upon (Kenis & Schneider, 1991; Mayntz, 1997b; Scharpf, 1978, 1992). Despite the time-consuming process of policy formulation, policy networks are nevertheless considered to be potentially more effective and efficient than other modes of societal coordination. Policy networks can be both more effective and efficient in the policy implementation stage than hierarchies and markets. Bargaining process ensure cooperative behaviour of actors which facilitates implementation. According to Kenis and Schneider (1991), the potential benefits of policy networks as a mode of governance should therefore be seen in this implementation stage. The relative effectiveness of policy networks in the implementation stage compared to hierarchies and markets outweighs any efficiency losses in the policy formulation stage. Additionally, Mayntz (1997a, 1997b) argues that the shadow of hierarchy is considered an important impetus for cooperative behaviour in policy networks. This link to the hierarchy should stimulate actors involved in a policy network to display cooperative behaviour by exchanging resources and agreeing shifts in policy positions (Mayntz, 1997a, 1997b; Scharpf, 1992, 1994).

The first cycle literature thus consists of two quite distinct policy network perspectives. The interest intermediation literature has introduced many dimensions along which policy networks might vary. The governance approach has pointed to the potential of policy networks as a new mode of societal coordination. Despite these important conceptualisations of new modes of interaction between societal stakeholders, both the interest intermediation literature and the governance approach to policy networks have been subject to some quite fundamental criticism. These criticisms generally point to three main omissions of both the interest intermediation literature and the governance literature. Firstly, some have argued that these policy network perspectives lack a proper conceptualisation of relational variables. The first cycle literature focuses on the characteristics of actors instead, which results in policy network models that are not network models in the true sense (a.o. Pappi & Henning, 1998; Peters, 1998). Secondly, these policy network perspectives are criticised for their lack of a conceptual link between the characteristics of a policy network's structures and the characteristics of policy outcomes (e.g. Ansell, 2000; Dowding, 1995; Peters, 1998). And third, some have argued that early policy network perspectives have focused only on the structural characteristics of the global network structure rather than including potentially important differences within policy networks' structures in their models (Provan & Sebastian, 1998).

Those that stress that both the interest intermediation literature and the governance approach to policy networks do not constitute a network model *per se* argue that the variables distinguished in these approaches relate to actors, rather than to the relationships between these actors. Dowding (1995, p. 137) for example argues that 'the driving force of explanation, the independent variables, are not network characteristics *per se* but rather characteristics of components within the networks'. The dimensions along which policy networks are considered to vary are characteristics of actors, rather than of the relationships between these actors (*inter alia* Bressers et al., 1994; Dowding, 1995; Pappi & Henning, 1998; Peters, 1998). Marsh and Rhodes' typology, for example, builds on the dimension that captures the nature of network membership. This dimension stresses both the number of actors, and the characteristics of these actors, but does not elaborate upon the relations between actors. In a similar vein, Van Waarden (1992) stresses the importance of network actors' individual characteristics. . The

only relational variable that is stressed throughout the interest intermediation literature is the balance of power within the policy network. However, in the empirical literature, this dimension is often operationalised by focusing on the policy resources the various actors in a network have at their disposal (e.g. Cavanagh, 1998; Daugbjerg, 1997, 1998). Such an application of the dimension undermines the relational character of the power dimension.

Not only the typologies developed within the interest intermediation literature suffer from the exclusion of relational variables, but the governance approach to policy networks tends to be criticised for the same point. This strand of literature has not explicitly focused on the identification of the independent variables of policy networks and their relations to the outcomes of policy processes. It has rather introduced the policy network concept as a heuristic device (e.g. Dowding, 1995; Pappi & Henning, 1998). Scharpf (1978) argued that policy networks could vary along so many dimensions that comparing in terms of similar networks could be highly problematic. The application of the policy network concept as a metaphor therefore undermines its potential as a theoretical perspective. The governance perspective may not causally relate the characteristics of a policy network to the outcomes of such a mode of governance, as a consequence of its use of the policy network concept The lack of clear conceptualisation of the independent (i.e. both the characteristics of actors and the relational variables) and dependent variables of policy networks (i.e. the policy outcomes) hamper the development of a policy network theory. The governance approach therefore lacks hypotheses that define the causal relations between the characteristics of a policy network's structure and the characteristics of its outcomes (a.o. Bressers et al., 1994; Dowding, 1995; Peters, 1998).

The second main point of criticism of the first cycle literature refers to the lack of a conceptual link between the structural characteristics of a policy network and the characteristics of policy process outcomes (e.g. Peters, 1998). The typologies developed within the interest intermediation literature point to the characteristics of certain policy networks and the characteristics of policy outcomes likely to result from such network structures, but cannot explain how outcomes are linked to the structures of policy networks. The interest intermediation literature has indicated at best a correlation between different types of policy networks and different types of policy outcomes, but the causal relations remain unclear. The

lack of a conceptual link between the structure of a policy network and the characteristics of policy outcomes thus limits the explanatory value of these policy network perspectives.

Similar arguments apply to the conceptualisation of policy networks as a mode of governance. Within these policy network perspectives what is lacking is a clear conceptual mechanism to explain relations between network structures and policy outcomes. The governance approach only provides associations between network characteristics and policy outcomes. Scharpf (1978) argued that the most feasible way to study and compare policy networks would be to focus on the governance structures of policy networks. The governance approach has however not been able to conceptually clarify these governance structures for two reasons. Firstly, the conceptualisation of policy networks in the governance approach lacks a relational dimension. And secondly, the governance approach has not provided a concept that explains what it is that produces outcomes (Bressers et al., 1994; Dowding, 1995; Pappi & Henning, 1998; Peters, 1998).

The final main point of criticism of the first cycle literature is most apparent in the work of Peters (1998) and Provan and Sebastian (1998). These authors argue that both the interest intermediation typologies and the descriptive policy network perspectives of the governance approach tend to focus on the global characteristics of a policy network. The dimensions of the typologies developed within the interest intermediation approach characterise a policy network for example as 'institutionalised' (e.g. Jordan & Schubert, 1992; Marsh & Rhodes, 1992) or 'cohesive' (e.g. Daugbjerg, 1997, 1998). The typologies pay no attention to potentially important differences within the structure of such policy networks. The governance school not only characterises policy networks exclusively at the global level, but also fails to specify differences between these global network structures. This is largely due to the different points of departure of the governance approach and the interest intermediation literature. Whereas the latter approaches tend to focus on differences between various platforms for the representation of stakeholders' interests, the governance approach compares policy networks to other modes of governance (Kenis & Schneider, 1991; Mayntz, 1997b; Scharpf, 1992). Both schools of policy network analysis overlook potentially important differences within policy network structures (Dowding, 1995; Pappi & Henning, 1998; Peters, 1998; Provan & Sebastian, 1998).

The first cycle literature has contributed to the identification of some interesting dimensions and processes related to policy networks. It has however not been able to produce a convincing theoretical model that relates the characteristics of different policy networks to the characteristics of policy outcomes. The three main points of criticism on the first cycle literature have led some to conclude that these policy network perspectives do not constitute a theoretical perspective. Dowding (1995, p. 141) has argued that the interest intermediation literature cannot move beyond the metaphorical stage as long as it builds its systems of classification on the characteristics of network components. Dowding argues that policy network models should instead build on characteristics of policy networks. Börzel (1998, p. 263) adds that the governance approach is not a theory, but derives its explanations of the outcomes of policy networks from various other theoretical perspectives, most notably actor-centred institutionalism. Despite their limitations, these early policy network perspectives did introduce policy networks as a topic in the literature, and formed the basis for much of the policy network literature in following decades. Although a policy network theory has not resulted from the efforts made in the first cycle theory, it nevertheless forms an important point of departure for other approaches. One of these approaches is the network management literature.

2.3 The Second Cycle of Policy Network Literature

The previous section argued that policy network analysis originated within two different strands of literature, both with their own theoretical points of departure. Despite some major differences between the interest intermediation literature and the governance approach to policy networks, (most noticeably in the perceived utility of policy networks in terms of the production of policy outcomes) the conceptualisation of policy networks does not necessarily greatly differ between the two strands. Both approaches found in the first cycle literature stress the importance of network actors and their policy resources, as well as the interactions between these actors (e.g. Kenis, 1991; Kenis & Schneider, 1991; Marsh & Rhodes, 1992; Marsh & Smith, 2000; Mayntz, 1997b; Van Waarden, 1992). Furthermore, both approaches encounter similar problems in terms of their

explanatory value (Bressers et al., 1994; Dowding, 1995; Pappi & Henning, 1998; Peters, 1998). The second cycle of policy network literature ('second cycle literature') largely abandons the debate surrounding the conceptualisation of policy networks as either platforms of interest intermediation or a specific mode of governance. It focuses instead on the opportunities which policy networks afford a variety of actors - especially government - to represent their interests and influence policy outcomes. Anchored in the new public management literature, the second cycle literature built on the policy network perspective introduced in the governance approach to policy networks. This is apparent not only in the capacity ascribed to policy networks in terms of the realisation of policy outcomes, but also in the relabeling of policy networks as governance networks (Bogason, 2004; Kickert & Koppenjan, 1997; Skelcher et al., 2006; Sørensen & Torfing, 2007a).

The second cycle literature attempted to specify policy networks' interaction processes and clarify the potential of policy networks as a more effective and efficient mode of coordination (Klijn, 1997; Sørensen & Torfing, 2007b). This conceptual point of departure implies that the network management literature does not develop a policy network theory *per se*, but extends and refines the metaphorical application of the policy network concept. This refinement of policy networks as a heuristic tool to analyse complex and interactive policy processes is most evident in the distinction made between two management strategies. The second cycle literature generally distinguishes between one management strategy labelled game management, and the other labelled institutional design (e.g. Kickert, Klijn, & Koppenjan, 1997a; Kickert, Klijn, & Koppenjan, 1997b; Klijn, 2005; Klijn & Edelenbos, 2007; Klijn & Koppenjan, 2006; Klijn & Teisman, 1997; Schaap & Twist, 1997; Skelcher et al., 2006; Sørensen & Torfing, 2007a). This section first presents the conceptual basis upon which the distinction is made, then elaborates upon the two distinct management strategies. Finally , this section points to the merits of the network management literature for the analysis of policy networks, and to the issues related to policy network analysis that remain unresolved.

The network management literature views policy networks as a mode of societal coordination that differs from market steering and hierarchical command and control. With a focus on the inter-organisational relations that appear at the

sectoral level in terms of both the processes and structures of these inter-organisational relations, it further develops concepts introduced in the governance school. This cycle of the policy network literature is anchored in the new public management literature. This new public management perspective is indicated by a focus on the effectiveness and efficiency of policy networks as a mode of governance (e.g. Kickert & Koppenjan, 1997; Sørensen & Torfing, 2007b). The management of policy networks requires a different perspective to the management of stratified organisations. According to Bardach (1998, pp. 230-231) network management requires a different set of strategies to the management of hierarchical organisations because within policy networks, 'the steering processes are multiple, sometimes overlapping, and often complex. Complete consensus is always either impossible or very time consuming'.

A management view on policy networks implies that the processes and structures of policy networks can be affected by management efforts. Network management is commonly defined as 'promoting the mutual adjustment of the behaviour of actors with diverse objectives and ambitions with regard to tackling problems within a given framework of inter-organisational relationships' (Kickert et al., 1997a, p. 44). Implicit within this definition of network management is an assumption made throughout the second cycle literature: the management of both the processes and structures of a policy network takes place at a superior level, rather than within the policy network. Network management is commonly viewed as a 'meta-level process', and changes in both the interaction patterns within a policy network and the structures of a policy network are the result of conscious interference of a governing body (Kickert & Koppenjan, 1997; Klijn & Edelenbos, 2007; Sørensen & Torfing, 2007b; Toonen, 1998).

Network management is thus geared towards resolving the tensions inherent in policy networks between the 'go-alone' strategies of individual actors, and the need for collective action to produce a policy outcome that is preferred to the *status quo* by the majority of the network's actors. The governing body can employ two management strategies to stimulate collective actions. Game management is concerned with facilitating interactions between network actors in a policy network in such a way that collective outcomes can be reached (e.g. Klijn & Teisman, 1997; Koppenjan & Klijn, 2004c). This management strategy requires steering strategies from the governing body that aim to create common

perceptions amongst actors of both the problem, and the preferable solution (Klijn, 2005; Klijn & Teisman, 1997). The characteristics of the policy network, in terms of rules, participating actors, resources, norms, and values are accepted as a given.

The process of formulating and shaping both the problem and possible solutions are considered to take place within an environment that is characterised by uncertainty. Koppenjan and Klijn (2004c, p. 184) argue that this uncertainty emerges from interdependence between network members. Actors in a policy network are therefore required to 'adapt their strategies on the basis of an initial exploration of their strategic environment'. This type of coordination might sometimes occur due to the voluntary coordination of network actors (cf. Ostrom, 1990). Voluntary coordination does not occur automatically. Koppenjan and Klijn (2004c) point to the limitations of voluntary coordination among actors embedded in a policy network if the environment is characterised by uncertainty. The uncertain situation in which actors find themselves can lead to a situation where coordination will not occur if actors are risk averse. An outside stimulus is then needed to facilitate the development of common perceptions and definitions of problems and preferable solutions. A governing body that can stimulate horizontal coordination has several ways of managing the policy games in these networks, including the activation of a policy network, arranging and facilitating interactions between actors, matching problems and solutions, and acting as a mediator (Agranoff & McGuire, 1998; Kickert & Koppenjan, 1997).

The network management literature argues that policy processes in policy networks do not take place in an institutional void. Policy processes rather take place in an institutionalised context (Koppenjan & Klijn, 2004b; Skelcher et al., 2006; Sørensen & Torfing, 2007b). This institutionalised context is formed by the policy network's characteristics, for example the actors participating in the policy network, and the policy resources these network actors have at their disposal. The institutional context is important for voluntary coordination, but is not the only facilitating factor. The structural characteristics of a policy network might in some cases not suffice to facilitate spontaneously-occurring collective efforts. Furthermore, such structural characteristics might not provide network managers with sufficient opportunities to steer the policy making process by means of game

management. In such a case, it might prove necessary to change the institutionalised context in which actors are operating (Klijn & Koppenjan, 2006).

Institutional design attempts to change a policy network's structural characteristics in such a way that the resulting institutional features of policy networks are more likely to facilitate cooperation and the production of collective outcomes (Klijn & Edelenbos, 2007; Klijn & Koppenjan, 2006; Sørensen & Torfing, 2007b). These institutional characteristics of policy networks regulate and facilitate the interactions between actors. Kickert and Koppenjan (1997, p. 53) list a variety of strategies to design the structural characteristics of policy networks. One of the main tools at a network manager's disposal to change the institutional design of a policy network is by changing the legal context in which the policy network operates, or the legal status of the policy network. Other strategies predominantly focus on the introduction of new actors into policy networks, aiming to providing a new impetus for the interest groups to reach consensus.

The second cycle literature encompasses a rather homogenous approach to policy networks. Anchored within the new public management literature, and building from the conceptualisation of policy networks as a specific mode of governance, it extends and refines the heuristic use of the policy network concept. The network management literature focuses explicitly on the opportunities policy networks offer public authorities to affect both the policy process and its policy outcomes in societies characterised by increasing degrees of functional differentiation. One of its main contributions is the introduction of the changing configurations of policy networks. The network management literature argues that both the processes taking place within policy networks and the structures of policy networks can be consciously changed by means of an impetus from an external governing body. Policy networks in the network management literature are not static structures, but are dynamic.

The introduction of network dynamics in the policy network literature is one of the second cycle literatures' valuable contributions. Despite the refinement and further elaboration of the governance perspective, the network management literature does suffer from similar limitations to the first cycle literature with the main points of criticism in the previous section equally valid here. Firstly, the concept of policy networks as applied in the network management literature lacks a proper conceptualisation of relational variables. Although, for example, the

importance of interactions and trust relationships are stressed on many occasions, the second cycle literature does not focus on the specifics of these relations, rather elaborating upon the various ways in which interactions can be affected by a network manager.

Different to the first cycle literature is that the network management literature pays little attention to actors' individual characteristics. Network management perspectives tend to focus less on policy networks' internal characteristics, but rather treat them as a black box. The primary focus of the second cycle literature is on the shape of such a black box rather than on the content. Such a view on the policy network and its role in the policy process implies that differences within a network structure are largely overlooked by the network management literature. The network management literature focuses therefore even more explicitly than the first cycle literature on policy networks global characteristics. Such a focus on the global characteristics could result in situations where potentially important differences within policy networks were overlooked.

The third criticism refers to the lack of a conceptual link between policy networks and the outcomes of policy processes within these networks. The network management literature focuses on how policy networks can be steered, rather than on policy network structures. The outcomes of policy networks are often attributed to the management strategies employed by an external, independent governing body, rather than to the policy networks' characteristics. The network management literature does not attempt to define any causality between the characteristics of policy networks and the characteristics of policy outcomes. Attributing the outcomes of policy networks to the management strategies employed by an external manager rather than to the policy network undermines the actual importance of policy networks as a mode of governance.

The three main points of criticism thus apply to the network management literature in similar ways as to earlier policy network perspectives. The second cycle literature is however often criticised on an additional point, treating the management of policy networks as a process similar to the management of a single organisation, which results in a policy network perspective where the autonomy of network actors is severely undermined. The network management literature only focuses on external governmental entities' network management strategies, not policy network actors' strategic interactions. The second cycle

literature might for these reasons overestimate external network managers' roles. Furthermore, it potentially overlooks changes in interactions and network structures resulting from network actors' activities. Another aspect unaccounted for in the network management literature is the unintended effects that might emerge from the employment of either game management strategies, or the institutional design of a policy network.

This section has argued that the network management literature has not introduced a policy network theory, but extended and redefined the policy network concept as an analytical tool. This is exemplified by the fact that the main arguments voiced against the interest intermediation approach and the governance approach to policy networks presented in section 2.2 are equally applicable to the network management literature. The second cycle literature has nevertheless brought one important aspect to the fore. The network management literature does not treat policy networks as static governance structures, but rather as structures that change over time. The drivers of these changes in policy network structures are considered to be the external network managers. Potential changes resulting from the activities of the actors involved in such a policy network are largely overlooked. The policy outcomes resulting from a policy network tend to be attributed to the management strategies applied rather than to the characteristics of the policy network. These criticisms on the second cycle literature have stimulated some interested in policy networks to reconsider the main concepts upon which both the first cycle and the second cycle literature build. The next section focuses on this third strand of literature.

2.4 The Third Cycle of Policy Network Literature

One of the most noticeable developments in the policy network literature is that some authors have taken up Dowding's (1995) suggestion and utilised social network analysis tools to model and analyse policy networks. The advantage of incorporating social network analysis within policy network analysis is that one of the main problems related to the first two cycles of policy network literature could be overcome. The inclusion of social network analysis into policy network analysis offers the opportunity to include actual relational variables (Bressers et

al., 1994; Dowding, 1995; Pappi & Henning, 1998; Peters, 1998). This section focuses on the various ways in which social network analysis has been introduced in the policy network literature. It will argue that the inclusion of social network analysis into policy network analysis signals an emerging third cycle of policy network literature ('third cycle literature') that is geared towards the development of a policy network theory. The section will first present an overview of the various ways in which social network analysis is utilised within this third strand of literature. After that, it elaborates upon the merits and limitations of these emerging policy network perspectives for the development of a policy network theory.

The third cycle literature consists of two distinct research approaches. Some scholars have introduced social network analysis to characterise global network structures (e.g. Borras & Olsen, 2007; John & Cole, 1998; Sandström, 2008). Others have utilised social network analysis to describe the relationships between a pair of organisations rather than a complete policy network (e.g. Brass, Galaskiewicz, Greve, & Tsai, 2004; Isett & Provan, 2005; Kenis & Knoke, 2002). Despite these differences, the research approaches within the third cycle literature do have one common point of departure. Network structures are conceptualised as a set of compositional and relational variables (e.g. Kalfagianni, 2006; Kenis & Knoke, 2002; Provan & Sebastian, 1998). The compositional variables are not unknown within earlier policy network approaches. Both actors and the policy resources these actors have at their disposal have been recognised throughout the policy network literature as important parts of policy network structures (*inter alia* Marsh & Rhodes, 1992; Mayntz, 1997b; Scharpf, 1978, 1994; Van Waarden, 1992). The explicit conceptualisation of relational variables as an important part of network structure is nevertheless a new element. Defining policy network structures as a set of compositional and relational variables potentially overcomes one of the most persisting criticisms because of the explicit inclusion of the relations between pairs of actors (cf. Dowding, 1995; Peters, 1998).

The policy network perspectives that include social network analysis into their models tend to have two distinct points of departure. Some researchers focus on global network structures, characterising complete policy networks with the tools provided by social network analysis (a.o. Borras & Olsen, 2007; John & Cole, 1998). Others have focused on pairs of actors (dyadic interactions) in an attempt

to explain the utility of policy outcomes for individual actors. Such dyadic approaches can point to the development of the relationships between pairs of actors over time (Brass et al., 2004; Kenis & Knoke, 2002). These different points of departure indicate that policy network analysis can take place at different levels of analysis. These differences also mark a different type of policy network analysis. Authors focusing on dyadic interactions generally attempt to develop a theory of policy networks that either links structures to outcomes, or predicts the changes in policy network structure over time. Conversely, literature focused on global policy network structures aims to provide *ex post* explanations of policy network outcomes.

One example of a policy network study that starts from the global policy network level is performed by John and Cole (1998). John and Cole use sociometric mapping techniques to explain economic decision-making in two cities. These authors map the communication structures of the policy networks and apply social network measures to describe their structures at one specific point in time. John and Cole describe the frequency and intensity of a relational variable (i.e. communication relations), but use the assumptions and dimensions found in the typologies of the interest intermediation approach to explain the outcomes of the studied policy networks. Furthermore, changes in network structure over time are not mapped based on longitudinal data, but rather described. Although the importance of policy network dynamics is acknowledged, John and Cole do not extend their social network approach beyond mapping initial policy network structures.

Borras and Olsen (2007) apply social network analysis in a similar way to John and Cole. Borras and Olsen utilised social network analysis as a tool to map one policy network's structure in an exploratory study of the policy network surrounding the European employment strategy. Borras and Olsen gathered data on more than one type of relation (i.e. multiplex data). In this study the relations between pairs of actors were mapped based on a social network approach. Borras and Olsen resorted to previous policy network perspectives to determine both the importance and the location of an actor within the policy network. Mapping multi-relational policy networks offers some interesting opportunities, yet the explanations of outcomes offered by Borras and Olsen are not linked to the structural characteristics of the policy network.

Different from both studies described above is the study presented by Kalfagianni (2006). Kalfagianni maps the global structures of policy networks based on two different types of relations. She employs models of network structure to elaborate upon structural differences within these networks. Such differently-structured elemeents have implications for both the development of the global network structure over time, and for the policy outcomes resulting from these networks.

Another approach that focuses on the global network level is best characterised as a combination of social network analysis and organisational theory. Sandström (2008) explicitly focuses on the performance of different policy network structures in terms of their effectiveness and efficiency for realising policy goals through policy outcomes. Sandström maps policy network structures in terms of composition variables and relational variables. These policy network structures are characterised with social network measures of structure. The conceptual link between network structure and network performance in terms of policy outcomes is not drawn from social network theory, but from rational choice institutionalism. This is an approach regularly found within the third cycle literature. Provan and Kenis (2007) for example focus on the opportunities offered by differently-structured policy networks for external network managers to increase policy network efficiency and effectiveness. In a similar vein, Howlett (2002) focuses on the opportunities within policy network structures for individual network members to realise their interests. Howlett identifies the social structure of the policy network by collecting data on multiple relational variables and compositional variables. The explanations of policy outcomes of the policy network offered by this author are derived from actor-centred institutionalism.

The inclusion of social network analysis in policy network analysis could prove advantageous in terms of identifying and mapping policy network structures. The studies indicate that social network analysis can be utilised as a tool, but have failed to develop models that describe the dynamics of policy networks, and the relationships between policy network structures and policy outcomes.

Another point of departure found in the third cycle literature is an approach that primarily focuses on the relationships between a pair of actors. These

exploratory studies attempt to formulate hypotheses or propositions on either the structural drivers of network change (i.e. the development of relations between actors over time), or on the extent to which the relationships an actor has with others affect that actor's opportunities to realise their policy goals.

An example of a dyadic study focusing on relationships dynamic aspects over time is presented by Isett and Provan (2005). Isett and Provan focus on the evolution of trust relationships between pairs of actors rather than at the general level of trust within a policy network. These authors stress that over time, trust relationships between any pair of actors are likely to strengthen due to interactions facilitated by other types of relational variables (e.g. communication or contractual relationships). The more intense these trust relationships between pairs of actor become, the closer are the actors within the network structure. Kenis and Knoke (2002) also focus on the relationships between pairs of actors, concentrating on single dyadic interactions. These authors find that the evolution of a policy network can be predicted from its initial structural characteristics alongside the single dyadic interactions.

Brass et al. (2004) attempt to aggregate data collected at the level of individuals of dyadic interactions into higher level structures (e.g. the organisation). Brass et al. argue that aggregating relational data provides opportunities to employ a multi-level perspective to policy network analysis. Their analysis builds strongly on organisational theory to explain the outcomes of such aggregated dyadic interaction patterns. The aggregation of dyadic relational data to higher units of analysis does not bridge the dyadic measurements to global policy network structures. Brass et al. therefore need to resort to organisational theory rather than social network theory to provide explanations of policy outcomes.

The third cycle literature has so far made a number of major contributions to the advancement of policy network analysis. The introduction of social network analysis as a tool to characterise policy network structures offers an opportunity to resolve one of the most persisting conceptual caveats of previous policy network approaches. Relational variables are included and the characteristics of policy network structures can be identified with formal indicators of network structure (e.g. Kalfagianni, 2006; Sandström, 2008). Such indicators of network structure provide opportunities to characterise policy network structures at the

global level, and can also be employed to identify differences within policy network structures. The potential importance of such differences within policy network structures has been illustrated by Kalfagianni (2006). Finally, the third cycle literature has made progress in theorising likely changes in policy network structure. These emerging theories of network dynamics are based on the properties of the relationships between pairs of actors (e.g. Isett & Provan, 2005; Kenis & Knoke, 2002).

The introduction of social network analysis in the policy network literature thus appears to have some major advantages. Nevertheless some of the criticisms of earlier policy network perspectives remain valid for the third cycle literature as well. One of these remaining issues is the relation between the characteristics of a policy network's structure and the characteristics of its outcomes (cf. Ansell, 2000; Peters, 1998). The extent to which policy networks are likely to produce outcomes effectively and efficiently is still one of the core questions upon which researchers focus (a.o. Kalfagianni, 2006; Provan & Kenis, 2007; Sandström, 2008). Explanations of relations between policy network structures and policy outcomes tend to be provided *ex post*, based on organisational theory. The inclusion of organisational theories into policy network analysis is necessary because of the lack of a conceptual link between the structures of policy networks and the policy outcomes. Explanations of policy outcomes derived from organisational theories could show a correlation between network characteristics and outcome characteristics, but cannot point to the causality between these two variables. The models developed within the third cycle literature are not therefore policy network theories that relate policy network structures to outcomes. Social network analysis has nevertheless proven a valuable point of departure to advance the state of the art of the policy network approach.

2.5 Concluding Remarks

Policy networks have been the central focus of an impressive body of literature over the past three decades, and the attention paid to these networks shows no signs yet of diminishing. Since the introduction of the policy network concept in the late 1970s, both conceptual and empirical literatures have attempted to

explain policy networks and their outcomes in various ways. This chapter has provided an overview of the conceptual literature. The chapter argued that the policy network literature developed in three distinct cycles, each with its own conceptualisation and specification of the variables and processes related to policy networks.

Section 2.2 elaborated upon the first cycle literature. It argued that the concept of policy networks emerged in two distinct perspectives. On the one hand, the interest intermediation literature described the interactions between government and a variety of societal interest groups in differently-structured policy networks. These differences formed the basis for the development of several typologies that distinguish between several dimensions along which policy networks vary. The dimensions most often stressed are the degree of institutionalisation of policy networks, the nature of policy network' boundaries (open or closed), the nature of the actors involved in networks, and policy resources which actors have at their disposal. There are differences between typologies but the authors do share two general ideas. Firstly, there is a common understanding of policy networks as 'power dependency relationships between government and interest groups, in which resources are exchanged' (Börzel, 1998, p. 256). Secondly, there is general agreement regarding the extent to which policy networks are able to produce outcomes. The prevailing perspective is that policy networks may influence and affect policy processes, but networks are not considered to produce policy outcomes.

Section 2.2 also showed that another strand of literature developed in parallel to the interest intermediation approach. The governance school conceptualises policy networks as a mode of governance differing from hierarchical command and control and market-steering. This governance approach to policy networks views the emergence of policy networks as a response to increasing levels of functional differentiation and complexity within modern societies. Policy networks are viewed as platforms where a variety of stakeholders interact and exchange ideas and resources. The governance school tends to focus on policy processes of which policy networks are part rather than on the structural characteristics of policy networks. Furthermore, the governance perspective attributes policy networks with the ability to produce policy outcomes.

The first cycle literature introduced some important concepts and variables into the policy network literature, but the theoretical value of the early policy network literature has been questioned on several occasions. Three of these criticisms turned out to be particularly difficult to overcome within the policy network literature. Firstly, the conceptualisation of policy networks in both the interest intermediation literature and the governance literature tends to focus predominantly on actors and their characteristics, rather than on the relationships between these actors. Secondly, both policy network perspectives within the first cycle literature tend to characterise policy networks at the global network level. Such a focus at the global level might result in a situation in which potentially important differences within policy network structures are overlooked. And finally, the conceptual link between policy network structures and policy outcomes has not clearly been defined. Such a lack of a conceptual link limits the explanatory power of policy network approaches. These problems related to the first cycle literature have resulted in a general acceptance of early policy network approaches as heuristic tools, their value being mostly metaphorical rather than explanatory.

From the mid 1990s onwards, the literature on policy networks moved in a different direction. The network management literature focused on the extent to which policy networks can be steered by an external manager. Section 2.3 argued that the network management literature mostly builds from the conceptualisation of policy networks as a new mode of governance. This second cycle literature extends the metaphorical use of the policy network concept, but does not attempt to develop a policy network theory. It generally distinguishes between two strategies deployed to steer policy networks. One strategy, labelled game management, is geared towards the steering of interactions within the policy network. Game management aims to facilitate cooperative behaviour among actors. The other strategy attempts to change the institutional characteristics of a policy network is such a way that outcomes are more likely to be produced effectively and efficiently.

The network management literature has not developed a policy network model. It rather treated the policy network as a black box, and focused on the opportunities network managers outside the policy network have to influence the processes within the policy network. Although the network management

literature's contribution to the theoretical development of the policy network approach is limited, it does introduce one important aspect into the policy network literature. The network management literature has pointed out that policy networks are not static structures, but can change over time, changes attributed to network manager efforts.

The network management literature thus has made a valuable contribution to the policy network literature in terms of the introduction of network dynamics. It has however not resolved any of the three previously identified core problems of the policy network approach. If the policy network approach is to progeress beyond metaphorical value, then a proper way of dealing with relational variables is necessary. The most recent strand of policy network literature attempts to strengthen the theoretical value of policy network perspectives by introducing social network analysis in various ways into policy network models. It has thus far developed in two distinct ways. Some analyses have focused on the global network level and mapped network structures by employing the tools of social network analysis. Such policy network structures are then taken as a point of departure to provide *ex post* explanations of the outcomes of these networks. Others have focused on the evolution of the relationships between pairs of actors over time and attempt to provide explanations of the changes in the structures of policy networks over time based on these dyadic structures. These introductions of social network analysis into policy network perspectives have proven to have a great potential. One of the core problems related to policy network analysis (i.e. the exclusion of actual relational variables) has been resolved by defining a policy network's structure as a collection of compositional and relational variables. Furthermore, some authors utilised the methods available in social network analysis to distinguish between differently-structured parts within a policy network. And finally, the third cycle literature has introduced a theory-based approach to the dynamic nature of policy networks.

Overall, this chapter has highlighted that two important issues must be resolved before the policy network literature can develop into a theory,. firstly, the conceptual link between a policy network's structure and the characteristics of the outcomes resulting from that policy network need be established. Although the application of social network analysis allows the policy network literature to both map and analyse policy network structures, the drivers of outcome

production are still unclear in the models developed. Explanations of outcomes remain mainly based on organisational theory, and only descriptively linked to policy network structures. Secondly, the policy network literature lacks a clear perspective on the drivers of change in global network structures. Some important first steps have been taken at the level of pairs of actors, but the translation of these dynamics to the global network level remains underdeveloped. This chapter concludes that policy network analysis currently lacks the theoretical capacity to explain policy outcomes based on policy network characteristics. The most recent body of policy network literature has shown the potential of the inclusion of social network analysis into policy network models. Social network analysis is as yet only utilised as a tool; explanations of both policy network dynamics and the relations between its structures and its outcomes are not based on social network theory. There is therefore a need consider the concepts and theories offered by social network analysis in more detail, which takes place in the following chapter.

3 Social Network Perspectives

3.1 Introduction

The most recent developments in the policy network literature point towards the utility of social network analysis. Social network analysis is increasingly utilised to map the structures of policy networks, and employed to analyse these structures. Social network approaches to policy networks have yet to model the dynamic nature of the relationships between pairs of actors, and the relationships between policy network structures and policy outcomes simultaneously. The current state of the art of the policy network literature does not include policy network theory. The broadening of the conceptual scope towards social network analysis might provide a fruitful point of departure for the development of a policy network model that hypothesises on the causal relations between the policy networks' structural characteristics and the characteristics of its policy outcomes. This chapter will focus in more detail on the main concepts and theoretical perspectives embedded within the social network literature.

Social network analysis is generally considered to have developed in parallel in multiple social science disciplines, with two disciplines being of particular importance. During the first half of the 20th century, the development of sociometry formed a source of inspiration for the development of social network perspectives (De Nooy, Mrvar, & Batagelj, 2005; Jansen, 2003; Knoke & Yang, 2008; Wasserman & Faust, 1994). The introduction of sociograms by Moreno in the 1930s enabled scientists to visualise the social structures of small groups (Wasserman & Faust, 1994). Ideas about the relations among actors were first formulated in anthropology in the 1950s as a response to the structuralist and functionalist perspectives then-dominant within this discipline (Barnes, 1954, 1972; Mitchell, 1974). Within anthropology, the first notions of social networks were primarily metaphorical, emphasising that 'the social links of individuals in any given society ramify through that society' (Mitchell, 1974, p. 280).

Social network analysis has thrived throughout the social sciences as a research approach since its introduction. Unlike critiques formulated in response to the policy network literature, the concept of social networks has moved beyond being a mere metaphor. Social network analysis includes a wide variety of methods to analyse social structures, and has formed the basis for the development of probabilistic models of structural outcomes (cf. Wasserman & Faust, 1994). This chapter focuses on the basic conceptualisation of social networks and the models of network structure. Additionally, the chapter elaborates upon various perspectives of what these social structures imply for the actions of both individual actors, and the collection of actors comprising the social network.

The chapter is structured as follows. Firstly, section 3.2 elaborates upon the theoretical motivations that stimulated the development of social network analysis as a new, distinct research approach in the social sciences. Section 3.2 then introduces the basic concepts upon which social network analysis builds. Next, section 3.3 focuses on the models of network structure corresponding to various levels of analysis. These models of network structure introduce important indicators of the structural characteristics of social networks. Section 3.4 elaborates upon the theoretical perspectives concerning the opportunities provided and constraints imposed by a social network's structure on the actions of actors. Section 3.5 presents some concluding remarks.

3.2 Basic Concepts in Social Network Analysis

Social network analysis is grounded in the realisation that besides the individual characteristics of actors, relations between actors are at least equally important (a.o. Marsden, 1990; Wasserman & Faust, 1994; Wellman, 1988). Over recent decades, methodologies for analysing and characterising social network structures have proliferated. Social network analysis has proven to be a useful tool to characterise various aspects of modern societies. It has been applied in many fields, mapping the structures of for example small groups, trade patterns among nations, but also of coalition formation and decision making processes (cf. Wasserman & Faust, 1994). This section elaborates upon the development of the

basic concepts that form the building blocks of the social network perspective. Firstly, it briefly sketches the emergence of social network analysis as a new research approach across various disciplines within the social sciences. Secondly, the section elaborates upon the fundamental concepts upon which social network analysis builds. After that, attention is paid to the two main social network perspectives, namely role analysis and positional analysis. The section ends with a brief summary of the merits and the limitations of social network analysis.

Sociometry is considered one of the main points of origin for social network analysis. Sociometry was developed by Moreno in the early 20th century and depicts the structure of small groups. These visualisations of group structure are referred to as sociograms (De Nooy et al., 2005; Jansen, 2003; Knoke & Yang, 2008; Turner, 2001; Wasserman & Faust, 1994). Social entities (e.g. individuals or organisations) are depicted as points, and the relations these entities maintain with one another are represented by lines, linking the corresponding points (Turner, 2001). Those researchers that applied sociometry did not only depict the structures of these small groups in pictures, but soon also included the analysis of the dynamics of these group structures in a longitudinal perspective. These representations of the social structures of small groups and their analysis 'led to two of the mainstays of social network analysis: a visual display of groups structure, and a probabilistic model of structural outcomes' (Wasserman & Faust, 1994, p. 12).

Discussions within anthropology in the 1950s concerning the utility of action-theories and structuralist or functionalist perspectives are the second point of origin of social network analysis. According to Mitchell (1974, p. 281), the idea of social networks proliferated partially as a response to 'the overformalisation of the structural-functional approach originally developed in small-scale societies'. Barnes (1954) argues that these formal approaches could not grasp the complexity of modern societies in terms of their formal organisation. Social network analysis developed as a response to the functional differentiation and increasing levels of complexity in modern societies. The first introductions of social networks into the field were largely metaphorical. The concept of a social network was at first viewed as merely an idea to indicate the 'configuration of cross-cutting interpersonal bonds in some unspecified way causally connected with the actions

of these persons and with the social institutions of their society' (Barnes, 1972, p. 2).

Social network analysis builds on a number of fundamental concepts. According to Wasserman and Faust (1994, p. 6), 'the fundamental difference between a social network explanation and a non-network explanation of a process is the inclusion of concepts and information on relationships among units in a study'. This specification of patterns into propositions of social structure is what allows social network approaches to provide 'a collection of descriptive procedures to determine how the system behaves and statistical methods to test the appropriateness of the propositions' (Wasserman & Faust, 1994, p. 22). It aims to understand social organisation by focusing not just on social entities, but also by including relations among these entities into the analysis.

Social entities in social network analysis are referred to as actors. An actor can range from a single individual to organisations, or any other collective social unit (a.o. Turner, 2001; Wasserman & Faust, 1994; Wellman & Berkowitz, 1988). Although the concept of actors is not different from its application in other social science approaches, social network analysis adds one important factor. Actors are considered to act within the realm of opportunities offered and constraints imposed by social network structure (Coleman, 1990; De Nooy, Mrvar, & Batagelj, 2005; Granovetter, 1973; Janky & Takacs, 2002; Jansen, 2003; Katz, Lazer, Arrow, & Contractor, 2004; Wasserman & Faust, 1994). The social network perspective implies that social entities' actions are not only determined by their individual characteristics. The social structures within which these actors are embedded offer not only opportunities to act, but simulataneously impose constraints on these actors' actions.

A second concept often included in social network analysis is actor attributes. Actors are considered to have certain attributes at their disposal which they can employ when interacting with others in a social network. Actor attributes can potentially play an important role in social network analysis in two respects. Firstly, they are a variable that is part of the social structure of a network. Actors and their attributes together form the composition variables of a social network. Secondly, attributes facilitate the actions of actors (*cf.* Barnes, 1972; Jansen, 2003; Knoke & Yang, 2008; Mitchell, 1974; Stokman & Oosten, 1994; Turner, 2001; Wasserman & Faust, 1994; Wellman, 1988; Wellman & Berkowitz, 1988).

Attributes are resources that actors can employ when interacting with others. Wellman (1983, p. 177) stresses the importance of attributes for behaviour, referring to them as resources: 'behaviour should be explained by analysing the social distribution of resources […] as well as the structures through which these resources are gained and mobilised, and the social systems that develop through these processes'. Others have pointed out that the inclusion of attributes is not necessary social network analysis, Knoke and Yang (2008, pp. 4-5) arguing that 'structural relations are often more important for observed behaviour than are attributes'. Social network analysis turns its attention primarily to the structures of ties, and views attributes as secondary to these social structures (Wasserman & Faust, 1994).

An actor and its individual attributes is referred to as a node of a social structure. The collection of nodes form the composition variables in social network analysis (a.o. Burt, 1982, 1992; De Nooy et al., 2005; Kalfagianni, 2006; Turner, 2001; Wasserman & Faust, 1994; Wellman, 1983). Composition variables are therefore similar to the basic unit of analysis in other social science approaches. Social network analysis only becomes a distinct research approach when relational variables are included in the analysis of systems of actors (Wasserman & Faust, 1994). The relational variables comprise the ties between pairs of actors. Ties connect pairs of nodes in a social system. A pair of nodes and the ties between them is generally referred to as a dyad. In a similar vein, the ties between three nodes are labelled triads. Ties can connect people, groups, organisations, or any other social unit that has been defined as an actor. These linkages can be directional or reciprocal, and vary in content, medium, and frequency (cf. De Nooy et al., 2005; Jansen, 2003; Katz et al., 2004; Turner, 2001; Wasserman & Faust, 1994; Wellman, 1983; Wellman & Berkowitz, 1988). In Wellman's (1983, p. 157) view, the inclusion of ties with various characteristics into social network approaches shifts attention away 'from seeing the world as composed of egalitarian, voluntary chosen, two-person ties and concentrates instead on seeing it as composed of asymmetric ties bound up in hierarchical structures'. Ties are not only important because they represent a dyadic relationship, but also because they are part of the social network within in which the dyad is embedded. Ties give actors potential indirect access to others to whom an actor is not directly connected. Ties can therefore not be attributed to a

single actor, but are instead 'a joint dyadic property that exists only so long as both actors maintain their association' (Knoke & Yang, 2008, p. 7). These relational elements of a social network can influence a single actor's behaviour. Furthermore, the relations between actors can affect the performance of the system in ways that cannot be attributed to this actor's individual characteristics (a.o. Barnes, 1972; Burt, 1980, 1982; Jansen, 2003; Knoke & Yang, 2008; Mitchell, 1974; Turner, 2001; Wasserman & Faust, 1994; Wellman, 1983).

Composition and relational variables together form the structure of a social network. Once the boundaries of a network have been specified (cf. Knoke & Yang, 2008; Wasserman & Faust, 1994), data collected on both the composition and relational variables can be analysed in two distinct ways. Positional analysis is concerned with the grouping of actors according to their relations to others. Role analysis is concerned with studying the associations among relations and the grouping of actors according to these associations (Burt, 1980, 1982; Jansen, 2003; Knoke & Yang, 2008; Wasserman & Faust, 1994). These two modes of social network analysis result in quite distinct network models (c.f. Burt, 1980, 1982; Jansen, 2003; Wasserman & Faust, 1994). Positional analysis gives primacy to positions, statuses, and structures over the actions of actors embedded within social network structures. Role analysis starts from an action-oriented perspective and determines structures according to network actors' actions. These modes of social network analysis and the sequence in which these two distinct modes of analysis are conducted affect explanations of structures and actions.

Positional social network analysis focuses on assigning actors to identifiable positions or statuses. In social network analysis 'position refers to a collection of actors who are similarly embedded in networks of relations' (Wasserman & Faust, 1994, p. 348). It refers to a collection of actors that display similar activities and ties compared to actors in other positions. Positional analysis therefore does not necessarily group actors around having similar patterns of relationships to others, but on a similarity in terms of their status. An example of such a social position is the position of a teacher. In a social network that consists of a number of students and teachers, the collection of teachers form one position, and the collection of students a second position. Positional analysis thus assigns actors to certain positions, without the necessity of any relations between actors in the same positions (Burt, 1980, 1982).

The network position of an actor is an important indicator of the role that that particular actor will play within the social network (Burt, 1980, 1982; Jansen, 2003; Knoke & Yang, 2008; Wasserman & Faust, 1994). A social role can be defined as 'the behaviour expected of a person occupying a particular social position' (Wasserman & Faust, 1994, p. 349). The identification of particular roles can serve as an indicator of an actor's social position. Role analysis is concerned with studying the associations among relations rather than the associations among positions. Role analysis differs from positional analysis because 'in contrast to social position, which refers to a collection of actors, the concept of social role refers to the ways in which occupants of a position relate to occupants of other positions' (Wasserman & Faust, 1994, p. 352). It aims to model the system of relations that link actors and (or) positions into a specific role. In contrast to positional analysis, role analysis does not necessarily take all relations defined in a social network into account. Role analysis focuses on specific relations that indicate a certain type of behaviour associated with a certain social position. In the example of a social network existing of teachers and students, role analysis would thus group the teachers and the students in their class, rather than the position of teacher on the one hand, and the position of student on the other hand.

Classes of equivalent actors can be defined based on the grouping of certain relations in specific roles. Actors are considered structurally equivalent in social network role analysis when they have similar sets of behaviour with respect to different groups. Structural equivalence is more likely to be found in role analysis than in positional analysis due to the focus upon specific relations. A second important indicator of similarity is the extent to which actors are regularly equivalent. Regular equivalence in role analysis groups actors based on similarity of roles towards equivalent actors (Jansen, 2003; Knoke & Yang, 2008; Turner, 2001; Wasserman & Faust, 1994).

This section has introduced the basic concepts of social network analysis. It introduced the two analytical approaches that can be employed to structure information about both actors and their attributes. Positional and role analysis are modes of network analysis and allow the grouping of actors in equivalence classes. These analytical models do not form a model of network structure or a network theory (Mitchell, 1974, p. 282). Models of network structure are

nevertheless important to characterise a social network. Section 3.3 elaborates upon models of network structure.

3.3 Models and Indicators of Network Structure

With the basic concepts of social network analysis introduced in the previous section, the current section introduces the models that have been developed to characterise social network structures. The range of these models is extensive. It is nevertheless possible to distinguish between groups of models based on both the level of analysis and the mode of analysis. Differences within groups are mainly mathematical variations of basic models. These differences are considered beyond the scope of this thesis (for an extensive review, see Wasserman & Faust, 1994). This section will rather focus on the differences between the groups of models. One of the most comprehensive overviews of different models of network structure is presented by Burt (1980, 1982). Burt's sixfold typology distinguishes between the two modes of analysis, and between three levels of analysis. Burt distinguishes between the actor-level, the subgroup level, and the global network level. Each model results in a different description of social network structure.

Table 1: Models and Indicators of Network Structure

Analytical Approaches	**Actor aggregation in a unit of analysis**		
	Actor	**Multiple Actors as a network subgroup**	**Multiple Actors/ subgroups as a structured system**
Relational	Personal network as extensive, dense and/or multiplex	Primary group as a network clique	System structure as dense and/or multiplex
Positional	Occupant of a network position as central and/or prestigious	Status/role sets as a network position	System structure as a stratification of status/role-sets

*Source: Burt, R.S. (1980). "Models of Network Structure" Annual Review of Sociology **6**: 80.

At the actor level of analysis, measures of social network structure focus upon a specific actor as the point of departure. The models of network structure at this actor level differ considerably between the positional mode of analysis and social network role analysis. For describing the involvement of a single actor in a social network with a role analysis approach, the model of the ego-network has been developed. An ego-network consists of the direct relations an actor has with others, and the direct relations that exist between these others (a.o. De Nooy et al., 2005; Jansen, 2003; Marsden, 1990; Turner, 2001; Wasserman & Faust, 1994; Wellman, 1983). Ego-networks can be used as an indicator of the extent to which ego can rely on its immediate surroundings (the ego-network) for support. Ego-networks are characterised by the range, density, and multiplexity of the ego-network (Burt, 1980, 1982; Jansen, 2003; Wellman, 1983, 1988).

Ego-networks have a range to the extent that they include a diversity of actors. The range of an actor's ego-network therefore indicates its potential access to social resources (*inter alia* Burt, 1980, 1982; De Nooy et al., 2005; Wellman, 1983). One of the main indicators of the range of an ego-network is its size. Size alone is not enough to asses the extent to which a focal actor potentially has access to social resources. It is also important to take the composition of the ego-network in terms of the characteristics of its alters into account. Heterogeneity is therefore

another indicator of the range of an ego-network (De Nooy et al., 2005). Conversely, the extent to which an ego-network is homogenous is an indicator of network density rather than of the range of an ego-network. Density is a social network property that not only applies to ego-network analysis, but is also used at other levels of analysis. Network density is defined as the ratio of the number of ties present and the number of ties possible given a defined set of actors (De Nooy et al., 2005; Wasserman & Faust, 1994). The more ties present, the more closed triads an ego-network contains. According to De Nooy et al. (2005, pp. 144-145), triadic closure indicates homogeneity rather than heterogeneity. Triadic closure thus limits the range of an ego-network. Multiplexity is another indicator of the structure of an ego-network within role analysis. Ego-networks are considered to be multiplex to the extent that ego is directly connected to a significant number of alters by more than one type of relation (Burt, 1980, 1982; Jansen, 2003; Marsden, 1990). Multiple types of ties are a second indicator of network heterogeneity.

The positional mode of analysis focuses at the level of an individual actor on ego's network position to describe its involvement in a social network. An actor's impact on the actions of others in the network not only depends on the social network structure, but also on its position within the network structure (Gould, 1993). Katz et al. (2004) attribute observed similarities in the behaviour of actors to shared positions in the social network. In their view, similarity in behaviour is most likely the result of being part of the same network position rather than of having the same roles. For a positional analysis of ego, it is not only the direct ties ego has with others, and the direct relationships among these alters, which are important. The ties ego and its alters *do not have* to others are just as important as the ties a focal actor and its alters do have, 'the latter defining its ego-network' (Burt, 1980, p. 91).

Measures of social integration can be utilised to indicate an actor's network position alongside the indicators of the structure of an ego-network. One indicator of an individual actor's network position is centrality. Degree centrality and betweenness centrality are of particular importance at this level of analysis (a.o. Burt, 1980, 1982; De Nooy et al., 2005; Jansen, 2003; Knoke & Yang, 2008; Mitchell, 1974; Turner, 2001; Wasserman & Faust, 1994). Degree centrality indicates the extent to which the focal actor has relations with others (Wasserman

& Faust, 1994). Betweenness centrality indicates the extent to which the focal actor lies on a path connecting two alters (De Nooy et al., 2005). Centrality measures are therefore indicators of the extent to which an actor is integrated in a social network.

At the intermediary level of analysis, role analysis employs the concepts of cliques and cohesive subgroups to study the associations among the relations. These associations among relations indicate how similar actors behave towards others. The formal definition of a clique requires that all actors belonging to the clique maintain relations to all other clique-members (Jansen, 2003; Marsden, 1990). This formal approach to cliques implies that cohesive subgroups can only be considered cliques when they are fully connected. This condition is rarely met above the level of triads. Burt (1980) therefore relaxes this strict requirement to some extent, and defines a clique as a 'set of actors in a network who are connected to one another by strong relations'. This definition of a clique is also covered by the concept of a cohesive subgroup (cf. De Nooy et al., 2005; Jansen, 2003; Knoke & Yang, 2008; Turner, 2001; Wasserman & Faust, 1994). Cohesive subgroups are characterised by the range, density and multiplexity of ties between constituent actors, and the frequency of interactions among its members. Furthermore, cohesive subgroups interact less frequently with members of the larger social structure (Burt, 1980, 1982; Jansen, 2003; Knoke & Yang, 2008; Wellman, 1983; Wellman & Berkowitz, 1988).

In Burt's (1980, 1982) typology, the intermediary level of positional social network analysis focuses on jointly occupied network positions. Actors can jointly occupy the same network position when 'each of them is involved in the same relational pattern' (Burt, 1980, p. 102). Positional analysis at the intermediary level differs in one important aspect from role analysis. Positional analysis at this intermediary level does not focus on a single relationship, but rather on multiple relations among the same subset of actors (Jansen, 2003). In Burt's (1980, pp. 100-101) view, however, status and the roles that stem from these positions 'are not, in general, reducible to relations between individuals'. Status and role are inseparable because there are no roles without statuses, or statuses without roles. The occupants of a certain status therefore jointly occupy a single network position. This argument implies that Burt defines positional analysis at the intermediary level slightly differently to Wasserman and Faust (1994, p. 350), who

use the term jointly occupied network position to exclusively refer to a subset of actors, rather than including their relations to others as well. Wasserman and Faust stress that their conceptualisation of positional analysis at the intermediary level requires a subsequent role analysis in order to clarify the extent to which the collection of actors that jointly occupy a network position are embedded in the social network. Some have also employed the concept of regular equivalence to determine which actors occupy the same network position. Regular equivalence is a property that focuses on similarities of relations between various positions in a social network, rather than on the same relations (a.o. De Nooy et al., 2005; Knoke & Yang, 2008). Actors are considered structurally equivalent when they have the same relations to the same group of actors within a social network structure. Actors are regularly equivalent if they have the same relations to similar actors that occupy a specific position in the network structure.

Relational models that describe social network structure in terms of the relations amongst all actors in the social network focus on system density and relational transitivity (Burt, 1980, 1982; De Nooy et al., 2005; Gould, 1993; Jansen, 2003; Knoke & Yang, 2008; Wasserman & Faust, 1994). Relational density and relational transitivity both refer to the total number of ties present compared to the total number of ties possible (De Nooy et al., 2005). Density at the global level refers to the ratio between the ties present and the maximum number of ties possible (Marsden, 1990; Wasserman & Faust, 1994; Wellman, 1983). Relational transitivity focuses not only on the ratio between the actual ties present and the number of ties possible, but also takes the directionality of these ties into account (De Nooy et al., 2005; Marsden, 1990; Wasserman & Faust, 1994; Wellman, 1983). Relational transitivity indicates the extent to which groups of actors within a network structure can be considered either homogenous or heterogeneous.

Models with a positional approach in social network analysis focusing on the global social network level of analysis 'attend to patterns of relations linking actors within and across subgroups' (Burt, 1980, p. 116). An analysis at the global network level aims to detect the extent of stratification in social structures. Global network structures might be stratified to an extent that they can be characterised as hierarchical. A hierarchical network structure implies that a single actor is either directly or indirectly related to all other actors (Burt, 1980, 1982; De Nooy et al., 2005; Freeman, 1978; Jansen, 2003; Knoke & Yang, 2008; Marsden, 1990).

Centralised networks are global network structures that have a clear core and periphery structure (Freeman, 1978; Gould, 1993). Both these indicators of stratification describe inequality in terms of actors' mutual relations (Jansen, 2003). According to Wellman (1983, p. 176), structural form at the global level affects the flow of resources through specific ties: 'the density of clusters, the tightness of cluster boundaries, and the pattern of ties within and between clusters all structure resource flows. Because of their structural location, members of a social system differ greatly in their access to these resources'.

The models of network structure allow the identification and characterisation of specific elements within a social network. Over recent decades, the number and variety of methods of analysing social network structure have proliferated. The basic models presented here are only a cross-section of the wide variety of mathematical properties available to characterise social network structures. These methodological tools do not comprise a social network theory. Only when the implications of social structures on behaviour, action, and structure are specified in a theory, social network analysis becomes more than an analytical framework. The next section elaborates upon such theoretical specifications of social network structures for action, behaviour and social structures.

3.4 Network Structure and Action

Some authors focused on the extent to which social network structures affect the actions of individuals and collectives. Such perspectives are important for a social network perspective on policy networks. They offer points of departure to elaborate upon the relationships between the structural characteristics of a network and the interactions within a policy network. Two structural theories are of particular importance in this respect. firstly, Granovetter (1973, 1983) and Burt (1992, 2000, 2004) present arguments that emphasise the opportunities which sparse social network structures provide for acting upon. Secondly, Coleman (1966, 1986, 1988, 1990) stresses the utility of extensive degrees of social integration as a resource for actions. Despite these differences, both theoretical approaches have one main common element. The theoretical perspectives on the extent to which social network structures affect action build on the concept of

social capital to explain both structural outcomes and the actions of individual actors and collectives. This section will elaborate upon these structural network theories, after briefly introducing social capital as a concept.

Social capital is a form of capital that is embedded in relations and cannot be attributed to individual actors (Coleman, 1986, 1988, 1990). The main characteristic of social capital is that it only exists as long as two actors maintain the tie between them (a.o. Burt, 2000; Coleman, 1988; Jin, 1999). If the tie between two social entities disappears, the social capital embedded within that tie also disappears. Social capital can therefore be defined as a collection of social resources embedded within a social network's structure. It forms a resource for the actions of individual actors (Coleman, 1988, p. 95). Social capital is not one specific form of capital, but, as Coleman (1988, p. 98) argues, defined by its function: 'It is not a single entity but a variety of different entities, with two elements in common: they all consist of some aspect of social structures, and they facilitate certain actions of actors – whether persons or corporate actors – within the structure'.

The concept of social capital points to the importance of social structures for the variety of resources an actor has at its disposal. The extent to which an individual actor maintains relations, as well as the characteristics of these relations are important for the extent to which an actor can utilise the social capital present in these relations. Such social resources can facilitate action. Social capital arguments have therefore formed an important point of departure for a number of structuralist social network perspectives on the interactions between structure and action (Burt, 2000; Coleman, 1990; Granovetter, 1973, 1983; Jansen, 2003; Knoke & Yang, 2008; Wasserman & Faust, 1994).

Granovetter's (1973, 1983) theory of the strength of ties builds on the intensity of relations between actors. Granovetter argues that the relations between any pair of actors can essentially be characterised in three ways. The tie between ego and alter can be strong, suggesting a close relationship between these two actors. A weak tie suggests a less intensive relationship. Friendship ties are often referred to as an example of a strong relationship between a pair of actors. Acquaintance implies a less close relationship between a pair of nodes, indicating that the tie is weak. Besides strong and weak ties, Granovetter stresses the importance of absent ties between pairs of actors. Absent ties are equally significant as existing

relationships. For any actor, the set of actors this ego is connected to by strong ties comprise a densely-knit-cluster in a social network, where many of the possible ties are present. An additional characteristic of such dense clusters is that the constituent actors tend to be rather similar in terms of their attributes. This phenomenon is referred to as homophily (De Nooy et al., 2005; Granovetter, 1983; Jansen, 2003; Knoke & Yang, 2008; Wasserman & Faust, 1994). Contrary to those alters ego is connected to by strong ties, those that ego is connected to by weak ties are less likely to be mutually socially involved. These weak ties are found in parts of the ego-network structure where the density is relatively low.

Granovetter specifies his structural social network perspective with an additional distinction between two distinct types of weak ties. Some weak ties are present within a cluster of otherwise densely-knit actors. Other weak ties connect ego to a different part of the social network. The latter type of weak tie functions as a bridge between parts of the social network that would otherwise not be connected. The theory stipulates that this second type of weak tie can be of great value to ego (De Nooy et al., 2005; Granovetter, 1973, 1983; Wasserman & Faust, 1994). Bridging weak ties are potential channels that link ego to resources that are unavailable through its strong ties (Granovetter, 1973, 1983). Ego's strong ties are most likely to provide attributes to ego that are widely available within the densely-knit part of ego's immediate surroundings.

Burt (1992, 2000, 2004) presents arguments similar to those of Granovetter in his work on structural holes in social networks. Burt argues that holes in a social structure (i.e. missing ties between any pair of nodes) provide other actors with a structural advantage. Actors that connect two nodes in a social network structure are able to act as a broker between these alters. A broker can control the flow of attributes between the alters it connects. A broker therefore has a structural advantage over other actors. The presence of a structural hole provides the disadvantaged actors with an incentive to bridge the structural hole in an attempt to regain control of the flow of attributes. Burt distinguishes between two types of structural holes. Structural holes might occur in otherwise densely connected clusters within a social network structure. These structural holes do not necessarily provide the actor in the broker position with a structural advantage. Bridging a structural hole in an otherwise densely-knit part of a social structure can only provide redundant social capital because the broker is only one of many

ways to reach other parts of a social network (Burt, 2000, pp. 208-209). The social capital provided by the existence of a structural hole is redundant. This implies that the actor in the brokerage position has either strong ties to the two unconnected nodes, or weak ties in an otherwise highly connected part of the network structure (cf. Granovetter, 1973, 1983). Weak ties rather than strong ties are the relations most beneficial for an actor. More specifically, weak ties that connect otherwise not connected parts of a social structure are the most valuable for the actor in the brokerage position.

Structural holes that exist between two different parts of a social network structure do provide the actors in brokerage positions with a structural advantage. If an actor's position allows it to broker between two otherwise unconnected parts of a network, it profits from the structural hole. The lack of other ties connecting such parts allow the broker to control the exchange of attributes between these parts (Burt, 1992, 2000, 2004), giving the broker access to the resources and information available within the otherwise separate clusters. The bridging weak ties of the broker thus connect parts of the network that would otherwise not be connected (Burt, 1992, 2000, 2004; Granovetter, 1973, 1983).

The arguments presented by Granovetter and Burt imply that social network structures containing many structural holes and weak ties are structures that provide actors with many opportunities which can be acted upon. Loosely connected social networks are according to these theories therefore the most beneficial structures for individual actors. Such social structures contain many structural holes and bridging weak ties which allow some individuals to control the flow of resources between different parts of the social structure. Furthermore, actors that are not in a position allowing them to broker could improve their structural position by bridging structural holes.

The utility of sparse network structures as a resource for action has been questioned. Some have argued that densely-knit cohesive social structures prove to be of more value as a resource for action than loosely-knit structures. Coleman (1988, 1990) argues that dense networks facilitate action. Social integration implies that many of the possible ties between pairs of actors are present. Densely-knit social networks contain more social capital than loosely connected networks because social capital arises from network closure rather than from open social structures. Social structures characterised by social cohesion and network closure

have a higher level of trust, and better established social norms than loosely-knit social structures. Coleman (1988, 1990) argues that such social capital facilitates the occurrence of coordinated actions because cohesive social networks exert control over the individual actions.

Coleman's (1988, 1990) arguments concerning the utility of socially cohesive structures appear at first instance at odds with Granovetter's (1973, 1983) theory of tie strength and Burt's (1992, 2000, 2004) perspective on structural holes. This is a paradox rather than an actual contradiction. Granovetter's argument that bridging weak ties are crucial is based on their utility for individuals rather than for the collection of actors embedded within a social network structure. Bridging weak ties provide an individual with opportunities to broker between otherwise unconnected actors. Similarly, Burt's ideas about structural holes are based on the one hand on the brokerage positions of certain individuals, and on the other hand on the future gains in social capital due to an improvement in structural position of others. These arguments focus on the extent to which open network structures provide opportunities for individual action.

Coleman (1986, 1988, 1990) stresses the utility of dense social networks rather than sparse and open network structures. His arguments focus on the constraints on individual action social capital can impose. Social norms and rules, and high levels of trust that are present in densely-knit social structures, affect individual actor's actions. Coleman argues that such forms of social capital limit the range of possible actions of an individual actor. Individuals in certain positions could experience an incentive to profit from certain actions. Such actions are however likely to be experienced as deviant behaviour (i.e. actions going against the network's social norms and rules) by other network members. Deviant actions are likely to be noticed by others because of the high level of connectedness. Network density allows information to travel quickly throughout the social structure. Deviant individual actions are therefore prone to inspire retaliation. Individuals within densely-knit social networks are therefore less likely to act against the social norms and rules. Conforming to the existing rules and norms facilitates collective actions.

The structure of a social network offers opportunities and imposes constraints on the actions of both individuals and collectives. Social network structures characterised by a low density are rich in structural holes and weak ties that

provide some actors with access to social capital. Structural theories of social networks have pointed out that these loose, open network structures provide individuals with a structural advantage compared to others in different locations within a social network. This structural advantage of some actors over others is the result of the differences in the availability of social capital between actors in different structural locations. At the same time socially cohesive network structures provide groups of actors with better opportunities to act collectively. The many ties in such densely-knit social structures prevent defective behaviour via the social norms embedded within these ties. Different characteristics of network structure thus have different effects on action. Despite these differences, the theoretical perspectives do have one important element in common. Both theories emphasise the value of social cohesion for collective action and stress social capital as a key resource for action.

3.5 Concluding Remarks

Social network analysis has proliferated as a research approach in the social sciences throughout the 20th century. Ever since the introduction of the sociogram by Moreno in the 1930s, methods to visualise the social structures of groups of actors have proliferated (De Nooy et al., 2005; Wasserman & Faust, 1994). At the same time, the discussions between those researchers with a structuralist perspective and others with a more action-oriented approach in anthropology have spurred some to introduce a more integrated perspective of action and structure by means of social network concepts (Barnes, 1954, 1972; Mitchell, 1974). This chapter has provided an overview of social network perspectives. It has illustrated that the literature on social network analysis can be divided in three strands of research: the basic conceptualisation of social networks, the models and indicators of social network structure, and the theoretical perspectives that focus on the implications of structures on action.

Section 3.2 introduced social network analysis as a different perspective to analyse interactions between societal actors and the basic concepts upon which social network analysis builds. The section argued that the 'fundamental difference between a social network explanation and a non-network explanation

is the inclusion of concepts and information on relationships among social units in a study' (Wasserman & Faust, 1994, p. 6). Based on the concepts of actors and actor attributes and the ties between these 'nodes', information about social systems can be analysed. Section 3.2 also elaborated on the two distinct modes of analysis. Based on the notions of social positions and social roles, network structures can be analysed in two distinct, but not mutually exclusive, ways. Positional analysis gives primacy to positions, statuses and structures over actions. Role analysis focuses on grouping the associations among relations, and the analysis of the relations between positions.

The basic concepts of social network analysis and the two distinct modes of analysis provide a valuable toolbox for mapping social structures, but do not indicate the characteristics of these social networks. In order to analyse differences between and within a social network, various models of network structure can be employed. Section 3.3 introduced models of network structure within each of the two modes of analysis at three distinct levels of analysis. These levels of analysis are the level of the individual actor, the level of subgroups, and the global network level. When social networks are mapped with a role analysis, an individual's ego-network is considered the main model to interpret ego's embeddedness. Density and multiplexity serve in ego-network models as indicators of the ego-network structure. At the level of a subset of actors, role analysis focuses on cliques and cohesive subgroups to identify the associations among relations of a set of more or less homogenous actors. At the global network level, social network role analysis focuses on system density and transitivity as main indicators of network structure.

For positional network analysis, the position of an individual is employed to describe its involvement in a social network structure. For a positional analysis, the absent ties in a network structure are equally important as the ties that are present. At the intermediate level of analysis, positional analysis therefore focuses on jointly occupied network positions rather than cohesive subgroups. Jointly occupied network positions indicate that actors display the same pattern of relations to others. At the global network level, positional analysis focuses on the extent to which social systems are stratified or centralised. Stratification and centralisation indicate the extent to which one individual or a subset of actors is either directly or indirectly related to all others in the social network.

The models of network structure presented in section 3.3 are tools to analyse the characteristics of a social system. The models do however not explain how social structures provide opportunities and impose constraints on the actions of the actors embedded within the network. Section 3.4 focused on the theories that aim to explain how social structures affect the actions of individuals and collectives. It argued that social capital is a crucial element in both strands of theory. Social capital has a relational character. It exists only as long as two actors remain their association (Knoke & Yang, 2008). The relational character of social capital does not necessarily imply that social capital cannot be used by individual actors. The perspectives of Granovetter (1973, 1983) on strong and weak ties, and Burt (1992, 2000, 2004) indicate the utility of access to social capital for individual actors. These theories argue that access to social capital can provide some individuals embedded in a social network with structural advantages compared to others. Sparse and open structures are therefore beneficiary for some actors in a social network. Based on the work of Coleman (1988, 1990) the section illustrated the utility of cohesive networks for collective action. The social norms and trust embedded within the ties amongst actors exert social control on individual action. Such social control limits deviant individual behaviour and facilitates collective action. Despite these differences, the theories do share the idea that social capital is an important resource for action.

This chapter has introduced social network analysis as a research approach to map and characterise social systems. The chapter also elaborated on structural theoretical perspectives that hypothesise how structures affect actions. The explicit specification of relational variables next to the more general composition variables offers opportunities to not only explain action, but also to formulate expectations about the structural outcomes. Social network analysis might therefore provide a fruitful point of departure to develop a theory of policy networks. Part II of this thesis will utilise the concepts offered by social network perspectives to introduce a model of policy networks.

4 Types of Action, Modes of Steering

4.1 Introduction

Social network analysis, as chapter 3 indicated, has established itself as a valuable collection of methods and measures to analyse social structures. It has formed the basis for the development of theoretical perspectives concerned with the structural outcomes produced by social networks over time. The structural embeddedness of actors in a social network provides indicators of the extent to which actions are affected by the ties which network members maintain with others. The utility of social network analysis is widely recognised throughout the social sciences. Social network analysis has also been recognised as a valuable opportunity to strengthen policy network literatures, but it does not translate across directly to policy networks. Policy network analysis is not only concerned with the interactions between various stakeholders. It has a specific interest in the utility of policy networks as a mode of governance. Policy network analysis focuses on analysing how policy networks can be employed as a policy instrument that is not only effective, but potentially also efficient in producing policy outcomes (cf. Klijn & Koppenjan, 2000; Marsh & Rhodes, 1992; Mayntz, 1997b; Scharpf, 1978).

Neither of the network approaches discussed in part I can fully grasp the issues related to policy networks as both a platform for interest intermediation and a mode of governance. The policy network approach in general suffers from a number of conceptual problems that limit its utility as a theoretical approach (Bressers et al., 1994; Dowding, 1995; Pappi & Henning, 1998; Peters, 1998). Social network analysis focuses on the 'visual display of group structure, and a probabilistic model of structural outcomes' (Wasserman & Faust, 1994, p. 12). Social network analysis does not offer tools for the analysis of policy networks as a mode of governance.

This chapter addresses the opportunities of combining policy network analysis and social network analysis. It focuses on the development of a framework that captures both the dynamics of policy networks and the relationships between networks and policy outputs. As recent policy network studies have illustrated, the potential utility of social network analysis as a tool to map and analyse the structures of policy networks is promising. This chapter builds from these third cycle perspectives, illustrating that the inclusion of social network theories provides a conceptual link between policy networks and policy outputs. The chapter introduces a conceptual model that draws on both policy network analysis and social network perspectives. This model forms the foundation for an exploration of the opportunities that social network analysis might offer for the development of a policy network theory in later chapters.

The chapter is structured as follows. Section 4.2 focuses on the clarification of the variables and concepts derived from both policy network analysis and social network analysis. These concepts, variables and processes form the point of departure for the development of a policy network model. The conceptual framework distinguishes between two different processes. This distinction is necessary to capture both the relations between policy goals, policy networks, and outputs, as well as the structural outcomes of interactions in policy networks over time. Next, section 4.3 elaborates upon the interactions between actors in policy networks, and the extent to which such interactions might affect the structures of these policy networks. Section 4.4 specifies the conceptual anchors of the process of policy making in networks. The chapter's final section reflects on the proposed integration of policy network analysis and social network perspectives.

4.2 Concepts, Variables, and Processes

Policy network analysis developed in three distinct cycles. Each of these cycles made its own contribution to the conceptual development of the policy network literature. Within the first cycle literature, the interest intermediation approach focuses on the opportunities policy networks provide to individual actors to represent their interests and policy positions (e.g. Atkinson & Coleman, 1989;

Marsh & Rhodes, 1992; Rhodes, 1988, 1997; Richardson & Jordan, 1979; Van Waarden, 1992). Governance literatures focus on the utility of policy networks as a new mode of governance that is potentially more effective and efficient than hierarchies and markets (e.g. Kenis & Schneider, 1991; Mayntz, 1997b; Scharpf, 1978). The network management approach has indicated that policy networks are not static structures but rather subject to change over time., changes which can be attributed to an outsider. This network manager provides the impetus for changes that could facilitate cooperative behaviour within the network (e.g. Kickert et al., 1997b; Klijn & Edelenbos, 2007; Koppenjan & Klijn, 2004a; Sørensen & Torfing, 2007a). The most recent strand of policy network literature has introduced relational variables in the analysis of policy networks in a similar manner as relational variables are conceptualised in social network analysis (e.g. John & Cole, 1998; Kalfagianni, 2006; Sandström, 2008).

Policy network perspectives build on a number of fundamental concepts. Several of these variables and concepts have a corresponding analogue in social network perspectives. This section aims to identify those variables and concepts and argues that, based on these variables and concepts, a distinction between two different processes can be made. The section will introduce the process of steering in networks and the process of steering by networks as two related, but distinct, processes in policy network analysis.

One of the basic concepts in both policy network analysis and social network analysis is the actor. Actors in the policy network literature are often conceptualised as representatives of organisations or interest groups that participate in a policy network to represent their organisations' interests. Participation in a policy network is motivated by the opportunities such networks offer actors to affect the policy-making process (Mayntz, 1997b; O'Toole, 1997; Pappi & Henning, 1998; Rhodes, 1997; Sabatier, 1988; Scharpf, 1978). In social network analysis, the concept of an actor can refer to any type of social entity (cf. Wasserman & Faust, 1994). Nevertheless, the basic conceptualisation of an actor does not differ. Actors can therefore be considered one of the main elements relevant for the development of a policy network model.

Policy network perspectives also stress the importance of a variety of resources that actors have at their disposal in policy networks. In policy network literatures, different types of resources are considered valuable assets for

individual actors. The policy resources most often elaborated upon are financial means, information, and knowledge (e.g. Daugbjerg, 1997; Kenis, 1991; Kenis & Schneider, 1991; Marsh & Rhodes, 1992; Marsh & Smith, 2000; Marshall, 1995; Mayntz, 1997b; Rhodes, 1997; Sabatier, 1988; Scharpf, 1978). Social network analysis refers to the various resources that individual actors have at their disposal as attributes (Jansen, 2003; Snijders, Bunt, & Steglich, 2009; Turner, 2001; Wasserman & Faust, 1994). These attributes also include actors' characteristics such as gender and age. Social network analysis therefore builds upon two types of attributes. The first type is similar to the policy resources stressed in policy network analysis. These attributes could change over time due to the interactions in the network. The second type of attributes do not change due to the actions of actors. Both types of attributes can play an important role in policy networks. Actor attributes are therefore the second important element to be built upon by the policy network model developed in this chapter.

The third element that needs to be included in a conceptual policy network framework is the set of relations between actors. These relational variables have not been clearly conceptualised in the first two cycles of the policy network literature. Relations are often mentioned as an important variable in policy network analysis, but the conceptualisation of these relations between the actors in a policy network remains problematic (cf. Bressers et al., 1994; Dowding, 1995; Pappi & Henning, 1998; Peters, 1998). The third cycle of policy network literature and the social network literature have indicated that relations are a characteristic of a pair of actors. The relational aspects of policy networks in the model introduced here develops from the conceptualisation of relations as proposed in social network analysis. The ties between a pair of actors are conceptualised as a 'joint dyadic property that exists only so long as both actors maintain their association' (Knoke & Yang, 2008, p. 7).

The actors, attributes, and relations between actors together form the basic variables of a network structure. The definition of network structure as a collection of nodes and ties is equally applicable to the policy network perspectives. The policy network perspective introduced in this chapter draws upon this social network definition of network structure for two reasons. Firstly, the basic concepts included in the definition of network structure as a set of composition and relational variables have their counterparts in policy network

analysis. Secondly, such a definition of network structure offers the opportunity to deal with two of the main weaknesses of policy network analysis in general. Social network analysis conceptualises relational variables in a more consistent way than certain policy network perspectives. Additionally, the models of network structure developed within social network analysis offer the tools to characterise network structures not only at the global level, but provide measures of network structure that identify differences within network structures (e.g. Burt, 1980, 1982; Jansen, 2003; Knoke & Yang, 2008; Marsden, 1990; Wasserman & Faust, 1994). Such differences within a policy network's structure might have important implications for the policy processes and outcomes resulting from policy networks (e.g. Kalfagianni, 2006; Sandström, 2008).

Policy network analysis does not only focus on an adequate characterisation of policy network structure. Policy network literatures argue that policy networks are a policy instrument to attain a variety of policy goals via the policy outcomes resulting from the network. Policy networks are often considered to be employed as a policy instrument with three possible generic policy goals. firstly, policy networks can be employed by government to create a platform for a variety of stakeholders to represent their interests (a.o. Marsh & Rhodes, 1992; Marsh & Smith, 2000; Rhodes, 1997; Richardson & Jordan, 1979; Van Waarden, 1992; Wilks & Wright, 1987). Employing policy networks as a tool to create a platform for interest intermediation is considered in policy network literatures to facilitate the production of a policy outcome that is not only supported by a variety of stakeholders, but also experienced as a legitimate outcome by those concerned with the issue at stake. Secondly, some have argued that policy networks might be the only policy instrument available to governments capable of addressing increasing levels of functional differentiation in modern societies (e.g. Börzel, 1998; Mayntz, 1997b; Scharpf, 1978; Thatcher, 1998). Policy network literatures argue that governments can no longer be expected to have sufficient expertise within their bureaucracies to be able to deal with the increasing degrees of complexity of certain policy fields. Policy networks are considered a tool to acquire the information necessary to guarantee effective and efficient policy formulation and implementation (Benz, 1992; Börzel, 1998; Kenis & Schneider, 1991; Mayntz, 1997a; Pappi & Henning, 1999; Skogstad, 2005). Finally, some argue that policy networks have the capacity to produce outcomes that are more

innovative than those of other modes of societal coordination (i.e. markets and hierarchies) for two reasons. Firstly, policy networks include a variety of stakeholders and experts within policy processes, who would otherwise not participate. Secondly, policy networks provide opportunities for these societal stakeholders to interact (Kickert et al., 1997b; Klijn, 2005; Klijn & Koppenjan, 2000; Klijn & Teisman, 1997; Koppenjan & Klijn, 2004b, 2004c; Provan & Kenis, 2007; Provan & Sebastian, 1998; Scharpf, Reissert, & Schnabel, 1978). The interactions within policy networks facilitate actors that would otherwise not interact to exchange information and ideas. Policy networks might therefore potentially lead to the production of innovative policy outcomes.

The policy network literature does not aim to explain structural outcomes *per se*. Rather, it focuses on the extent to which policy networks offer opportunities as a policy instrument to reach a variety of policy goals via policy outcomes that result from interactions between interdependent actors in policy networks (a.o. Marsh & Smith, 2000; Marshall, 1995; Mayntz, 1997b; O'Toole, Hanf, & Hupe, 1997; Rhodes, 1997; Schneider & Werle, 1991; Thorelli, 1986). A social network conceptualisation of network structure therefore only specifies part of the concepts and variables relevant for policy network analysis. The policy goals and policy outcomes are variables in policy network literatures that do not have an equivalent in corresponding social network literatures. A policy network model does need to include these two important variables. However, rather than focusing on policy outcomes, this chapter focuses on policy outputs. Outputs differ from outcomes because outputs represent the policies and initiatives agreed upon by the network actors. Policy outputs therefore directly result from the network's activities. They differ from policy outcomes because outputs do not include changes in attitudes, behavior, knowledge, skills, status, or level of functioning that are expected to result from network activities at the system level. Policy outputs can thus generally be defined as the product of 'the interactions of resourceful and bounded rational actors whose capabilities, preferences and perceptions are largely, but not completely shaped by the institutionalized norms within which they interact' (Scharpf, 1994, p. 195).

The focus on the relations between policy goals, policy networks, and policy outputs implies that policy network analyses often treat networks as a variable rather than as an entity comprised of several variables. Conversely, social

network analysis focuses on the variables of a social network. It aims to analyse the social structures, actions, and structural outcomes of the processes within the network. The policy network literature, on the other hand, focuses rather on the policy process in which a policy network is a variable. This does not imply that policy network analysis treats the policy network as a black box. It emphasises the importance of the interactions between actors and the processes of bargaining over various policy resources and policy positions (cf. Börzel, 1998; Daugbjerg, 1998; Hackmann, 2003; Hajer & Versteeg, 2005; Kenis & Schneider, 1991; Koppenjan et al., 1993; Marsh, 1998b; Provan & Sebastian, 1998; Thatcher, 1998). This chapter argues that these bargaining processes within the network take place at a different level - and are of a different nature - to the policy making process where the policy network is utilised as a policy instrument.

This section has introduced a generic definition of a policy network as a set of composition variables and a set of relational variables. Bargaining processes between actors are processes that affect policy network variables. When an actor employs financial resources to affect the policy position of another actor, the composition of the set of attributes each of these actors has at its disposal changes. This implies that the composition variables, and therefore the social structure of the policy network changes. In other words, the bargaining processes between actors within a policy network, as conceptualised in policy network literatures, refer to the changes in a policy network's social structure. At the same time the process of policy making in which a policy network is employed as an instrument does not focus on the variables that shape the network, but rather on the policy network as a variable in a policy process. The levels at which these two processes take place differ considerably. The remainder of this chapter elaborates upon these two related, but distinct, processes, referring to bargaining processes between actors within the policy network as steering in networks. The policy process in which policy networks are employed by governments as a policy instrument will on the other hand be referred to as steering by networks. Section 4.3 focuses on the former process, whilst section 4.4 elaborates upon the latter.

4.3 Steering in Networks

The previous section has introduced a distinction between two processes important when policy networks are perceived as a mode of governance. Firstly, the interactions between individual actors are a process that affects the structures of a network over time. Secondly, the network is a variable in the policy making process. This section elaborates upon the first of these two processes. The process of bargaining over attributes between individual network actors is referred to as steering in networks. The initial network structure is an important indicator for the changes in its structure over time due to the actions of individual actors. The section specifies the definition of network structure in a policy network context, elaborating upon the interactions between network actors resulting from the interdependence between these actors, and the effects of such interactions on policy network structures.

The policy network model introduced in this chapter takes the basic concepts of social network analysis as its point of departure to characterise network structure. In social network analysis, network structure is defined as a set of composition variables (i.e. actors and their attributes) and a set of relational variables (i.e. the ties between the network actors). This rather generic definition of network structure does require some specification on two related issues. It is necessary to specify the attributes and the ties that need to be included in policy network analysis.

In social network analysis an almost infinite number of actor attributes can be taken into consideration. The primary criterion for inclusion or exclusion of certain attributes is relevance. The same argument applies to the study of policy networks. Not all attributes of actors are necessarily relevant for the analysis of a policy network. Policy network literatures, most prominently the typologies developed within the interest intermediation literature, has already indicated that attributes like financial resources, information and knowledge, the level of commitment to the issue at stake, and the policy position of an actor are attributes of particular importance in policy networks (cf. Daugbjerg & Marsh, 1998; Kalfagianni, 2006; Kickert & Koppenjan, 1997; Marsh, 1998b; Rhodes, 1988;

Scharpf, 1994; Smith, 1993; Van Waarden, 1992). These attributes are subject to bargaining processes. Attributes that do not change due to actors' attempts to steer in the policy network can nevertheless be equally important (e.g. gender, age). Any attribute an actor can employ in the process of steering in networks is relevant and is therefore part of the policy network's structure.

The relational variables included in the analysis of a policy network should be approached in a similar fashion. However, the distinction between attributes and ties is not as obvious as one might expect. The actors embedded within a policy network maintain different types of relations with others. Different ties between any pair of actors indicate a multiplex dyadic structure. The different types of ties between any pair of actors imply that network structures can be defined on different relations. In other words, the various types of relations present between the actors of a network (indicated by network multiplexity) imply that among that same set of actors several uniplex networks can also be defined. Ties that indicate communication patterns map the communication network. Among the same set of actors, a network defined through friendship ties might also exist, mapping a different uniplex network. Although parts of the networks that are defined on different relations may overlap, these uniplex networks are unlikely to have the same social structure. Among the same set of actors, different uniplex networks therefore exist in parallel. Focusing on one of these networks affects the status of a variable as either an attribute or a tie. In a policy network, the friendship ties present between any pair of actors become attributes that individual actors can employ when interacting with their friends in the policy network.

The ambiguity of the status of ties as either attributes or ties raises one important question. If several networks coexist among the same set of actors, it is necessary to identify those ties that form the relational variable of the policy network. Before this question can be answered, it is useful to reconsider the characteristics of a policy network. Policy networks are networks in which actors interact with the aim of producing policy outputs. Actors have policy positions concerning particular issues at hand: preferred policy outputs maximising the utility for that particular actor (a.o. Sandström, 2008; Smith, 1993; Stokman & Oosten, 1994). Such a policy position is an attribute. Different actors have different interests and therefore policy preferences. This does not imply that there

is no common ground between actors' policy positions. In some cases, the preferred network outputs of some actors will only differ marginally. In other cases the differences of opinion regarding the preferred policy outputs of the policy network might be diametrically opposite. No actor involved in a policy network can unilaterally produce a policy output. Policy networks imply a certain degree of interdependence between actors (e.g. Börzel, 1998; Kenis & Knoke, 2002; Marsh & Rhodes, 1992; Mayntz, 1997b; Sabatier, 1988; Scharpf, 1994; Scharpf et al., 1978). Engaging in coordination, cooperation and consensus building is a necessary activity for each actor to realise at least part of its policy position in a policy output. The interdependence between actors and need for coordination, cooperation, and consensus building point towards the ties that relate policy positions, and therefore also relate actors, to one another. In a policy network structure, the relational variable is therefore the association among the policy positions of different actors. These associations, in turn, indicate the interdependence between pairs of actors in the policy network.

The differences in policy positions and the resulting interdependence between actors in a policy network imply that in order to realise a policy output, at least some actors must be prepared to shift away from their initial policy position. Such shifts in policy positions do not occur spontaneously. Each individual actor in a policy network can be considered to act as a utility maximising individual. These attempts by actors to maximise their individual utility affect the social structure of the policy network in various ways. Some actors will interact with others in the network in an attempt to convince those others to change their policy position. These individual actor actions are thus geared towards affecting the policy position of others. Actors employ the attributes at their disposal to convince others of the utility of their preferred policy output. Actors bargain over policy positions to mobilise a critical mass in favor of a certain policy position. The mobilisation of a critical mass around a policy position resonates to a large extent with Sabatier's (1988, 1991) advocacy coalitions and the work of Ostrom (1990, 1999). The bargaining process necessary to create such coalitions is facilitated by the attributes (including those that form ties in parallel networks) that actors have at their disposal as resources for their individual actions (cf. Burt, 1992, 2000, 2004; Granovetter, 1973, 1983).

The interactions between the actors in a policy network that occur in the process of steering in networks are important for the structure of a policy network. These interactions are in fact a collection of individual actions aimed at changing the structure of a policy network. From an individual actor's perspective, these actions are aimed at convincing other actors involved in the policy network to shift away from their initial position towards the policy position of the individual actor concerned. Steering in networks can therefore change the structure of the policy network.

Individual actor attempts to convince others to shift towards their preferred policy position might not always be successful. Shifts in policy positions do not occur spontaneously. Actors are only likely to move away from their initial policy position for two reasons. Firstly, some actors might change their policy position because they are convinced by others that a different policy position would actually result in a policy output preferable to their initial policy position. This is only likely to occur when the actors that change their policy position have obtained new information or knowledge regarding the issue at stake, and this information or knowledge has changed their perspective on which particular output would maximise their individual utility. Secondly, actors might shift towards a policy position that is less preferable if they are compensated for their loss in prospective utility of a policy output. In either case, both the composition of the nodes (actors and their attributes), and the number and/or composition of ties, change due to these shifts.

This section has illustrated that a policy network is a network of policy positions in which all other parallel networks that actors maintain among the same set of actors are attributes. These attributes can nevertheless be employed in the interactions in a policy network. The individual actions of network actors might change the social structures of a policy network in two important respects. firstly, these actions change the number or the composition of the ties within a policy network's structure. Secondly, the individual actions of actors change the composition of nodes in a policy network by redistributing attributes. The individual actions of actors that are aimed at changing network structures are referred to in the remainder of this thesis as type I actions. Type I actions facilitate the development of a network structure that could potentially produce a policy output over time. The process of steering in policy networks thus refers to the

collection of individual actions that are aimed at changing the structure of a policy network via the shifts in policy positions of at least some actors. Type I actions do not produce an output, as the production of policy outputs requires a type of action that differs considerably in nature from the individual actions described in this section. The next section elaborates upon such type II actions.

4.4 Steering by Networks

The previous section highlighted the importance of the actions of interdependent individual actors for the structural outcomes of a policy network over time. Such type I actions change the structures of policy networks in various ways. Type I actions and the resulting changes in the structure of a policy network conceptually capture network dynamics as a process of steering in policy networks. The process of steering in networks is important for the changes in network structure, and the structural outcomes of a policy network, but it cannot account for the production of policy outputs. The production of policy outputs depends instead on a different process. This section focuses on the process of steering by policy networks, and introduces a conceptual link between policy goals, policy networks, and policy outputs.

One of the main remaining problems of policy network analysis is the lack of a conceptual mechanism linking the structures of policy networks to policy outputs. This link, this section argues, can be derived from social network perspectives. The conceptual mechanism that links the structures of a policy network to its policy outputs is action. Unlike type I actions, actions that produce policy outputs are coordinated amongst a subset of actors. A second difference between the two types of action is their aim. Whereas type I actions aim to affect the social structure of a network, type II actions aim to produce a policy output. This section elaborate upons these type II actions - of collections of actors - after introducing the process of steering by policy networks.

A significant part of policy network literatures has focused upon the utility of policy networks as an instrument for effective and efficient policy making (cf. Benz, 1992; Börzel, 1998; Daugbjerg, 1997; Kenis, 1991; Mayntz, 1997b; Scharpf, 1992; Thatcher, 1998). In these contributions, the importance of policy goals is

underlined. Policy networks are generally considered to be employed as an instrument to reach three possible policy goals. Firstly, policy goals can be geared towards the creation of a platform of intermediation, where a variety of stakeholders have the opportunity to represent their interests. Policy networks are with this policy goal in mind regarded as facilitating the production of a policy output that is widely supported and at the same time experienced as legitimate by those concerned with the issue at stake (e.g. Marsh & Rhodes, 1992; Richardson & Jordan, 1979; Van Waarden, 1992). Secondly, policy networks could be able of dealing with increasing degrees of functional differentiation in modern societies more effectively and efficiently than other modes of coordination (e.g. Mayntz, 1997b; Scharpf, 1978, 1994). And third, policy networks might facilitate the production of policy outputs that are more innovative than policies potentially resulting from other modes of societal coordination, due to the range of interactions among a variety of actors involved in the policy process (e.g. Kickert & Koppenjan, 1997; Klijn & Edelenbos, 2007; Koppenjan & Klijn, 2004a).

Policy networks can thus be employed by governments as an instrument to obtain three generic policy goals. Governments utilise these policy networks as an instrument to steer society. Policy networks are not by definition effective or efficient policy instruments. There can be not guarantee that policy outputs will result from interactions in these networks. Furthermore, if policy outputs do emerge, these outputs do not necessarily reflect the policy goals set by government. The policy goals of government serve primarily as an input in the policy process. Government might have some control over the initial policy network, but cannot control or steer the interactions between actors completely. Moreover, the actors in a policy network are interdependent. This interdependency implies that none of these actors can produce a policy output on its own (Börzel, 1998; Thatcher, 1998; Thompson & Pforr, 2005). Shifts in the policy positions of at least some actors need to occur before a policy network has the capacity to produce policy outputs. Such shifts are the result of the process of steering in networks. Steering in networks changes the structural characteristics of a policy network, and could result in the clustering of at least a subset of actors around a certain policy position.

Steering by policy networks as a process can only be successful if the policy network's activities result in a policy output. Policy outputs are the result of

specific actions coordinated amongst at least a subset of network actors. Such coordination of action is necessary because actors embedded within policy networks cannot produce policy outputs on their own. The coordinated actions among at least a subset of actors are in the remainder of this thesis referred to as type II actions. The emergence of policy outputs as a result of these type II actions does not by definition imply that the process of steering by policy networks is successful. The characteristics of the policy outputs resulting from the policy network need to be assessed in the light of the policy goals formulated by government. The attainment of specific policy goals might in the case of some policy goals require only that a policy output is produced. In other cases, the process of steering by networks can only be considered successful if the policy outputs display specific characteristics that facilitate the attainment of specific policy goals. Chapter 7 elaborates upon these specific characteristics of policy goals and policy outputs.

The structural characteristics that facilitate type II actions are rather different to those that facilitate the individual actions of type I. For individual action, sparse and open social structures in a policy network provide some individuals with excellent opportunities to manipulate their surrounding structures because of the bridging function of these actors' ties, and the proximity of some actors to structural holes (cf. Burt, 1992, 2000, 2004; Granovetter, 1973, 1983). Type II actions are facilitated by social structures that are dense and socially cohesive. Social structures that are dense and integrated contain much social capital which exerts control over social behaviour (Coleman, 1988, 1990). Such social control in densely-knit social structure limits the likelihood of defective actions of actors.

Type II actions have been defined as coordinated actions amongst at least a subset of actors aimed at producing a policy output. Type II actions can only emerge if the process of steering in networks (i.e. the changes in network structures due to shifts in policy positions and exchange of attributes) has resulted in a social structure in which at least one subset of actors have a similar policy position regarding the issue at hand. These actors form cohesive subgroups in policy network structures. Coordinated type II actions do not necessarily have to be collective actions of all actors involved in the policy network. Cohesive subgroups can have the capacity to coordinate their type II actions. Furthermore, policy outputs might result from these type II actions.

Because of this capacity of cohesive subgroups to coordinate their actions, it is necessary to focus on both global structural characteristics and on differently-structured elements within policy network structures. Such a focus on differences within the structures of policy networks is necessary to assess the policy network's capacity to produce policy outputs.

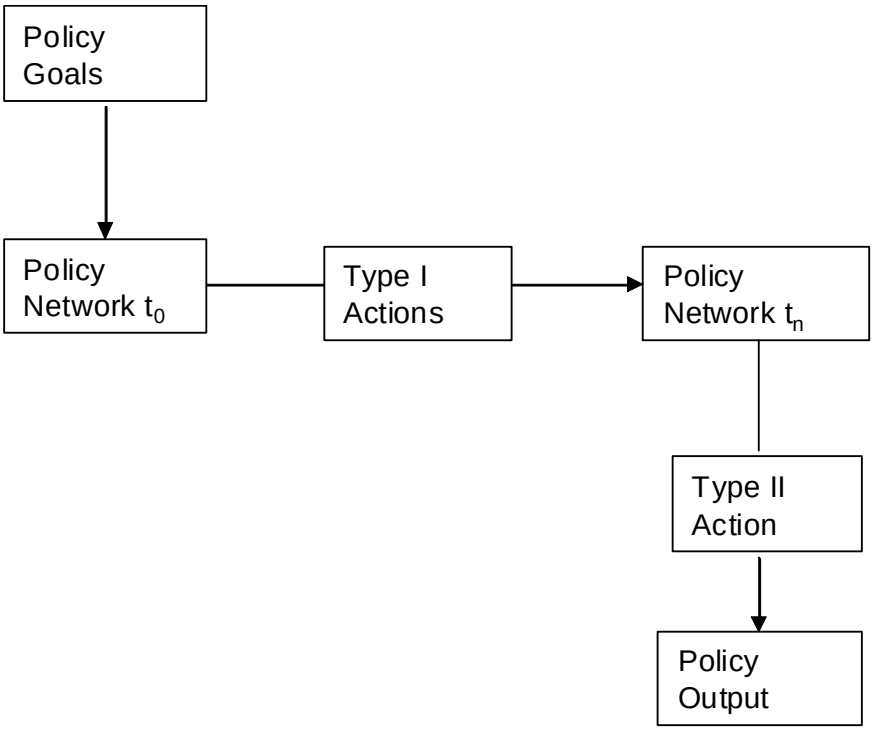
Individual type I actions that aim to change the structure of a policy network might result in a structural outcome where the policy network structure contains cohesive subgroups. Although some policy network structures might contain such densely-knit parts from the outset, the process of steering in networks is likely to further integrate such groups. Cohesive subgroups form in policy networks around certain policy positions (cf. Ostrom, 1990, 1999; Sabatier, 1988, 1991). Due to the relatively high degree of integration, such clusters of actors might have the capacity to coordinate type II actions. The social norms embedded within the multiple relations maintained by these actors facilitate collective actions. These type II actions aim at producing a policy output. Type II actions nevertheless do not necessarily result in policy outputs. The structural location of cohesive subgroups within the global structures of policy networks determines the extent to which the type II actions of one cohesive subgroup are likely to result in policy outputs. Chapter 6 elaborates upon the extent to which policy networks with different structural characteristics are likely to produce policy outputs.

The policy positions of actors are an attribute of particular importance in policy networks because they are subject to a bargaining process throughout the process of steering in networks. The type I actions of individual actors aim to affect the policy positions of other actors in favour of their own policy positions. The clustering of actors around one policy position in turn facilitates type II actions. Depending on the global network structure, such type II actions might result in policy outputs. Policy positions are equally important in the process of steering by policy networks. Rather than on the individual policy positions of actors and the bargaining over these positions, steering by policy networks relies on the policy position of a subset of actors. Over time the process of steering in policy networks facilitates the emergence of cohesive subgroups around certain policy positions. Such subsets of actors might have the capacity to coordinate their type II actions. If the type II actions of such a cohesive subgroup result in

policy outputs, these outputs reflect the policy position taken up by that particular subset of actors over time. This does not imply that these policy outputs reflect the policy goals set by government. The extent to which policy outputs resulting from the type II actions of at least a subset of actors reflect the policy goals set by government depends at least partially on the initial structural characteristics of the policy network. Chapter 6 elaborates upon the extent to which type II actions are likely to result in policy outputs. Chapter 7 elaborates upon the extent to which policy outputs are likely to reflect the various policy goals under different structural characteristics respectively.

This section has described the conceptual anchors of the process of steering by policy networks. It argued that the process of steering by networks depends on the extent to which the structures of policy networks facilitate collective actions. rather than individual actions. These type II actions form the conceptual link between policy network structures and policy outputs. This section has also highlighted that the processes of steering in policy networks and steering by policy networks are strongly intertwined. Steering in networks changes network structure via the type I actions of individual actors. These structural developments are necessary to allow the policy network to develop the structural capacity to produce policy outputs. Only when cohesive subgroups form around certain policy positions might policy outputs result from coordinated type II actions. Furthermore, successful steering by policy networks requires that such policy outputs result from the interactions between interdependent actors. Figure 1 illustrates the relations between the horizontal process of steering in policy networks, and the vertical process of steering by policy networks

Figure 1: Steering in and Steering by Policy Networks



4.5 Concluding Remarks

This chapter has addressed the opportunities of combining policy network analysis with social network analysis. It has focused on the development of a framework that captures both the dynamics of policy networks and the relationships between network structures and policy outputs. The chapter argued that social network analysis offers the opportunity to map and analyse the structures of policy networks, and includes the theoretical perspectives to hypothesise on the structural outcomes of policy networks. Nevertheless, social network perspectives do not include a perspective on the results of interactions in the network other than the structural outcomes. Therefore, this chapter has made a distinction between two related, but different, processes important for policy networks as a mode of governance.

Section 4.2 argued that the concepts upon which policy network literatures build have their equivalent in social network analysis. The concepts of actors, attributes, and relations are stressed in both approaches. The social network conceptualisation of the relational variables of a network offers opportunities to analyse network structures more consistently than their counterpart in the policy network literature. This utility of a social network definition of policy network structure has recently also been recognised by the third cycle of policy network literature. Furthermore, a definition of network structure as a set of composition variables and relational variables allows the identification of differently-structured parts within a network. These differences within the structure of a policy network have largely been overlooked in previous policy network approaches. A social network approach to network structure therefore might potentially overcome two of the most persistent criticisms of policy network approaches.

Despite its utility for mapping and analysing policy networks' structural characteristics, social network analysis is nevertheless unable to explain the utility of policy networks as a mode of governance. Based on the basic definition of a policy network's structure as a set of composition variables and relational variables, section 4.2 argued that the social network approach might prove a valuable tool to explain structural outcomes, but it does not include the necessary conceptual links between network structures and policy outputs. For this reason, a distinction was made between two processes. On the one hand, a process of bargaining over policy positions was distinguished. Steering in networks refers to a process of bargaining over policy positions in which attributes are exchanged amongst the actors involved in the network. On the other hand, a process of steering by networks was introduced which describes how policy networks are employed as a mode of governance.

The horizontal process of bargaining over policy positions between the actors was further explained in section 4.3. The structure of a policy network is important for steering in networks because of the opportunities it provides and constraints it imposes on actions. The composition variables of a policy network are shaped by the actors and all attributes they can employ when interacting with others. These attributes also include any parallel networks actors might maintain with other actors. The relational variable that connects the nodes in a policy

network are the associations among policy positions. Such ties in turn indicate the interdependence between actors. Section 4.3 argued that individual actors' actions are aimed at affecting the policy positions of others. Since no actors can unilaterally produce a policy output, shifts in policy positions of at least some network actors are necessary if a policy output is to be realised. Only if cohesive subgroups develop around certain policy positions might policy outputs result from the interactions in a policy network. Individual type I actions can affect both the composition variables and the relational variable of the policy network structure.

Section 4.4 focused on the process of steering by policy networks and argued that policy networks might be employed as a mode of governance with three possible policy goals in mind. The extent to which the policy network is likely to produce policy outputs depends upon both the initial structure of the policy network and the changes in this structure over time. Rather than type I actions, actions coordinated among a subset of actors are drivers of output production. Due to the process of steering in policy networks a subset of actors might emerge that group around the same policy position. Such a subset of network actors then forms a cohesive subgroup in the policy network. Section 4.4 argued that such cohesive subgroups are best equipped to coordinate their actions towards producing policy outputs. These type II actions of at least a subset of actors form the conceptual link between the policy network and policy outputs.

The current chapter has introduced a conceptual perspective to policy networks that distinguishes between two distinct, but related processes. This framework can potentially describe the interactions between interdependent actors, and explain *ex post* the policy outputs of policy networks. It does not provide the necessary elements to formulate hypotheses on the relations between policy goals, the structural characteristics of policy networks, the changes in these structures over time, and any potential policy outputs. Before such hypotheses can be formulated, it is necessary to assess the extent to which different structural characteristics of policy networks affect the process of steering in and facilitate the process of steering by networks. The following chapters focus on these tasks and theorise on the process of steering in networks in chapter 5, the production of policy outputs in chapter 6, and the process of steering by policy networks in chapter 7.

5 Steering in Networks

5.1 Introduction

The previous chapter introduced the conceptual distinction between the processes of steering in policy networks and steering by policy networks. The current chapter elaborates upon the first of these two processes. Steering in networks captures horizontal bargaining between actors over policy positions. Steering in networks, chapter 4 argued, can change the social structures of policy networks in two ways. Firstly, the exchange of attributes in an attempt to influence the policy positions of other network actors changes the composition of the nodes. Secondly, such attempts to steer in the network can affect the ties between actors. These changes in the social structure are the result of individual actors'.type I actions.

The conceptual framework of steering in networks introduced in the previous chapter can only explain *ex post* why certain changes in the social structure of a policy network occur. The current chapter aims to strengthen the framework theoretically. It elaborates the dynamic relations between network structure and type I actions. The chapter focuses on the development of a set of theory-based hypotheses that point to expected changes in the social structures of policy networks under different initial structural conditions. The model of steering in networks introduced here builds on actor-based models of network dynamics. These models are anchored in a structural perspective often referred to as structural individualism (Heidler, 2008; Snijders et al., 2009; Udehn, 2001). Structural individualism builds on the assumption that the actors embedded in the social structure of a policy network are affected by these structures in terms of their opportunities to act individually. These structural opportunities and constraints on type I actions, and changes in the social structure of a network that result from these type I actions, are in this chapter taken as a point of departure

for theorising on the structural outcomes of policy networks as a result of the process of steering in networks.

The chapter elaborates upon the effects of type I actions on network structure at three distinct analytic levels. It argues that the direct effects of type I actions are found in the changes in the structures of ego-networks. Over time, such individual actions also have an effect on the social structures of a policy network beyond these immediate surroundings of the actor. Therefore, this analysis includes both structural effects of type I actions over time, on the ego-centred local structure, and the global network structure.

The chapter is structured as follows. Section 5.2 presents a specification of the process of steering in networks and introduces the actor-based model of network dynamics. This model of network dynamics forms the theoretical foundation and the point of departure for the formulation of hypotheses in subsequent sections. Section 5.3 focuses on the opportunities and constraints different initial social structures offer individuals at the level of ego-networks. In a similar vein, section 5.4 elaborates upon ego-centred local network structures and their effects on both type I actions and network dynamics. The global network structure is the focus of section 5.5. In this section, a set of hypotheses on the structural outcomes that are likely to result from the process of steering in networks in differently-structured policy networks is presented. Finally, section 5.6 summarises the main findings of this chapter and presents some concluding remarks.

5.2 Modelling Steering in Networks

Chapter 3 explained the basic concepts and theories of social network analysis. Network structure was defined as consisting of a set of nodes (actors and their attributes) and the relations between these nodes. The identification of these composition variables and relational variables allows the social structures of policy networks to be mapped (a.o. Burt, 1980, 1982; De Nooy et al., 2005; Jansen, 2003; Marsden, 1990; Wasserman & Faust, 1994; Wellman & Berkowitz, 1988). The mapping of network structures based on these two sets of variables is rather static. The social structure of the policy network is only accurately displayed at the time of data collection. Network structures are however not static, but rather

change over time. The social structure of a network changes due to the type I actions of the actors embedded within it. More specifically, both the composition variables and relational variables of policy networks can change due to bargaining over policy positions. This process was earlier referred to as a process of steering in networks. Network dynamics therefore comprise the changes in both the composition and relational variables between two points in time.

The development of a set of hypotheses on the relations between the initial structural characteristics of networks and the structural outcomes requires a conceptual driver of changes in social structures over time. Chapter 4 argued that the process of steering in networks captures such dynamics of the social structures of networks. To recall the preceding argument, actors embedded within the social structure of a policy network each have a policy position regarding the issue at stake. In the initial network structure, such a policy positions reflects the policy outputs most preferred by each actor. However, actors are interdependent, with none of these actors able to unilaterally produce a policy output. Actors attempt to maximise the prospective utility of the policy output by bargaining with others over policy positions. Actors exchange attributes in order to convince others to shift their policy positions towards their own position. These type I actions can change the social structures of a policy network in two distinct ways. Firstly, type I actions affect the composition of nodes due to the flow of attributes from one actor to another. Secondly, type I actions affect the number and composition of the ties embedded within the network. Type I actions can thus change both the composition variables and the relational variables of a social structure.

Interactions between the actors embedded within the social structure of a network are not random. Actors' attempts to steer in the network via their type I actions are structured by policy networks' social network structure. This social network structure provides individual actors with opportunities to attempt to steer in the network, but also places constraints on such actions of type I. Network structures thus provide opportunities and impose constraints on the range of feasible actions of actors (cf. Barnes, 1954, 1972; Burt, 1980, 1992, 2004; Coleman, 1986, 1990; Mitchell, 1974; Snijders et al., 2009).

The dynamic model of steering in policy networks specified here is an actor-based model of network dynamics. The model is grounded in a theoretical

perspective that is commonly referred to as structural individualism. Structural individualism is a perspective that builds its models from the assumption individual actors act purposively and rationally given the constraints which social structures imposes upon them (Heidler, 2008; Snijders, 2009; Snijders et al., 2009; Steglich, Snijders, & Pearson, 2006; Udehn, 2001). The process of steering in networks that captures the dynamics of policy networks builds on a specific type of action that has previously been labelled type I action. Type I actions are the individual actions of actors aimed at changing the social structure of the policy network. Through its anchoring in structural individualism, such type I actions are therefore purposive within the opportunities provided and constraints imposed upon these actors by social structure.

Structural individualism considers the individual actor as the primary level of analysis. Based upon the assumption of purposive and bounded rational individual action, dynamic network models have been developed that take these assumptions from structural individualism as their point of departure (Heidler, 2008; Snijders, 2009; Snijders et al., 2009; Steglich et al., 2006; Udehn, 2001). Such models of network change start from an initial social structure and predict, based on a set of mathematical properties, the expected structural outcomes over time. These actor-based models of network dynamics form the basis in following sections for specifying the process of steering in networks and the development of hypotheses on the expected structural outcomes.

Actor-based models of network dynamics generally build on several assumptions. In order to specify the process of steering in networks, these assumptions need to be articulated here:

1. Changes in the social structures of a network over time are the outcome of a Markov process. A Markov process implies that 'for any given point in time, the probability distribution of the future network given current and past states of the network is a function only of the current network. All relevant information is therefore assumed to be included in the current state' (Snijders et al., 2009, p. 5).

2. Network actors are considered to act purposefully within the structural constraints of the social structure in which they are embedded. Actors are

therefore assumed to control their outgoing ties (Heidler, 2008; Snijders, 2009; Snijders et al., 2009).

3. Although time is considered continuous, at any discrete point in time actors can only change one outgoing tie. According to Snijders et al. (2009, p. 5) this assumption 'implies that tie changes are not coordinated, and depend on each other only sequentially, via the changing configuration of the whole network'.

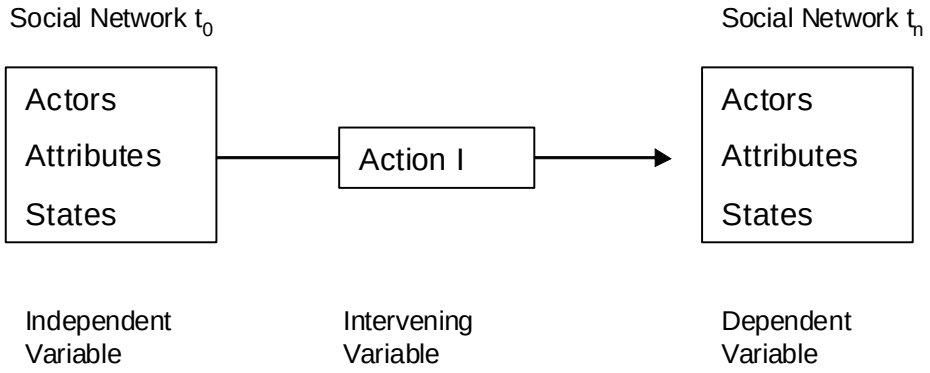
Actor-based models of network dynamics distinguish between two types of relational variables (cf. Snijders, 2009; Snijders et al., 2009; Steglich et al., 2006). The first type of relational variable comprises those relations that can be characterised as states. States are a type of relational variable that has a continuous rather than *ad hoc* character. This does not imply that states cannot emerge, change, or disappear over time. However, the nature of relations that can be characterised as states is that such changes do not occur spontaneously, but rather follow the occurrence of an event. States can for example transmit perceptions of an actor's trustworthiness, power, but also social norms and rules (Coleman, 1988, 1990; Snijders et al., 2009; Udehn, 2001). Such social resources are referred to as social capital. Social capital is a form of capital that exists only in the relationships between a pair of actors. Social capital can not therefore be attributed to individual actors (a.o. Burt, 2000; Coleman, 1988, 1990; Jin, 1999). Furthermore, social capital exists only as long as both actors maintain their association (Knoke & Yang, 2008). A reciprocal relationship of trust between a pair of actors, for example, will not disappear as long as neither of these two actors acts in a way that alters each actor's perception of the other's trustworthiness.

Unlike states, events are a type of relationship that is discrete in nature rather than continuous. Events have an *ad hoc* character and form a tie between a pair of actors at one specific point in time. This *ad hoc* character is the result of the nature of events. Events exchange attributes. Consider for example the exchange of resources between any pair of actors. The actual exchange of these resources requires at least one tie between these actors to facilitate the transaction. As soon as the transaction is completed, such an exchange relationship disappears. The

importance of events for social structures is therefore not directly related to the relationships these events form in the social structure of the policy network. Events do affect the social structure of a policy network in two important respects. Firstly, events change the distribution of attributes between the nodes embedded within a social structure. In the earlier example of resource exchange, the sending actor may have fewer resources, and the receiving actor more than before the event took place. Secondly, events can also affect the states of a social structure. In that same example, the receiving actor may change its perception of the sending actor's trustworthiness for the better (Coleman, 1986, 1988, 1990; Snijders et al., 2009).

The distinction between states and events as two types of relational variables in actor-based models of network dynamics translates to the definition of policy network structure elaborated upon in chapter 4. In a policy network, the ties between actors indicate the association between policy positions. If the policy positions of two actors have elements in common, a tie exists between these actors. The more similar the policy positions, the stronger the tie. Conversely, actors whose policy positions have only a few elements in common are connected by a weak tie. These relations contain social capital. Ties indicate that actors are mutually dependent for the production of a policy output. The stronger the tie, the more social control and social norms are present within this relation, and the more dependent two actors are upon each other. At the same time, such dyadic dependency reduces the extent to which the actors maintaining the tie depend on other actors in the policy network. The interdependency between two actors therefore provides these actors with social capital they can use to their advantage when interacting with others. The associations between actors' policy positions do not change spontaneously, but only if actors adjusts their policy positions. Such changes in policy position will only occur if attributes are exchanged. The exchange of attributes is a type I action that aims to change the structure of the policy network. The events in actor-based models of network dynamics are therefore the same as type I actions. The structure of a policy network thus consists of a set of composition variables and the states between them. Figure 2 displays the model of steering in policy networks.

Figure 2: Steering in Networks



This section has specified the variables upon which the process of steering in policy networks builds. The actor-based dynamic network model described here introduced two unknown, but related functions. The first function entails the degree to which the initial social structure of the policy network (defined as a set of composition variables and a set of states) provides opportunities and imposes constraints on the individual type I actions (events) of the actors embedded within its structure. The second function describes the degree to which such type I actions affect the social structure of the network over time, both in terms of the composition variables and in terms of the states. In summary, this section has introduced a causal model of the process of steering in policy networks. The initial social structure of the policy network can be considered the independent variable of the model. Type I actions are an intervening variable, influenced by the initial social structure of the policy network, while at the same time affecting the dependent variable. This dependent variable is the future social structure of the policy network. Figure 2 illustrated this model of steering in networks.

The model of steering in networks specified in this section has pointed towards the causal relations between the variables important in the process of steering in policy networks. This theory-based model of network dynamics will in the following sections form the framework for the formulation of hypotheses that will relate the structural characteristics of a current network structure to their likely future structural outcomes at different levels of analysis.

5.3 Ego-Network Dynamics

The previous section has introduced the two functions that describe the changes in the social structure of a policy network over time. The first of these interrelated but distinct functions describe the extent to which the social structure of a network affects the individual type I actions of the actors embedded within it. The second function captures the extent to which such type I actions affect the structure of a policy network over time. This model provides the the current section with a framework to theorise on the likely structural outcomes of policy networks with different initial structural characteristics.

As chapter 3 has illustrated, social network approaches distinguish between three distinct levels of analysis. The analysis of social structures can be performed at the level of an individual actor (ego), but also at an intermediate level and at the global network level (cf. Burt, 1980, 1982; Jansen, 2003; Wasserman & Faust, 1994). The level of the individual actor is important for the process of steering in networks because of the opportunities offered and constraints imposed by an actor's immediate surroundings on their type I actions. Such type I actions affect the future ego-network of the individual. The changing configuration of ego-networks also cause changes in the social structure at the intermediary level and the global network level. Furthermore, the changes in the social structure that are the result of type I actions affect the ego-networks of other actors in the network. The opportunities provided and constraints imposed by the social structure upon these alters are affected by the type I actions of ego. Such changes in the social structure of one actor's ego-network therefore also affect the type I actions of other actors over time. Subsequently, type I actions affect the policy network's structural outcome The three different levels of analysis are therefore not only important for the direct effects of type I actions, but also for the ramifications of type I actions throughout the social structure over time. The current section will focus on the ego-network level and include the ramifications of type I actions over time for higher level network structures. It focuses on the opportunities provided and constraints imposed by the social structure of the ego-network on individual actors. The section argues that tie strength is an important factor affecting the range of type I actions for an actor. This section first briefly summarises Granovetter's (1973, 1983) arguments, presented earlier in chapter 3,

concerning the significance of tie strength. Sections 5.4 and 5.5 respectively perform similar analyses for the intermediary level of analysis and the global network level respectively.

Granovetter's (1973, 1983) theory of the strength of ties builds on the intensity of relations between actors rather than on the characteristics of individual actors. Granovetter argues that strong ties between ego and alter suggest a close relationship (e.g. a friendship between the two actors) whereas weak ties indicate a far less intensive relationship (for example, acquaintances rather than friends). Granovetter's argument builds on the concept of homophily. The set of actors ego is connected to by strong ties are also very likely to be mutually socially involved. Such groups of socially involved actors are then likely to comprise a densely-knit part of the social structure. The actors that are part of these dense parts are not only largely structurally equivalent but also tend to show identical or very similar characteristics. This type of similarity, both in terms of their attributes and in terms of the relations these actors maintain with others, indicate homophily (cf. De Nooy et al., 2005; Granovetter, 1973, 1983; Knoke & Yang, 2008; Wasserman & Faust, 1994). Contrary to the strong ties that connect ego to some of its alters, the set of alters ego is connected to by weak ties are far less likely to be socially related to one another. The weak ties of a focal actor thus comprise a part of the social structure of an ego-network that is indicated by a lower density rather than a highly integrated group.

It is important to stress here that a distinction between two types of weak ties needs to be kept in mind. Some weak ties will be present within a cluster of otherwise densely-knit actors, whereas other weak ties will connect ego to a different part of the social network. The latter type of weak tie functions as a bridge, connecting parts of the ego-network that would otherwise not be connected. Granovetter (1973, 1983) argues that these bridging weak ties potentially are most valuable to ego. Bridging weak ties can provide ego with access to various attributes that are unavailable via its strong ties. Ego's strong ties can only provide this focal actor with attributes that are easily accessible within the densely-knit part of ego's ego-network structure because of the similarity between ego and these strongly connected alters.

Different types of ties thus affect the opportunities actors embedded within the social structure of a policy network have to steer in a network in different

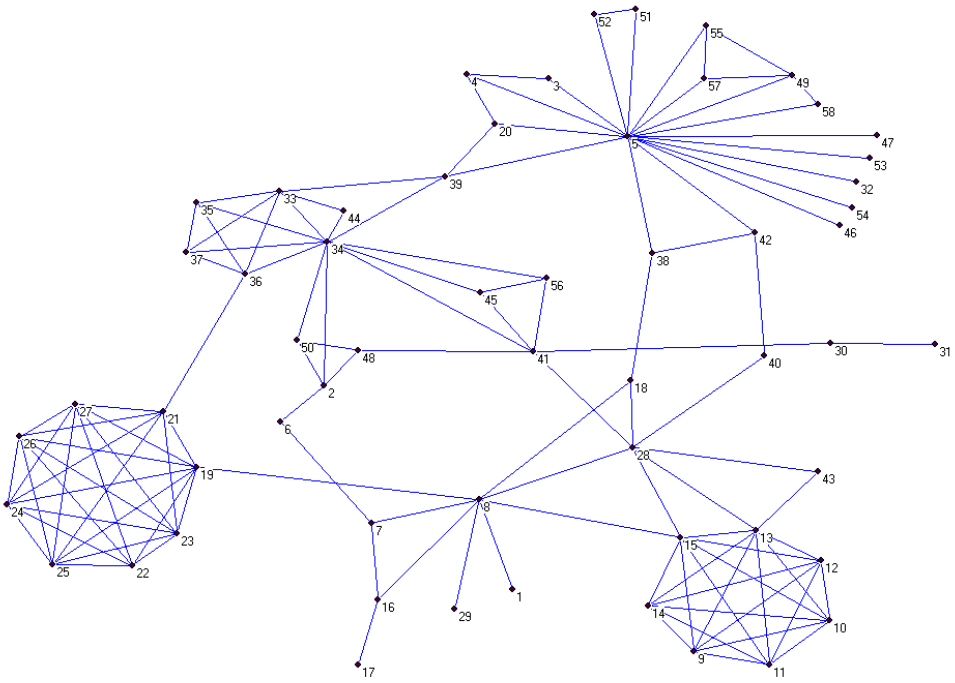
ways. In order to estimate the extent to which network structures provide opportunities and impose constraints on an individual actor (ego), this section will focus on the ego-network. An ego-network consists of the focal actor, ego, its direct relations to others, and the ties among these alters (a.o. Burt, 1980; De Nooy et al., 2005; Jansen, 2003; Knoke & Yang, 2008; Marsden, 1990; Turner, 2001; Wasserman & Faust, 1994). The ties that are present between ego and its alters can be strong or weak. Furthermore, weak ties can be either bridging or non-bridging weak ties. If ego has bridging weak ties to parts of the social structure of the policy network, these ties provide ego with opportunities to access attributes that would otherwise be unavailable. At the same time, strong ties can impose constraints on the range of type I actions of an actor. Strong ties might impose such constraints firstly, because of the strong social norms embedded within such ties, and second because of the high level of interdependence it indicates. Both forms of social capital limit deviant behaviour (Coleman, 1988, 1990; Granovetter, 1973, 1983). The stronger a tie between ego and alter, the more severe these constraints are. Strong ties can therefore be considered a constraint on ego's range of individual type I actions.

At the ego-network level of analysis, both the number of ties and the composition of ego's direct ties to its alters are important indicators of the extent to which a social structure of a policy network provides opportunities and imposes constraints on ego's type I actions. The number of ties ego maintains with others affects ego's opportunities to act. The composition of these direct ties affects the range of ego's type I actions. According to the theory of the strength of ties, actors that have dense ego-networks experience more constraints on their range of actions than actors whose ego-networks are sparser. More specifically, this implies that the degree centrality of ego (i.e. the measure of the number of direct ties ego maintains with others) is an important indicator for the extent to which actors' individual type I actions are affected by the social structure of the policy network (cf. Daly & Haahr, 2007; Macy, 1991, 1993; Marsden, 1990). Actors that have high degree centrality relative to others maintain relations with many alters in the social network. Therefore, the more central ego is in terms of degree, the more constraints are imposed on ego's range of actions. At the same time, high degree centrality does provide ego with many opportunities to act upon (Burt, 1980, 1982; De Nooy et al., 2005; Freeman, 1978; Wasserman & Faust, 1994).

The degree centrality of ego is an important indicator for the extent to which ego is embedded in a social structure relative to others. It does however not suffice to determine the opportunities provided and constraints imposed by the social structure of the policy network on both ego's range of possible type I actions, and ego's opportunities to act. As Granovetter (1973, 1983) has argued, the strength of ego's ties to others in the network is also important for both the range of feasible individual actions, and the opportunities such ties provide ego with to act upon. It is therefore necessary to determine ego's betweenness centrality. Betweenness centrality measures the extent to which ego lies on a path linking other nodes (a.o. Daly & Haahr, 2007; De Nooy et al., 2005; Freeman, 1978; Jansen, 2003; Marsden, 1990; Wasserman & Faust, 1994). Taking Granovetter's arguments on triadic closure into account, in an ego-network, betweenness centrality is therefore an indicator of the extent to which ego has control over the exchange of attributes between alters. Nodes with a high betweenness centrality relative to others embedded in the social structure of the policy network have the structural capacity to facilitate interactions between other nodes that it links. Nodes with a high betweenness centrality score therefore link parts of the social structure of a policy network that would otherwise not be connected. In Granovetter's (1973, 1983) terminology, a relatively high betweenness centrality score of a focal actor in its ego-network thus indicates that ego has bridging weak ties. Since weak ties impose less constraints on ego's range of feasible actions, but at the same time do provide ego with opportunities for action, betweenness centrality can therefore be considered an indicator of the nature of ego's ties to others in terms of their strength.

Degree centrality and betweenness centrality thus serve as indicators of the extent to which the ego-network structure affects ego's type I action. However, to hypothesise on structural outcomes, the extent to which type I actions are likely to affect the social structure of the ego-network need to be analysed as well. In other words, the question that needs to be answered is which structural characteristics of ego-networks are most likely to facilitate ego's attempts to steer in the policy network. The remainder of this section elaborates upon various actor constellations at the ego-network level of analysis, illustrated with examples of such ego-networks. These examples will be derived from the network structure displayed in figure 3.

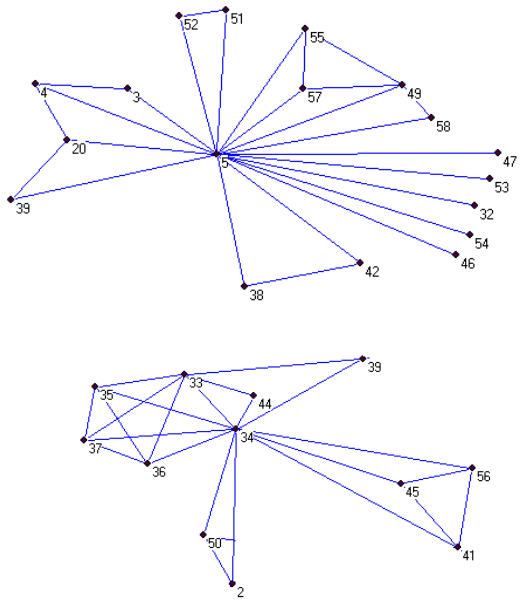
Figure 3: Global Network Structure



The network displayed in figure 3 consists of 58 nodes and 185 ties between these nodes. Within its structure several differently-structured parts can be identified. Degree centrality and betweenness centrality are important structural indicators at the level of the ego-network. These two measures of network structure indicate the extent to which a social structure affects ego's type I actions, both in terms of the number of opportunities ego has to act, and in terms of ego's range of feasible type I actions. Consider for example the ego-networks of node 5 and node 34 displayed in figure 4. Both focal actors have a high degree centrality compared to others in the social structure. Such a high degree centrality of the two actors indicates that that these actors have numerous relations to others. At the same time, these actors have a high betweenness centrality at the level of their ego-network, indicating that they form a crucial link between different parts of the social structure. Actors in such a linking structural position are often referred to

as brokers (cf. Burt, 1992; De Nooy et al., 2005; Jansen, 2003; Wasserman & Faust, 1994). These structural characteristics of the two actors' ego-networks have implications for their ability to steer in the network. In these cases, ego's attempts to affect the social structure of the policy network by its type I actions are most likely to have a significant effect on the social structure of its ego-network over time.

Figure 4: Ego-Networks with High Degree Centrality and High Betweenness Centrality

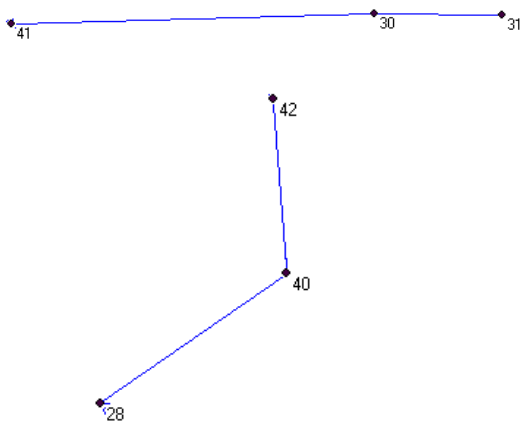


The high levels of degree centrality that characterise both ego-networks compared to the degree centrality of others in the network indicate that node 5 and node 34 are well embedded within the social network. Their numerous relations to others in the network structure provide both these actors with many opportunities to act upon. Furthermore, the comparatively high levels of betweenness centrality of these two actors in their ego-networks are important. These levels of betweenness centrality indicate that of the numerous direct ties these two focal actors maintain with others, many are bridging weak ties that connect otherwise not connected parts of the ego-networks' structures. Nodes 5 and 34 serve on several occasions as brokers between elements of the social

structure. Because the bridging ties are weak ties, they form potential channels through which those actors that maintain them can access attributes that are not available to them via their strong ties. At the same time, weak ties impose fewer constraints on the range of possible type I actions of actors than strong ties. These two factors facilitate the individual type I actions that aim to change the social structure of the policy network.

Different from the ego-networks displayed in figure 4, the immediate social structures surrounding nodes 30 and 40 are characterised by a relatively low degree centrality rather than a high degree centrality. These two nodes have only few connections to others in the social structure of the policy network. Maintaining only few ties with others in a social structure affects the number of opportunities these two actors have to attempt to steer in the network.

Figure 5: Ego-Networks with Low Degree Centrality and High Betweenness Centrality

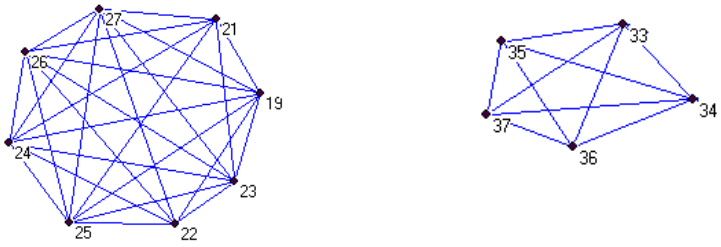


A low degree centrality at the ego-network level of analysis does not necessarily imply that an actor is not likely to affect its immediate surroundings via actions of type I. In the ego-networks of nodes 30 and 40 displayed in figure 5, the number of ties each of these actors maintains with others is very limited. In both cases these ties to their alters are nevertheless bridging weak ties in the ego-networks. The betweenness centrality of both node 30 and node 40 is therefore, given the number of relations these focal actors maintain with others the maximum possible. The ties these two actors maintain to others are less likely to limit their

range of type I actions because weak ties impose fewer constraints on actions than strong ties do. At the same time, these weak ties do offer the focal actors with potential access to resources other than those they possess themselves. In other words, although a low degree centrality limits the opportunities for an actor to act upon, the relatively high betweenness centrality increase the likelihood of successful type I actions. Nodes 30 and 40 therefore do have some opportunities to affect the social structure of the policy network over time. This implies that actors that are located further towards the periphery of a structure do have some opportunities to steer in the network (cf. Granovetter, 1973, pp. 1366-1367).

Type I actions are less likely to have a significant effect on the structure of an ego-network when ego is very central in terms of its degree, but at the same time has a low betweenness centrality score. If ego's degree centrality is high and its betweenness centrality is low, the focal actor is very dependent and strongly affected by the social norms and rules embedded in its strong ties to its alters. Such strong ties restrain ego's range of feasible actions. At the same time, the lack of weak ties limits ego's opportunities to acquire attributes other than those that are easily available to ego via its strong ties. Figure 6 illustrates this particular case with the display of the ego-networks of node 26 and node 35.

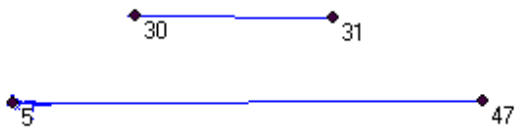
Figure 6: Ego-Networks with High Degree Centrality and Low Betweenness Centrality



The final scenario that is considered in this section is a case where the ego-network of a focal actor is characterised by both a low degree centrality and a low betweenness centrality. Actors that have both a comparatively low degree centrality and betweenness centrality in their ego-networks have very few ties to others in the social structure of a policy network. Furthermore, these actors are in a structural location in the network that does not allow them to control any flows

of attributes between their alters. Actors with both low degree centrality scores and low betweenness centrality scores are thus located at the boundary of a social network. Actors in such a structural location are the least likely ones to affect the social structure of a policy network via their individual type I actions. The ego-networks of both node 31 and node 47 illustrate such a case.

Figure 7: Ego-Networks with Low Degree Centrality and Low Betweenness Centrality



This section has illustrated that differently-structured ego-networks thus offer different opportunities to actors to act upon, both in terms of the number of opportunities to act and in terms of the range of possible type I actions. Such effects on type I actions also affect the extent to which actors are likely to be successful in their attempts to steer in a policy network. Degree centrality and betweenness centrality have been employed as indicators to assess the extent to which ego-networks affect type I actions, as well as the extent to which such attempts to steer in the policy network are likely to be successful. However, ego-networks only take the immediate surroundings of a focal actor into account. Such a focus on immediate surroundings implies that the analysis of ego-networks can only provide insights into the opportunities an actor has to steer in a network at a discrete point in time. As stipulated in section 5.2, actors are considered to change only one outgoing tie at any one point in time. This implies that 'tie changes are not coordinated, and depend upon each other only sequentially, via the changing configuration of the whole network' (Snijders et al., 2009, p. 5). The analysis of ego-networks can therefore only provide indicators of the likely changes in the social structure of a policy network between t_0 and t_1. Ego-network analysis cannot account for changes in these structures over a larger time interval. This limitation in terms of the longitudinal perspective, and the ramifications of type I actions over time for structural outcomes beyond an actor's

ego-network structure, do need to be taken into account. The next section therefore focuses on ego's ego-centred local network structures rather than its ego-network. Such an extension of the ego-network allows a more longitudinal perspective on the opportunities local structures provide to an individual, as well as the constraints it imposes for steering in the network.

5.4 Ego-Centred Local Network Dynamics

The analysis of ego-networks, as the previous section has illustrated, is an interesting approach for grasping the immediate surroundings of ego, and the extent to which such a focal actor is likely to be successful in its attempts to steer in the network between t_0 and t_1. Ego-network analysis is however constrained in terms of the amount of time elapsed that it can encapsulate. For policy network analysis, this limitation is rather important. The processes of steering in policy networks in which actors bargain over policy positions is likely to continue for several rounds in which actors interact, rather than as a one-round game.

In addition to the limitations regarding the time interval, other points of concern regarding ego-network analysis emerge from the literature. The utility of ego-network analysis has been discussed by many (a.o. Burt, 1992, 2000, 2004; Coleman, 1986, 1988, 1990; Granovetter, 1973, 1983; Jin, 1999; Marsden, 1990). One of the main points of criticism often voiced with respect to the analysis of ego-networks concerns the question to what extent actors are able to appreciate their surrounding social structures beyond the scope of their ego-networks. Some scholars have argued that actors are to some extent likely to be aware of their indirect relations to others (cf. Coleman, 1990; Granovetter, 1983; Mitchell, 1974). If actors are indeed aware of the social structures in which they are embedded beyond their immediate surroundings, ego-network analysis cannot fully capture the implications of social structure for action.

A third limitation of the exclusive focus on ego-network structures is that ego-networks only show the ties that are present between ego and its alters, and the ties among those alters. Although such ego-networks allow some insights in missing ties between alters, the structure of an ego-network cannot capture the extent to which ego lacks ties to important nodes in the social structure. Ego-

network analysis can therefore not point towards the opportunities an actor has to establish new ties. A related problem is that ego-networks cannot indicate the extent to which ego's bridging direct ties are actual bridges, or only local bridges that indicate just a shortest path, but not necessarily the only path between two of the focal actor's alters (Burt, 1992, 2000, 2004; Granovetter, 1973, 1983).

Ego-network analysis might therefore not provide the best picture of the opportunities provided *in toto* and the constraints imposed on ego's type I actions other than those between t_0 and t_1. Granovetter (1983), for example argues that it might be also be necessary to take into account indirect connections to other network actors alongside ego's direct ties to others. Such an extension of the ego-network might provide a better picture of the extent to which ego is able to manipulate its ego-centred local structures.

There are two possible ways an actor can reach others to whom it is not directly connected. One possible way is to utilise not only its own direct ties, but to employ also the direct ties ego's alters maintain with others in the network. Such an indirect path between two nodes is referred to as a geodesic distance, defined as the number of ties between two nodes in a shortest path connecting these two nodes (a.o. De Nooy et al., 2005; Wasserman & Faust, 1994). A second opportunity for ego to overcome the geodesic distance with other network actors is to establish new ties. Such new ties then bridge structural holes present in the social structure of its ego-centred local network (Burt, 1992, 2004). It might therefore be necessary to expand the focus of the structural analysis to allow for analysis of the the ego-centred local structures alongside the direct opportunities and constraints. Such an ego-centred local network structure is in fact the ego-network expanded by a geodesic distance of (n). This section now focuses on the extent to which such ego-centred local structures are likely to affect the type I actions of ego as well as the likely structural outcomes of such networks over time. It illustrates the ego-centred local structures with a path distance of (2). It should be equally be noted that expanding the ego-network to other path lengths might be equally suitable for studying ego-centred local network structures. The appropriate path length is an empirical question rather than a theoretical question, and for this section the maximum path distance of (2) is chosen rather arbitrarily because it only serves an illustrative purpose. Before going into these

ego-centred local network structures, the concept of path distance is briefly introduced because it forms a crucial concept in the analysis presented below.

Path distance is a concept that focuses on the shortest way for a focal actor, ego, to reach another actor. Path distance is therefore a property of a pair of nodes. According to Wasserman and Faust (1994, p. 107), 'if there is a path between nodes n_i and n_j, then n_i and n_j are said to be reachable'. Paths are important for steering in networks because they form channels through which attributes can flow from ego to other actors in the social structure of the policy network beyond ego's alters. Paths thus provide ego with opportunities to exchange attributes with those actors to which ego is not directly connected. However, paths depend on intermediary nodes. The more intermediary nodes on a path between two actors, the longer the exchange process takes, and the more likely it is that a certain amount of distortion emerges (Granovetter, 1973, 1978, 1983; Wasserman & Faust, 1994). Due to this distortion, a path between two actors is only likely to be a factor in the process of steering in networks if its distance does not exceed a certain length. In other words, paths are important for information diffusion in a social structure, but their utility depends strongly on the length of the path.

Alongside the distortion likely to occur when actors attempt to reach those actors to which they are not directly connected, a second problem arises in this context. It is rather unlikely that ego can appreciate the global social structure of a policy network to such an extent that ego is aware of all possible paths to others embedded within the global network's social structure. Empirical research has shown that individual's capacity to comprehend all possible paths to others is limited (Cook & Whitmeyer, 1992; Katz et al., 2004). This implies that in order to map ego-centred local structures, ego-networks can only be extended to a maximum geodesic distance of (n). Although longer paths might be present in the global social structure of the network, such paths have no value for ego due to their length.

So far, this section has extended the ego-network to an ego-centred local network structure in which all actors connected to ego via a path (with a maximum length of (2)) are included. The question that remains to be answered before such ego-centred local network structures can be analysed is which structural indicators are suitable for studying such extended ego-networks.

Centrality measures remain important indicators of the extent to which the social structures of the ego-centred local network structure affect the type I actions of actors. Degree centrality and betweenness centrality are also important indicators for ego-centred local network structures for both the number of opportunities available to ego to act upon, and its range of feasible type I actions.

Degree centrality in an ego-centred local network analysis does not differ from degree centrality in the analysis of an ego-network. Degree centrality is a measure based on direct ties. When an ego-network is extended to include those actors to whom ego is connected via a path longer than (*1*) - as is the case in an ego-centred local network structure - this extension does not affect ego's degree centrality. The number of direct ties ego maintains with others in the network remains the same. Despite the fact that compared to ego-network analysis, degree centrality does not add much information in the analysis of extended ego-networks, it nonetheless remains an important indicator for ego's opportunities to steer in the network. This is the case because the ego-network remains the core of the ego-centred local network structure.

Betweenness centrality indicates the composition of ego's direct ties in terms of their strength. However, in an ego-centred local network structure, betweenness centrality is also an indicator of ego's opportunities to act as a broker or local bridge. Granovetter (1973, 1983) argues that in larger networks, weak ties are less likely to be the only path to different parts of a social network's structure, but might nevertheless serve as a local bridge. For an individual actor Granovetter's argument implies that if such an ego has a high betweenness centrality in its ego-centred local network structure, ego is an intermediary in many of the shortest paths between two nodes. A high betweenness centrality therefore provides ego with opportunities to control the exchange of attributes between the nodes indirectly connected through ego in the ego-centred local structure. Furthermore, betweenness centrality remains an indicator of the composition of ego's ties to others in terms of their strength.

The inclusion of actors to whom ego is not directly connected but only indirectly via a path distance of (*n*), makes a third centrality measure an important indicator for the extent to which ego-centred local structures affect ego's ability to steer in the network. Closeness centrality indicates how close ego is located to the other actors in the ego-centred local network structure. Closeness

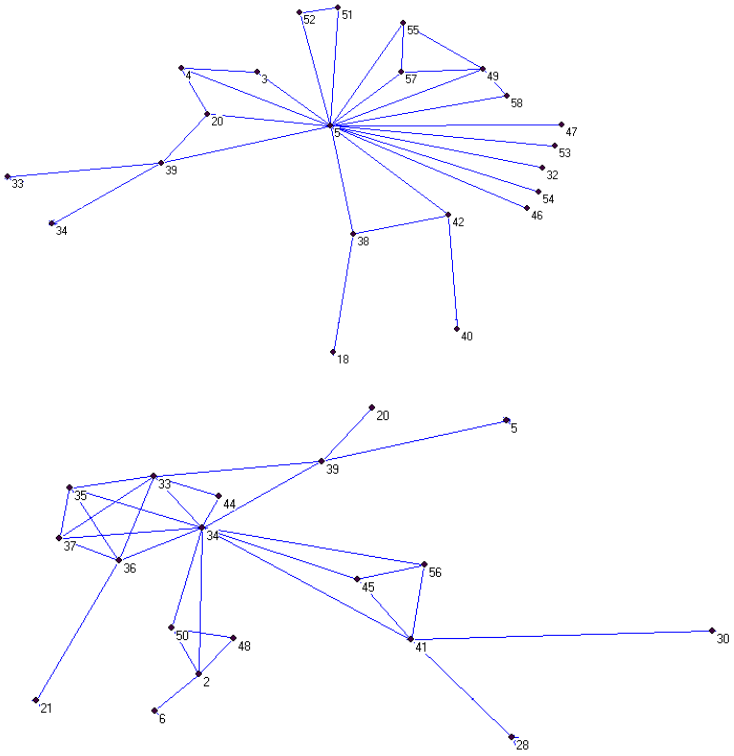
centrality has not been included previously because it is as a measure meaningless in ego-network analysis. Ego-networks only take into account those actors ego is directly connected to. Closeness centrality in an ego-network therefore always has a value of (*1*) (a.o. Daly & Haahr, 2007; Freeman, 1978; Wasserman & Faust, 1994). In an ego-centred local network structure including actors to which ego is not directly connected, closeness centrality does become an important indicator for the opportunities the ego-centred local structure provides ego with to act upon. In other words, closeness centrality measures how quickly an actor can interact with others (Jansen, 2003; Wasserman & Faust, 1994). Closeness centrality can therefore be regarded an indicator of the extent to which ego is able to manipulate its ego-centred local structure, and access attributes other than those of the alters over a period of time t_0-t_n, where (*n*) equals the geodesic distance.

Consider the case that ego has a high degree centrality, and a high betweenness centrality in its ego-centred local network structure. These structural characteristics, as elaborated upon in the previous section, provide ego with excellent opportunities to manipulate the social structure of its ego-network via type I actions. If ego additionally has a high closeness centrality, ego can reach many actors in the social structure, despite the absence of direct ties between ego and these others. Ego can in such a case quickly interact with both the immediate surroundings and those actors to which ego is only indirectly connected via its alters. The combination of a high betweenness centrality and a high closeness centrality indicates a local structure rich in structural holes, which offer opportunities to ego. Structural holes are potentially beneficial to ego for three reasons. firstly, ties that bridge structural holes can provide ego with additional non-redundant social capital (cf. Burt, 1992, 2000, 2004). Secondly, the establishment of such ties improves ego's structural location in the global network structure. And finally, it reduces the extent to which ego depends on the actions of those network actors to which it is not directly connected. Ego's type I actions are therefore very likely to affect the ego-centred local structure. Alternatively, if ego has high degree centrality and betweenness centrality, but a low closeness centrality, ego's weak ties predominantly connect it to peripheral actors with few, if any, ties to others. The potential indirect access to attributes is

therefore severely hampered, as well as ego's opportunities to manipulate the social structure of a policy network beyond its immediate surroundings.

Figure 8 illustrates the cases described above with the ego-centred local structure of nodes 5 and 34. Both nodes 5 and 34 have an ego-network structure that is rich in ties, indicated by a high degree centrality. Both actors also act within that ego-network structure as an intermediary between actors on many occasions because of their high betweenness centrality. However, the ego-centred local structures of these actors are rather different. Node 5 has a closeness centrality that is much lower than node 34. Node 5 can only reach a few additional actors in its local network structure. This indicates that the actors to whom ego is directly connected have only few ties to other actors. The ego-centred local network structure of node 5 is thus located near the boundary of the social structure of the policy network. This conclusion is also visible in the network displayed in figure 3. Unlike node 5, the ego-centred local network structure of node 34 connects this actor indirectly to many actors embedded in other parts of the social structure. This implies that, unlike node 5, node 34 can in the time period t_0-t_2 reach a substantial part of the social structure of the network. In the example illustrated by figure 8, node 34 is therefore in a better position to affect the social structures of the network beyond its immediate surroundings. In other words, node 34 is more likely to be successful in its attempts to steer in the network than node 5.

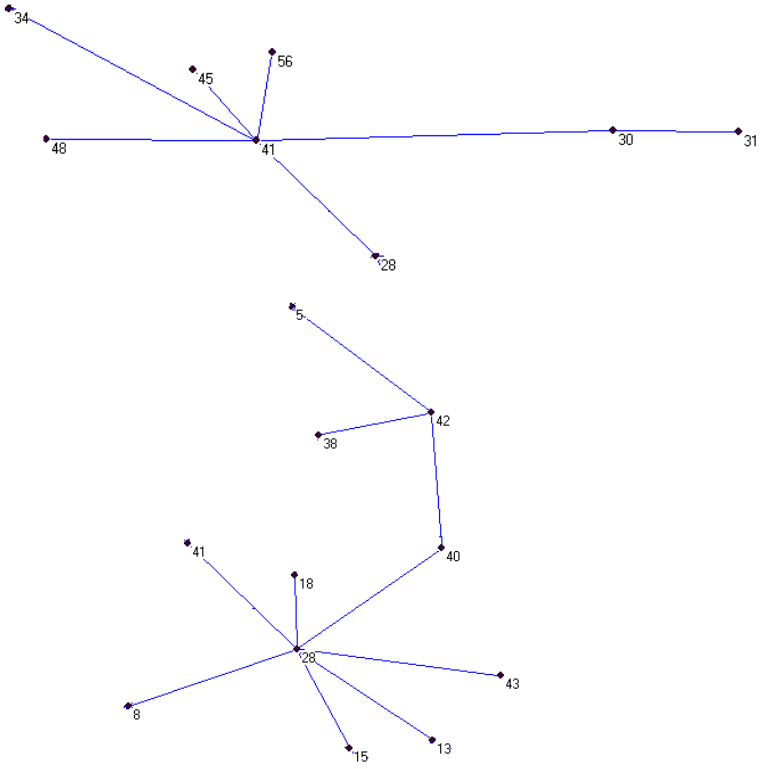
Figure 8: Ego-Centred Local Network Structures of Nodes 5 and 34 (path distance =2)



If ego has few direct ties to others (indicated by a low degree centrality), but at the same time connects its alters via weak ties (indicated by a relatively high betweenness centrality), a high closeness centrality indicates many opportunities for ego to act upon. In figure 9, node 40 illustrates this particular case. The relatively high closeness centrality indicates that ego is located near many structural holes in the social structure of the network. In this particular case, the relatively low density of the ego-centred local structure of node 40 indicates that these structural holes are non-redundant. Bridging such structural holes over time could therefore prove beneficiary to node 40, because this focal actor can gain in social capital via the establishment of such new ties. The relatively high number of actors ego can reach over time therefore provide node 40 with opportunities to affect its surrounding social structures. Conversely, if the closeness centrality of an actor with few, mostly weak, ties is low, ego's weak ties connect it to actors at the margins of the social structure rather than to actors at

the core. A low closeness centrality in addition to a low degree centrality thus indicates that the type I actions of an actor are far less likely to affect the social structures of the policy network. This particular case is illustrated by the ego-centred local structure of node 30.

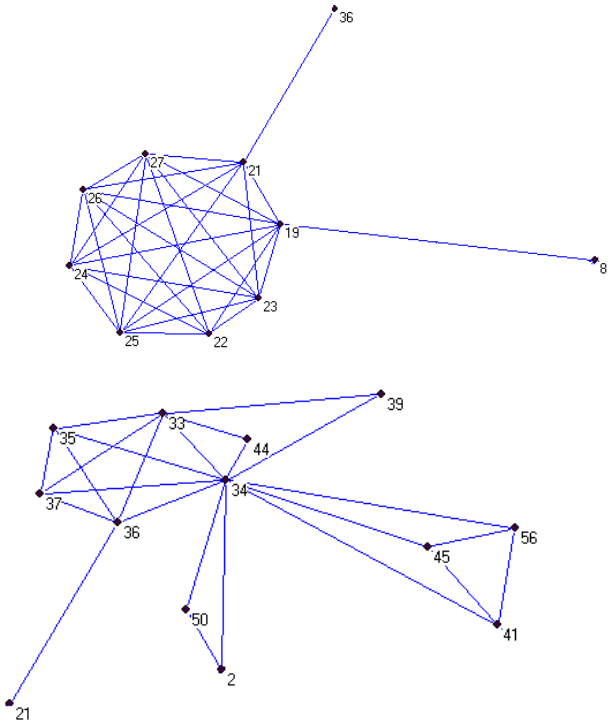
Figure 9: Ego-Centred Local Network Structures of Nodes 30 and 40 (path distance = 2)



Now consider an ego with a high degree centrality, but low betweenness centrality. It was argued in the previous section that these centrality scores limit an actor's possibilities to significantly manipulate its ego-network structure. These limitations are the result of the extensive social control ego experiences across its range of type I actions. Furthermore, ego is very dependent upon its alters because its ties are strong rather than weak. If ego's closeness centrality is high in this particular case, this indicates that structural holes are present in the otherwise relatively densely-knit ego-centred local structure. These structural holes are nevertheless unlikely to provide ego with many opportunities to gain

attributes and social capital when it attempts to bridge these structural holes. Structural holes in otherwise densely-knit social structures can only provide individual actors with redundant social capital (cf. Burt, 2004). Social capital is considered redundant if similar social resources are already available to ego through many channels. The efforts of an individual to steer in its ego-centred local network structure are therefore not very likely to have a significant effect on these social structures. If, however, an actor with a high degree centrality and low betweenness centrality in its ego-network has a low closeness centrality score in its ego-centred local network structure, its type I actions are even less likely to affect the social structure of the network. In such a case, ego is located at the core of a densely-knit cluster of actors and his attempts to steer in the network are even more unlikely to be successful. Figure 10 illustrates these cases for nodes 26 (low closeness centrality) and 35 (high closeness centrality).

Figure 10: Ego-Centred Local Network Structures of Nodes 26 and 35 (path distance = 2)

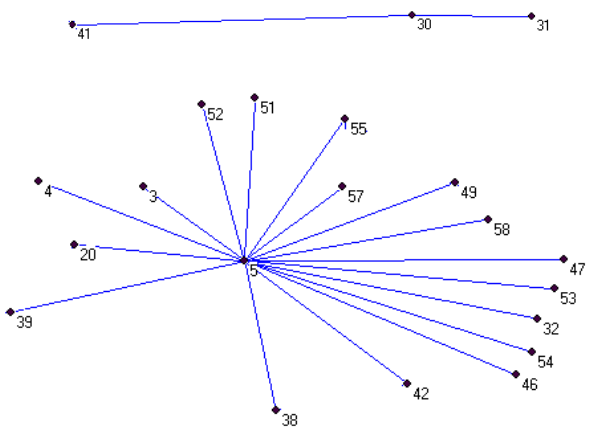


Actors that have both a low degree centrality and a low betweenness centrality in their ego-networks are located at the boundaries of the policy network's social

structure. Nodes 31 and 47 illustrate these particular cases. Section 5.3 argued that these actors were very unlikely to affect the social structure of the policy network via their type I actions because of their structural location. When the ego-network is expanded to the ego-centred local structure, this initial conclusion regarding both the opportunities and the likely success of these nodes' attempts to steer in the network structure do not change. Steering in the ego-centred local network structure depends heavily on the immediate surroundings of the focal actor ego. Those actors whose ego-network structure is not likely to facilitate ego's type I actions are therefore also unlikely to succeed in the ego-centred local structure in their attempts to steer in the social structure of the policy network. However, different levels of closeness centrality do point to some opportunities for actors located near the edges of a social structure.

Figure 11 illustrates the difference in ego-centred local network structures for nodes 31 and 47. These ego-centred local networks of the two nodes are structured very differently. Node 31 can reach only one additional actor when the ego-network is expanded to include also those actors that ego is connected to with a path length of (2). Node 31 is not only located at the boundary of the policy network's social structure, but its one direct tie connects this actor to an alter that also maintains very few ties. Node 31's structural location thus severely hampers both its opportunities to act and the range of feasible type I actions. Node 31 is therefore located at the periphery of the network and unlikely to affect the social structure of the policy network via its type I actions. The situation for node 47 is somewhat different. Despite the fact that also this node is located near the boundaries of the social structure, its closeness centrality to others in the network is relatively high. This implies that, despite the actor's dependency on node 5 as an intermediary, node 47 does have opportunities to interact with a variety of other network actors over a time period on t_0-t_2. The ego-centred local structure of node 47 is rich in structural holes whose bridging could prove beneficial. Node 47's type I actions are only likely to change the ego-centred local network's social structure if the broker allows such attempts to steer in the network. Therefore, node 47 is only slightly more likely to change the social structures of the policy network over time via its type I actions than node 31.

Figure 11: Ego-Centred Local Network Structures of Nodes 31 and 47 (path distance = 2)



This section has argued that the likelihood of successful steering in networks depends on the structural location of an individual focal actor. The centrality of an actor in his ego-centred local network structure is very important for the ability of ego to successfully steer in the network. This section argued that the likely changes in the ego-centred local structures of the network can be assessed based on centrality measures, which indicate an actor's embeddedness in the social structure of a policy network,. However, the likely changes in these local configurations do not indicate how the global structural characteristics of a policy network change over time. The type I actions of each individual actor embedded in the network might affect the network's social structure beyond ego-centred local network structures. To capture the full process of steering in networks from the global network level rather than from the level of individual actors embedded within its structure requires an analytical focus on the global structure of the network. Therefore, the next section will elaborate upon what the various centrality scores of different individuals imply for the structural outcomes of a policy network over time.

5.5 Network Structure and Steering in Networks

The inclusion of actors beyond ego's immediate surroundings in the previous section has provides additional indicators to theorise on the extent to which an actor is able to steer in a network. Despite the usefulness of focussing upon an individual to assess the extent to which differently-structured ego-networks and ego-centred local networks affect the type I actions of actors, such an analysis is insufficient for hypothesising on the structural outcomes of the process of steering in networks at the global network level. This section develops a set of hypotheses on the extent to which global network structures are affected by type I actions.

The current section builds upon one important assumption. It is assumed that individual actors are unlikely to have a clear overview of the social structure of a policy network at the global level. The actors embedded within a policy network's social structure are considered to be aware of their immediate surroundings as well as a limited part of the social structure beyond their ego-network (the ego-centred local network structure). It is important to reiterate that actors' type I actions have been considered a function of the network structure at t_0. At this point it is necessary to further specify this assumption. Actors are only aware of their ego-centred local network structures rather than of the social structure of the global network. This limited awareness of the network structure affects actors' decision-making process as far as the type I actions which are possible. Ego's type I actions are therefore a function of its ego-centred local network structure rather than of the global network structure.

Although the global network structure does not affect type I actions, these type I actions do affect the global social structure of the policy network. Initially, the structural characteristics of the global network change due to changes in local configurations. Over time, these changes affect the perceptions of other actors' ego-centred local structures. Such changes in local configurations affect these actors' ability to steer in the network. Some of the changes that result from type I actions will be merely local shifts that do not affect the global structural characteristics very much. A redistribution of attributes from one actor to another, for example, might be important for that part of the network structure in which these actors are embedded, but is unlikely to affect the global structural

characteristics of the policy network. Other type I actions might nevertheless result in significant changes in the global configuration of the policy network's social structure. It is the establishment of new ties which affects the global social structure of the policy network most profoundly. More specifically, new ties that bridge previously-existing structural holes in the global network structure affect the global configuration of the policy networks' social structure. In order to hypothesise on the likely structural outcomes at the global network level, it is therefore necessary to analyse how actors with different ego-centred local structures are embedded within the global social structure of the policy network.

The embeddedness of the ego-centred local structure of an actor in the global network structure is important to the extent to which the type I actions of ego are likely to affect the global network structure beyond the changing configuration of these ego-centred local structures. In order to hypothesise on the structural outcomes of the process of steering in networks at the global level, indicators of network structure at this global network level are needed. This section focuses on two characteristics of the global social structure of the network. Firstly, the extent to which the global network structure is socially cohesive affects the extent to which initial structures are likely to change due to the attempts to steer in the network of individual actors. The second characteristic of network structure that will be used to determine the extent to which the global network structure is likely to change is the extent to which this global network structure is centralised.

Before the concept of social cohesion is employed to theorise on the extent to which global network structures are likely to change due to the process of steering in networks, it is important to repeat two of the model's assumptions. Firstly, actors act purposively and rationally within the opportunities provided to them and the constraints imposed upon them by the ego-centred local network structures within which they are embedded. Actors attempt to maximise their expected utility in their choices for particular type I actions. And secondly, between t_0 and t_1, an actor can only change one outgoing tie, indicating that type I actions are both individual and sequential (cf. Heidler, 2008; Snijders, 2009; Snijders et al., 2009; Steglich et al., 2006).

To determine the extent to which a network is socially cohesive, two indicators are taken into account. Network density is a measure of social cohesion that indicates the proportion of ties present in a network, relative to the number of ties

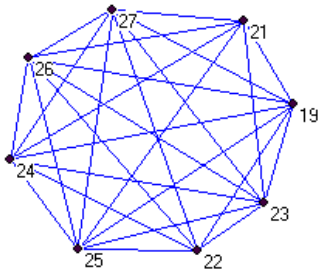
possible (Burt, 1980; De Nooy et al., 2005; Freeman, 1978; Jansen, 2003; Knoke & Yang, 2008; Marsden, 1990; Turner, 2001; Wasserman & Faust, 1994). The more ties present in a network, the denser its structure and the more cohesive its social structure are considered to be. Network transitivity is a property that measures the social cohesion of a global network structure via network closure. Transitivity indicates the extent to which 'a friend of a friend is a friend' (Wasserman & Faust, 1994, p. 150). When transitivity is combined with Granovetter's (1973, 1983) perspective on strong and weak ties, triadic closure thus indicates strong ties between the nodes. Conversely, a lack of transitivity indicates the presence of at least local bridges, or in Burt's (1992, 2000, 2004) words, the presence of a structural hole.

When global network structures are characterised by a high density and high levels of transitivity, the social structure of the network can be considered socially cohesive. Socially cohesive networks severely limit the extent to which type I actions are likely to occur, as well as the extent to which such actions are likely to affect the social structures of the policy network. Consider for example a fully connected network as illustrated in figure 12.[1] In a fully connected network structure, each actor has ties to all others, which means that the actors are structurally equivalent. Based on the arguments that Granovetter (1973, 1983) has presented, these networks are very homogenous. The actors are strongly embedded within their ego-centred local structures (which in the case of a fully connected network coincide with the global structure) and experience many constraints on their range of possible type I actions. Due to the homogenous character of this particular type of global network structure, there is no incentive for individual actors to employ attributes for type I actions. The fact that these actors are all connected by strong ties implies that they already have the same policy positions. Steering in networks is therefore redundant in this particular case. When the social structures of policy networks are socially cohesive to such an extent, their structures are therefore unlikely to change as a result of type I

[1] The networks used for illustration in this section are excerpts from the network presented in figure 3. For the clarification of the arguments presented here, they are in this section treated as global networks.

actions. Socially cohesive networks therefore present few if any opportunities to steer in the global network.

Figure 12: Network Characterised by High Density and High Transitivity

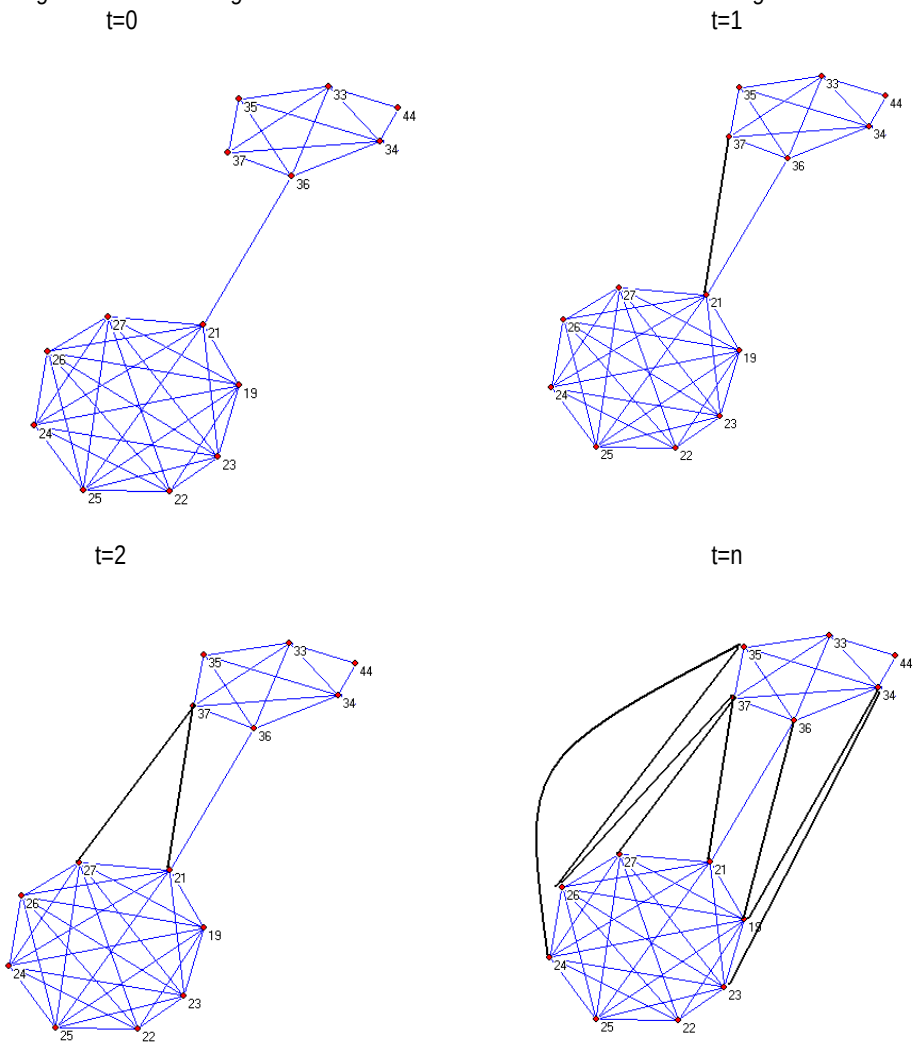


In the case of a global network structure that is characterised by a lower density, but at the same time is quite transitive, the global network structure could be characterised as cohesive locally but fragmented globally. Within the global social structure of such a network cohesive, subgroups can be identified that are relatively dense. At the same time, such cohesive subgroups contain relatively few actors with ties to other parts of the network structure. These ties to other parts are therefore bridging ties. In such a case, the network contains some structural holes, but these holes can only be bridged by a few actors over time. More specifically, only those actors that are central in their ego-centred local network structures in terms of their betweenness and closeness centrality can profit from bridging a structural hole. This implies that only those actors whose ego-centred local structures display these structural characteristics are likely to have a significant effect on the global network structure. Once a structural hole that contains non-redundant social capital is bridged, others in the network will be located near a newly emerging structural hole that is beneficial to bridge. This process continues throughout time, but the denser and more transitive the network becomes, the less the amount of non-redundant social capital to be gained by bridging these structural holes.

Consider the network displayed in figure 13 in t_0, t_1, t_2, and t_n. The network clearly displays two different cohesive subgroups at t_0. Nodes 21 and 36 are in the initial structure those that are in the best position to steer in the network. Both are adjacent to a variety of structural holes. However, the bridging of one of these

structural holes by either of these two actors affects their future opportunities to steer in the network. Each additional structural hole bridged by these actors will benefit them less than did bridging the preceding hole. For other actors in the global structure, the situation is different. Due to the establishment of a tie between nodes 21 and 37, these other actors have more opportunities to exchange attributes and are less dependent upon the two nodes that previously performed the role of brokers. Over time, the benefits of bridging additional structural holes also diminishes for these actors. Others will then experience incentives to establish new ties, a process continuing throughout time. The denser and the more transitive the global structure becomes, the fewer structural holes emerge that can beneficially be bridged. As soon as the network becomes globally cohesive rather than locally cohesive, structural holes only provide redundant social capital already available to actors via many channels. Bridging any remaining structural holes is from that point onward redundant. Until that time however, utility-maximising individuals will bridge the structural holes. Therefore, over time, local cohesion in parallel with global fragmentation is likely to result in global cohesion. It is important at this stage to bear in mind one important aspect of the initial network structure. At t_0 such global network structures provide only very few actors with opportunities to steer in the network. The structural outcome of such a network therefore depends heavily on their type I actions.

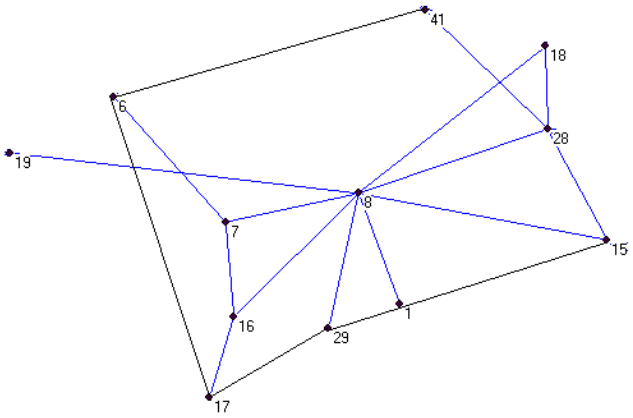
Figure 13: Overall Fragmented Initial Global Network Structure and its Changes Over Time



A global network structure that has many ties, but contains relatively few triads, contains many structural holes. The relatively high density, but lack of triadic closure, in such a social structure nevertheless implies that many of these structural holes can only provide individual actors with redundant social capital: the social capital which those actors can access by bridging the structural holes is already available via many other channels. Furthermore, bridging such a structural hole does not decrease an actor's dependency on actors to which it is

not directly connected. Those actors located near a non-redundant structural hole have the best position to steer in this particular global network structure. The few structural holes that provide non-redundant social capital will rapidly be bridged. The global network structure will therefore become both denser and more transitive relatively quickly. Policy networks whose social structures are characterised by a high density but a lack of triadic closure will become socially cohesive relatively quickly due to the process of steering in networks. Figure 14 illustrates such an initial network structure.

Figure 14: Initial Network Structure Rich in Redundant Structural Holes



The final network structure here requiring elaboration is a global network that can be characterised as both sparse and intransitive. The absence of triadic closure indicates that the majority of the ties present between pairs of actors are weak. The most extreme cases of such networks are represented by the circle network and the line network (cf. Jansen, 2003; Wasserman & Faust, 1994). The lack of triads in the social structure of the network also indicates the presence of structural holes. Different from the previously discussed dense, intransitive network structures, the sparseness of the network structure discussed here indicates that bridging these structural holes is potentially beneficial to the actors adjacent to it. The establishment of a new tie provides an actor with access to attributes that would otherwise not easily be accessible. The emergence of such new ties affects the global network structure. The social structure of such a policy network tends to get both denser and more transitive over time. However, the

initial social structure's sparseness and intransitivity also indicate that there are many, different actors embedded within the network, i.e. that network is very heterogeneous. Such heterogeneity might make the establishment of new ties between any pair of nodes rather challenging. The process of steering in networks in these social structures is therefore likely to take a great deal of time. Nonetheless, the structure gives individual actors incentives to employ their attributes in an attempt to establish new ties. The likely structural outcome over time of networks that are initially characterised as both sparse and intransitive is therefore an increased level of social cohesion.

Regardless of their initial structure, networks thus tend to become both denser and more transitive over time. The main difference between these social structures and their structural evolution is found in the amount of time that it takes before such a structural outcome is reached. The phenomenon that social structures tend to get both denser and more transitive over time is also found in empirical studies of social networks. Granovetter (1973, 1983) and Coleman (1988, 1990), amongst others, have shown that regardless of the initial structures of a network, a tendency towards increasing levels of network density and network transitivity appears to be a likely structural outcome over time (cf. Gould, 1993; Katz et al., 2004). The amount of time that elapses is an important variable, as chapter 7 will show. However, the remaining conclusion, namely that regardless of the initial levels of density and transitivity of a policy network's social structure, the process of steering in networks results in a structural outcome which can be characterised as socially cohesive, suffices for the purpose of the current chapter. Therefore, the first hypothesis formulated here is:

1. Over time, network structures are likely to become more socially cohesive due to the process of steering in networks.

The process of steering in networks results in increasingly socially cohesive network structures. Social cohesion is an indicator of network structure that is useful to characterise networks at the global level, but it is not enough to differentiate between the effects of the type I actions of individual actors located in differently-structured parts of the network. A second indicator of the global network structure is necessary in order to formulate hypotheses on the likely

structural outcomes of the process of steering in networks. This section therefore introduces degree centralisation as an additional indicator of the global network structure's characteristics. Degree centralisation is defined as 'the variation in the degrees of vertices divided by the maximum degree variation which is possible in a network of the same size' (De Nooy et al., 2005, p. 126). Networks in which the degree centrality scores of its nodes vary significantly are therefore more centralised. Whereas the centrality measures discussed in previous sections indicate the extent to which an individual actor is central, centralisation indicates the extent to which the structure of a global network is centralised. Centralisation measures are therefore an indicator of the extent to which a network structure is stratified.

Consider a highly centralised network in which the variation of the centrality scores of its actors is significant. These network structures have a clear core and periphery. This implies that some actors are very central in their ego-centred local network structures. The analysis presented in section 5.4 established that central actors are more likely to affect their ego-centred local network structures. Paradoxically, in a highly centralised network, the type I actions of central actors could have a less significant effect on global network structure. Central actors in centralised social structures have excellent opportunities to manipulate their ego-centred local network structures. However, these actors are already central and have many ties to others. Central actors in centralised networks therefore have relatively few opportunities to establish new ties.

Actors that are less central do have these opportunities. These actors are adjacent to structural holes which can beneficially be bridged. Over time, it is the structural-hole bridging ties that are formed by actors that are the ones that most affect the global social structure. Tie formation increases the network structure's degree of social cohesion. Furthermore, the bridging of structural holes increases an individual actor's centrality. The establishment of new ties by initially less-central actors additionally affects the global social structure of the policy network. Tie formation by less central actors decreases the extent to which the global network structure is centralised. The degree centralisation of a global network structure is a property based upon the variation in the degrees of vertices. The formation of new ties by less central actors decreases this variation in degrees between the core and the periphery. The type I actions of the less central actors

are therefore most likely to significantly affect the global social structures of a policy network. Therefore:

2. Over time, centralised network structures are likely to become more decentralised due to the process of steering in networks.

Now consider a global network structure that is not particularly centralised and which does not have a clear core. In such a global policy network structure, the variation of individual actors' centrality scores is limited. In these decentralised social structures, many actors have opportunities to establish new ties to others in the network. The formation of such new ties by actors embedded within the network structure increases the individual centrality of these actors. An increase in the individual centrality of some of the network members affects the overall degree of centralisation of the global network structure. When some actors become more central relative to others, the variation in centrality scores of the global network structure increases. This increase in the variation of the centrality scores of the actors embedded in the social structure of the network implies that the network becomes more centralised. Therefore:

3. Over time, decentralised network structures are likely to become more centralised due the process of steering in networks.

Despite differences in initial structures, the social structures of a policy network will thus develop over time as relatively flat structures. Global networks whose social structures are initially centralised will develop relatively quickly into relatively flat and socially cohesive structures. The reason for this structural outcome is that the initial social structure provides an incentive to those actors that are only moderately central in their ego-centred local structures to establish new ties. Global structures that are initially best characterised as decentralised will first develop into more centralised structures due to the type I actions of its actors. As soon as the social structure of the global network reaches a certain degree of centralisation, actors that are less central in their ego-centred local network structures have an incentive to bridge their adjacent structural holes. Once bridged, the variation in centrality scores of individual actors diminishes,

this decrease implying that the global network's social structure becomes less centralised. These processes may continue until the global network structure has reached a degree of social cohesion (indicated by both its density and its transitivity) in which the establishment of new ties becomes impossible, because the network is fully connected, or becomes redundant, as the remaining structural holes can only provide ego with additional social capital already available via many other channels. Therefore:

4. Over time, network structures are likely to become more socially cohesive and decentralised due to the process of steering in networks.

Actors' individual type I actions that aim to change the social structures of a network might therefore affect social structures beyond individuals' ego-centred local structures. Although individual actors base their decisions to act upon their perception of their ego-centred local network structures, such type I actions might affect network structures beyond this ego-centred local level. It was argued that the global structural characteristics of networks are affected by the establishment of new ties over time that connect ego to a different part of the network's structure.

The extent to which an actor is likely to be successful in attempts to steer in the network depends on its structural location and its surrounding global social structure. The structural outcomes of the process of steering in networks over time depend not just on the type I actions of one actor, but on the type I actions taken by all network actors. This section has focused on various initial global structural characteristics of policy networks. The social structures of policy networks tend to get both denser and more transitive over time. This increase in social cohesion is a result of the formation of new ties. Structural holes in social structures provide adjacent actors adjacent with an incentive to bridge these holes. The section argued that despite differences in the initial structural characteristics of networks, the process of steering in networks has a rather similar structural outcome for each of the different network structures analysed. A second conclusion from this section is that the structural outcome of the process of steering in networks over time is rather similar despite the differences in the initial global network structures. Global network structures tend to become

decentralised as a result of the process of steering in networks rather than centralised, regardless of the initial degree of network centralisation. Different initial global network structures may require varying amounts of time to converge on otherwise similar outcomes. Global network structures initially characterised as rather loose, intransitive and decentralised, will take a longer time to reach the same level of social cohesion and decentralisation than initially socially cohesive or centralised global social structures. In other words, the process of steering in networks could lead eventually to similar structural outcomes independent of initial global structural characteristics, but these structural outcomes will be reached in different amounts of time.

5.6 Concluding Remarks

This chapter has specified the process of steering in networks. It has introduced an actor-based model of network dynamics. This model has been employed to theorise around the structural outcomes of the process of steering in networks. Section 5.2 argued that the changes in the social structure of a policy network are the result of the type I actions of actors embedded within this structure. Based on the main assumptions forming the point of departure of actor-based models of network dynamics, the section specified the dynamics of network structures. It argued that the process of steering in networks builds on two distinct, but related, functions. The first of these functions describes the extent to which type I actions are affected by the initial network structure. The second function captures the extent to which these individual network actors' type I actions affect the policy network's social structure over time. Section 5.2 concluded that despite its potential as an analytical tool to capture the dynamics of policy networks the model does not predict the structural outcomes of these bargaining processes *ex ante*.

In order to develop hypotheses on the structural outcomes of the process of steering in networks over time, section 5.3 focused on differently-structured ego-networks. The section argued that these ego-network structures initially provide opportunities and impose constraints on the focal actor's type I actions. At the same time, the structure of such an ego-network provides indicators of the extent

to which ego's immediate surroundings are likely to change as a result of ego's type I actions. Section 5.3 based its analysis of different ego-network structures on two important indicators of ego's embeddedness in its immediate surroundings. The degree centrality (i.e. the number of ties ego has to its alters) and the betweenness centrality (as an indicator of the composition of ego's ties to its alters) are the primary structural indicators of an ego-network's structure for ego's range of possible type I actions, its opportunities to act, and the extent to which ego is likely to be successful in its attempts to steer in the network.

In the subsequent step, the analysis of differently-structured ego-networks was extended to also include those actors to which ego is only connected indirectly. The analysis of these ego-centred local network structures is important for three reasons. Firstly, individual actors are most often aware of at least a part of the social structures surrounding them beyond their direct contacts. Secondly, the inclusion of some actors to which ego is only indirectly connected in the analysis offers the opportunity to analyse the extent to which ego serves as a local bridge or broker. Extending ego networks to ego-centred local networks offers the opportunity for the identification of structural holes. The section argued that closeness centrality is a structural indicator which can be applied to ego-centred local network structures in order to analyse the extent to which ego can profit from such holes. And thirdly, the analysis of ego-centred local networks can point to consequences of type I actions in the larger network structure beyond the ego-network.

Both section 5.3 and 5.4 focused on changes in ego-networks and ego-centred local structures based on the structural embeddedness of particular individual actors, but did not focus on the dynamics of the social structure of the policy network at the global level. Section 5.5 characterised the social structures of global networks in terms of their density, transitivity, and the degree centralisation of the network. It argued that changes in a global social structure are the result of the establishment of new ties between actors. Paradoxically, the analysis presented in section 5.5 showed that the actors that are most likely to affect the global structural outcome of a policy network are different actors to those that are most likely to affect their ego-centred local network structures. One specific characteristic of such less central actors supports this argument. Actors that are less central in their ego-centred local network structures relative to others

embedded within the network have fewer ties in the initial structure. Furthermore, such actors are most likely to be adjacent to structural holes. Because of the relative sparseness of the ego-centred local structures, such structural holes are likely to provide those less central actors with additional social capital. The network structure therefore offers a clear incentive to such actors to establish a new tie. It is the establishment of such a tie that is most likely to affect the global network structure most significantly. The type I actions of actors who were initially less central are therefore more likely to have a significant effect on the structural characteristics of the policy network than the type I actions of actors that are very central in their initial ego-centred local network structures.

The chapter has pointed out that regardless of the initial social structure, policy networks are likely to develop into socially cohesive and decentralised structures. These structural outcomes are a result of the incentives provided to some individuals to establish new ties as a result of each change in network structure over time. Each additional tie formed between a pair of actors increases the social cohesion of a global network structure. Depending on the initial characteristics of the social structure of the policy network, some networks will develop instantly into decentralised structures, whereas others will initially become more centralised, but later decentralise. Differences between differently-structured initial networks are therefore not found in the structural outcome *per se*, but in the amount of time it takes to become socially cohesive and decentralised.

The process of steering in networks thus has relatively similar structural outcomes if the time factor is not taken into account. However, especially in policy networks, time is indeed an important element, both for governments and individual network actors. Furthermore, the utility of the outputs resulting from the policy network for individual actors is also time-dependent. For some actors, outputs are required relatively quickly, whereas for others it might make sense to steer in the policy network over a longer period of time before outputs are produced. These different views of actors depend on the structural location (i.e. the policy position) and the structural embeddedness of these individual actors in the policy network. The next chapter will focus on these differences and elaborate, firstly, upon the extent to which actors will be able to coordinate their

actions (type II actions) under different structural conditions, and secondly, upon the extent to which these type II actions are likely to result in outputs.

6 Network Structure and Outputs

6.1 Introduction

As that expectations on the structural outcomes resulting from the type I actions of interdependent actors have already been formulated in the previous chapter, the current chapter shifts its attention to the extent that outputs are likely to result from differently-structured policy networks. Previous chapters have argued that policy network approaches lack conceptual mechanisms to link policy network structure sto policy outputs. Furthermore, these approaches tend to characterise global network structures and thereby overlook potentially important within-network differences. Chapter 4 introduced type II action as the link between network structure and policy outputs. It argued that the occurrence of such coordinated actions depends on the characteristics of differently-structured elements within the global policy network.

This chapter elaborates upon the relations between network structures, type II actions and policy outputs. The first question that it seeks to answer is which structural characteristics of a policy network facilitate type II actions. Type II actions are characterised by their collective nature, aim to produce an output, and are coordinated among at least a subset of actors. Such coordination is necessary because of the interdependency between actors. This interdependency implies that actors are unable to unilaterally produce policy outputs and must form a cohesive subgroup around certain policy positions. Such locally cohesive elements within a global network facilitate coordination and collective action among the members of the cohesive subgroup.

The type II actions of cohesive subgroups embedded in policy networks do not by definition result in a policy output. This chapter will show why type II actions are more likely to result in policy outputs than in other structures, in certain policy networks. It argues that the ties between actors which coordinate

their type II actions and other network actors, determine the extent to which policy outputs are likely to result from the type II actions.

The chapter is structured as follows. Firstly, section 6.2 specifies the two distinct functions upon which the production of policy outputs relies. The first function describes the extent to which a policy network's social structures facilitate type II actions. The second function describes the extent to which these type II actions are likely to result in policy outputs. Section 6.3 focuses on the question to what extent differently-structured elements within a global network are likely to facilitate type II actions. Section 6.4 elaborates upon the question of how different global policy network structures affect the likelihood of policy outputs resulting from the type II actions taken by network members. Section 6.4 also presents the hypotheses on the relations between the global structural characteristics of policy networks and the extent to which outputs are likely to emerge. The final section of this chapter summarises its main findings and presents some concluding remarks.

6.2 From Structures to Outputs

This section specifies the two functions upon which the production of policy outputs relies. The conceptual link between policy networks and their outputs was previously identified as a specific type of action, type II actions, defined as those actions that are coordinated amongst actors and aim to produce a policy output. Such type II actions are affected by the structure of the policy network. This section specifies how both global structures and local structures embedded within policy networks affect network actors' opportunities for type II actions. Furthermore, it argues that ties between local structures and other areas of the global network affect the extent to which such type II actions are likely to result in policy outputs. It is important to stress here that the concept of local structures embedded within a global structure is different from the ego-centred local network structures upon which the hypotheses regarding the process of steering in networks were built. Whereas ego-centred local network structures are an extension of individual actors' ego-networks, local network structures are elements of the policy network that display different structural characteristics to

other elements. Actors can thus be part of one local network structure, but at the same time have ties to other parts of the global network structure.

The structure of a policy network is important for type II actions because certain structures are more likely to facilitate coordination than others. The utility of socially cohesive structures for type II actions has been illustrated by Coleman (Coleman, 1966, 1986, 1988, 1990). Social cohesion implies that a network is both dense and transitive. Many of the possible ties between nodes are present in such a network structure. In a policy network, the ties between nodes indicate how actors' policy positions relate to one another. In a socially cohesive policy network, the policy positions of actors are therefore similar, which facilitates the coordination of type II actions among all network actors. Such global type II action is nevertheless unlikely to occur because of the structural conditions that would be necessary to support global type II actions. The occurrence of type II actions indicates that the actors agree on the preferred policy output. Such an agreement on the preferred policy output is the result of the process of steering in policy networks. Prior to the point in time where type II actions are taken, actors have engaged in bargaining processes over policy positions. Steering in the network has made some actors shift away from their initial policy position towards those of others. If type II actions occur in which all the actors in the network are involved, then all actors in the policy network agree on the preferred policy output. In other words, the process of steering in networks has resulted in a situation where each individual actor has adopted the same policy position. Furthermore, the structural outcome of the process of steering in networks is a completely homogenous network. Recalling the homophily arguments of Granovetter (1973, 1983), such networks are most likely to be (almost) fully connected. Fully connected networks are networks in which each individual actor has a tie to all other actors in the network. Fully connected networks therefore do not contain any parts that are differently-structured from other parts. In other words, the local structure of a fully-connected network coincides with the global social structure of the policy network.

One could argue based on the hypotheses presented in the previous chapter that the process of steering in networks results in a situation where the global social structure of a policy network is rather homogenous. These hypotheses indicate that regardless of the initial structural characteristics of a policy network,

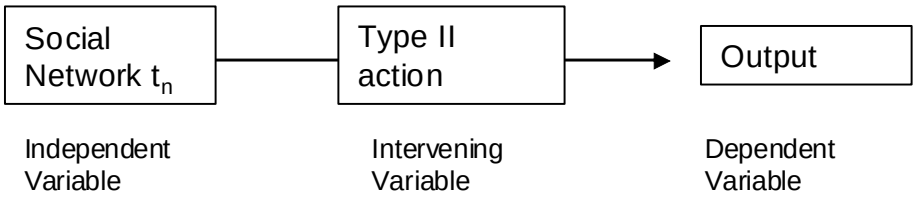
the process of steering in networks results in a global network structure that is socially cohesive and decentralised. The differences in policy networks' initial network structures do affect one important variable. Differently-structured networks take different amounts of time to reach a structural outcome that is both socially cohesive and decentralised. Time is a crucial variable for two reasons. Firstly, time is important for individual actors because over time the network structure offers actors opportunities to coordinate their actions with others and maximise their utility from a prospective policy output. And secondly, time is an important factor influencing the range of type II actions actors can take and subsequently affecting the characteristics of potential policy outputs. The latter issue will be illustrated in chapter 7. This section elaborates the opportunities which network structures offer to actors to maximise their utility from a particular policy output.

The importance of time for individual actors is a result of the existing interdependence between the network members. The various configurations of the global social structure of a policy network provide subsets of these interdependent actors with opportunities to maximise the potential utility of a policy output. This is the case because during the process of steering in networks, some actors adopt similar policy positions. In terms of the network structure, this implies that these actors form a densely-knit part in the global social structure of the policy network. Such densely-knit parts are cohesive subgroups. The individual actors that are part of a locally cohesive structure within the global policy network have two options. The first option is that each individual actor will continue its attempts to steer in the network. Actors then aim to affect the policy positions of other actors via their type I actions. Such attempts to steer in the network imply that actors need to deploy some of their attributes in an attempt to affect the targeted actors' policy positions. Actors, however, have another option. An actor that is part of a locally cohesive subgroup can also opt to coordinate its actions with others in an attempt to produce a policy output that reflects the policy position shared among the members of the cohesive subgroup. During the process of steering in networks, the social structures of a policy network at certain points in time are likely to provide some actors with an incentive to do the latter. The underlying cause for such incentives is that the costs, in terms of the attributes that are needed to make non-subgroup members

change their policy positions, are higher than the expected utility of these type I actions. A rational actor will therefore prefer to coordinate type II actions with others rather than to engage in further bargaining over policy positions. Type II actions will therefore occur in most policy networks before the structural outcome of socially cohesive and decentralised global structures is realised.

The type II actions of subsets of actors embedded within the global structure of the policy network will not by definition result in a policy output. The global structural characteristics of the network determine the extent to which the type II actions of a local structure embedded within this larger network are likely to result in policy outputs. More specifically, this chapter argues that the structural location of the cohesive subgroup that coordinates its actions determines the likelihood of policy outputs to result from these type II actions. In other words, the ties between the local structure and other parts of the global structure are a decisive factor determining the potential of type II actions to result in policy outputs.

Figure 15: The Relations Between Network Structure and Policy Outputs



The relations between the network structure, type II actions, and policy outputs are depicted in figure 15 above. Similar to the model of steering in networks presented in the previous chapter, the model presented in this section builds on two distinct, but related functions. The first function describes the extent to which the social structures of a policy network provide opportunities for and impose constraints upon type II actions. Similar to steering in networks, network structures affect the scope of type II actions which are likely to occur. Section 6.3 elaborates upon how differently-structured parts within a global social structure of a policy network are likely to facilitate these type II actions. The second function describes the extent to which type II actions of subsets of actors are likely to result in a policy output in differently-structured global policy networks.

Section 6.4 will focus on this question. The model presented in this section therefore builds on three important variables. The independent variable is the social structure of the policy network. Type II actions are an intervening variable that is affected by the network structure, but at the same time affects the dependent variable, which is the potential policy output of the network. The remainder of this chapter will specify the likelihood of type II actions and subsequent potential policy outputs under different structural conditions.

6.3 Network Structures and Type II Action

The characteristics of the global policy network structure and the differences within it are important as indicated by the previous section. These characteristics are important for two reasons. Firstly, network structures affect type II actions. Certain structural characteristics are more likely to facilitate type II actions than others. And secondly, the global social structure and the differences within these structures affect the extent to which policy outputs are likely to result from type II actions. The latter issue is elaborated upon in section 6.4, whilst the current section focuses on the former issue, elaborating upon the extent to which different structures are likely to facilitate type II actions. Before analysing the different structures, the section will briefly restate the characteristics of type II actions.

Type II actions require coordination among a subset of actors, and are therefore a form of collective action. More specifically, type II actions are actions of a collective nature that aim to produce a policy output. There is an impressive amount of literature available on the topic of network structures and collective actions (e.g. Burt, 2004; Chwe, 1999; Coleman, 1966, 1986, 1988, 1990; Granovetter, 1973, 1978, 1983; Janky & Takacs, 2002; Macy, 1991, 1993; Putnam, 1993). The literature shows many different approaches to the question which social structures are most likely to facilitate collective actions. Two indicators of network structure appear to be of particular importance for these collective actions across these approaches. The first major structural indicator to determine a social structure's capacity to facilitate collective actions is the extent to which a social network is socially cohesive. The second important structural indicator is the extent to which the social structure is centralised. The remainder of this

section will firstly elaborate upon the importance of different degrees of social cohesion of social structures for the capacity of these network structures to facilitate type II actions.

The extent to which the social structure of a policy network (or an element of the social structure of a policy network) is socially cohesive depends on the level of two measures of network structure. The social cohesion of a social structure is indicated by its density and its transitivity. The density of a social structure is a property of the number of ties present relative to those possible in a network of equal size (cf. Burt, 1980; De Nooy et al., 2005; Jansen, 2003; Marsden, 1990; Wasserman & Faust, 1994). Transitivity indicates the extent to which networks contain closed triads. The denser and more transitive a social structure is, the more socially cohesive the (local) network structure is. Social cohesion is important for type II actions because dense and transitive structures have more capacity to coordinate actions than sparse and intransitive network structures (*cf.* Coleman, (1988, 1990); Granovetter, (1973, 1983)) .

Coleman (1988, 1990) argues that network density affects the opportunities upon which individual actors can act. His argument is based on the social capital embedded within the relations maintained by network actors with others in a social network. Social capital is not only a resource an individual actor can use to its own benefit, but it also exerts social control over the behaviour of an actor. Coleman argued that such social control is needed if collective actions are required, limiting the chance of deviant behaviour. If the risk of defective actions is limited, collective actions are more likely to occur. Since social capital is present in relations rather than an individual actor attribute, more relations thus imply more social control over the behaviour of the actor maintaining those relations. Put differently, the denser the (local) network structure, the more social control over actions.

The importance of transitivity for collective actions can be explained based on Granovetter's (1973, 1983) theory of tie strength. A triad is transitive if each node has a tie to both other nodes. Transitivity, Granovetter argues, indicates that the ties between these nodes are strong ties rather than weak ties. Strong ties exert more social control over actors' actions than weak ties, also limiting the risk of defective actions. Furthermore, strong ties are an indicator of homogeneity. Actors connected to each other by strong ties are more likely to be the same or

similar in terms of their attributes. In the context of a policy network, this implies that actors connected to each other by strong ties are likely to have the same or very similar policy positions. Such similarity in terms of the preferred policy output further increases the likelihood that strongly connected actors will coordinate their type II actions.

The extent to which a social structure is socially cohesive is thus important for the occurrence of type II actions. If a social structure is both dense and transitive, the actors embedded within such a structure experience much social control. Policy networks whose social structures are both very dense and highly transitive are networks that are (almost) fully connected. Alongside the large amount of social control an actor experiences, information about the actions of an actor travel fast throughout the network. Individual actors' defective actions or free-rider behaviour in dense and transitive social structures are therefore likely to provoke retaliation from other actors. However, in homogenous network structures, defective actions are unlikely to occur. Because of the similarity between actors, individual actors in dense and transitive structures have an incentive to cooperate rather than to deviate. Coordination of type II actions is for actors in such homogenous network structures preferable to any other alternative. Type II actions are therefore most likely to occur in network structures that are both dense and transitive.

If a social structure contains many ties but relatively few triads, the structure is less socially cohesive. Of the ties present, many are weak ties rather than strong ties. The presence of such weak ties implies that there are differences between actors. In the case of a policy network, the presence of such weak ties might indicate that there are differences between the policy positions of any two actors connected by such a weak tie. Differences between policy positions then provide individual actors with an incentive to follow a defective strategy rather than to participate in the coordination of type II actions. However, the differences between policy positions do not necessarily imply that the actor will defect from coordination by default, as defective behaviour can result in repercussions. These repercussions, for example, might be that other actors will discontinue their relationship with any actors refraining from cooperation. Such a discontinuation of a tie would affect the actor. The social capital embedded in that particular tie would no longer be available were the tie to be severed. A defective strategy thus

damages actors' attributes. A cooperative strategy however also involves costs for actors, implying that the actor will participate in the type II action. However, the preferred policy output (indicated by the actor's policy position) of this actor is different from the policy output that is the likely result of the type II action. In other words, the potential policy output is different from the policy output that would maximise the actor's individual utility. Whether or not the actor will engage in cooperative type II action depends on the actor's perception of the costs of each of the two strategies. Since actors are assumed to be rational and utility maximising individuals, they will employ the strategy that is perceived as most beneficial. Social structures that are relatively dense but intransitive can thus in some cases facilitate type II actions, but these social structures are less likely to facilitate type II actions than dense and transitive structures.

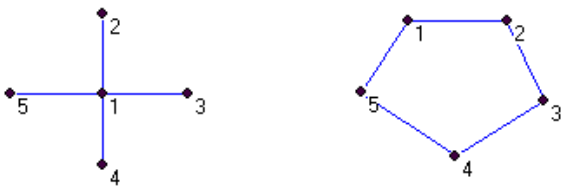
Type II actions are least likely to occur in social structures that are both sparse and intransitive. Sparse social structures contain relatively few ties between pairs of actors, implying also little social capital available in the social structure because social capital exists only in relations. Sparse social structures therefore exert little social control over the actions of individual actors. The lack of transitivity indicates that the vast majority of the few ties present in the sparse structure are weak ties. Information diffusion is hampered by the lack of social cohesion, so information about actors' deviant actions therefore also travels slowly throughout the network. Deviant behaviour in sparse and intransitive network structures is therefore less likely to provoke retaliation. The opportunity costs of non-cooperative strategies in sparse and intransitive network structures are therefore low. Furthermore, employing a cooperative strategy is likely to be very costly for most of the actors in a sparse and intransitive social structure. The low density and intransitivity of the network imply that the actors embedded within its structure are very different. In such a heterogeneous policy network, the policy positions of actors are therefore also likely to differ substantially. Taking part in type II actions under such structural conditions implies that many actors will experience significant costs. The projected policy outputs of the type II actions will for many actors embedded in the network differ significantly from their preferred policy output. In other words, a cooperative strategy is likely to be quite costly for many actors. Heterogeneous networks thus provide many actors

with a strong incentive to follow a defective strategy rather than to cooperate and engage in type II actions.

This section has so far pointed out that social cohesion facilitates type II action. But social cohesion as the sole indicator of the structural capacity of a network to facilitate type II actions might not always be sufficient. Some authors have argued that a second indicator needs to be included. Granovetter (1978) and Macy (1991, 1993) are among those scholars arguiing that the extent to which the social structure of a network is centralised is a second important indicator. The threshold models employed by these scholars are based on band-wagon or domino effects of actions. Threshold models essentially describe the processes of how actors affect one another in networks. These processes are very similar to the process of steering in networks described in chapter 5. Such threshold models show that centralised network structures facilitate information diffusion more efficiently than decentralised social structures. The degree of centralisation of a social structure therefore also affects its capacity to facilitate type II actions.

Centralisation is thus also important in determining the extent to which type II actions are likely to occur in a policy network. Additionally, assessing the extent of centralisation is important to encapsulate the social structure of a local network. Two completely differently structured social networks can actually have the same level of social cohesion. Based on only the indicator of social cohesion, one might then prematurely conclude that these social structures are equally likely to facilitate type II actions. However, the degree of centralisation of these different social structures has an impact on a structure's capacity to also facilitate type II actions. This is best illustrated with an example.

Figure 16: Social Cohesion and Centralisation in Networks of Equal Size



Consider the two networks of equal size in figure 16. Both networks contain the same number of nodes. However, the network on the right contains one more tie,

and is therefore denser than the star-shaped network on the left. At the same time, neither network contains any triads, thereby being equally intransitive. Drawing exclusively on social cohesion as an indicator of the extent to which a social structure is likely to facilitate type II actions, the logical conclusion would be that the circle-network displayed on the right is more likely to facilitate such coordinated actions than the star-network. However, the star-network on the left is completely centralised, whereas the social structure on the right shows no variance in the individual nodes' centrality scores. Taking thresholds models' arguments, the star-network has a more efficient structure for information diffusion and exerts more social control on the behaviour of individual actors. Defective strategies in the star-network are more likely to provoke retaliation than in the circle network. At the same time, the costs of type II actions for individual actors are either the same or lower in the star-network than in the circle network. The star-network is therefore more likely to facilitate type II action than the circle-network.

The two network structures displayed in figure 16 are extreme cases. Nevertheless, the example does illustrate the importance of centralisation as an indicator for the extent to which type II actions are likely to emerge. Social cohesion might be a useful primary indicator of the extent to which network structures are likely to facilitate type II actions, but it is important to bear in mind the importance of centralisation for the capacity of a social structure to facilitate type II actions. Social cohesion is the exclusive facilitator of type II actions only in the case of a fully connected social structure which is also completely decentralised,.

This section has pointed out that not all social structures are equally likely to facilitate type II actions. The capacity of a social structure to facilitate coordinated actions depends on two important structural properties. Firstly, as indicated by the literature on collective action, social cohesion is an important factor for collective actions. Social cohesion is indicated by both a social structure's density and its transitivity. The analysis of different social structures indicated that type II actions are most likely to occur in social networks that are both dense and transitive. Social cohesion therefore facilitates actors coordinating their type II actions that aim to produce a policy output. The section nevertheless argued that focusing on the social cohesion of a structure alone might in some cases be

insufficient to determine the likelihood of the occurrence of type II actions. In addition to the density and transitivity of a social structure, type II actions are in some cases more likely to occur in centralised structures rather than in decentralised structures. The extent to which centralised network structures facilitate type II actions depends on the density and the transitivity of the social structure. Social cohesion is therefore the primary indicator of a structure's capacity to facilitate type II actions. Nevertheless, an important conclusion that can be drawn from this section is that both the number of ties (density) and the pattern of these ties (transitivity and centralisation) are important structural features for type II actions.

6.4 Type II Actions and Outputs

Following from the determination in the previous section of the likelihood of the occurrence of type II actions, the current section elaborates upon the network structures in which such type II actions are most likely to result in policy outputs. One important aspect needs to be underlined here. Section 6.3 elaborated upon the characteristics of social structures and these structures' capacity to produce policy outputs without focusing explicitly on the differences between local network structures. It was not necessary at that point to explicitly differentiate between global and local structures for one important reason. Type II actions are facilitated by certain structural characteristics. Whether these structural characteristics occur at the local level or on the global network level does not affect the likelihood of type II actions. The existence of different local structures within a global social network is nevertheless important for a policy network's capacity to produce policy outputs. Section 6.2 has already pointed out that global type II actions are unlikely to occur because this would imply a fully connected, homogenous policy network. Type II actions are therefore more likely to be taken by local structures embedded within the global social structure of the policy network. This section will formulate hypotheses on how the characteristics of a global structure affect the extent to which policy outputs are likely to emerge.

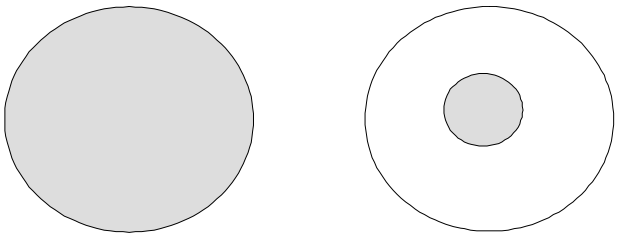
The analysis of the extent to which structural characteristics facilitate type II actions has indicated that type II actions are only likely to occur if a social

structure displays a significant degree of social cohesion. Only those (local) social structures that can be characterised as socially cohesive have the capacity to coordinate type II actions. Socially cohesive (local) network structures are in social network analysis generally referred to as cohesive subgroups. Type II actions are therefore only likely to occur if a policy network contains at least one cohesive subgroup. Furthermore, since policy outputs are a result from type II actions, the following hypothesis can be formulated:

5. A policy network is only likely to produce policy outputs if its network structure contains at least one cohesive subgroup.

A distinction can be only made between two different global network structures if a single cohesive subgroup is embedded within the global social structure of a policy network,. In one case, the cohesive subgroup is (almost) the same as the global network structure. This implies that the social structure of the policy network is (almost) fully connected. Fully connected networks are maximally dense and transitive because each actor is connected to all other actors in the social structure. All actors in the network are structurally equivalent, with no actor more central than any other. Fully connected networks are entirely homogenous. Each individual actor has the same policy position and therefore prefers the same policy output. Global type II actions are therefore likely to occur in policy networks with such social structures. In this specific case the cohesive subgroup coincides with the global network. Furthermore, the global type II actions will result in policy outputs. The network on the left in figure 17 illustrates the case of a fully connected network. The grey circles in the figure represent cohesive subgroups. The white circle indicates the global network. As represented in the network on the left, the cohesive subgroup equals the global social structure in a fully-connected policy network.

Figure 17: Global Network Structures Containing One Cohesive Subgroup



However, policy networks in which each individual actor has the same policy position are unlikely. Policy networks rather tend to display a certain degree of heterogeneity. Such a social structure implies that some network actors are embedded within the cohesive subgroup, whereas others will not be part of such a socially cohesive local structure. This is illustrated by the network on the right in figure 17. The cohesive subgroup in that figure is located in the centre of the global social structure. This is not coincidental. If the social structure of a policy network contains only one cohesive subgroup, such a cohesive subgroup is by definition central. To illustrate why this is the case it is necessary to consider the structural characteristics of such a policy network structure.

The global social structure contains one cohesive subgroup. A cohesive subgroup is a dense and transitive part in the global social structure. Within the cohesive subgroup there are many ties. These ties are primarily strong because of the high level of transitivity. Outside of the cohesive subgroup, the density is considerably lower. Furthermore, the ties outside of the cohesive subgroup are mostly intransitive. Actors outside of the cohesive subgroup thus maintain fewer ties than the members of the cohesive subgroup. This implies that the individual degree centrality of actors that are part of the cohesive subgroup is higher than the degree centrality of those actors that are not part of the socially cohesive local network structure. Centralisation is a property that is based on the variation in these individual degree centralities. Since the individual degree centralities of the members of the cohesive subgroup are higher than those of actors outside this subgroup, the global social structure is centralised around actors that are part of the cohesive subgroup. Policy networks that contain only one cohesive subgroup are therefore always centralised around this socially cohesive local structure.

The cohesive subgroup is thus central in policy networks whose global social structures contain only one socially cohesive local structure. Although the extent to which a cohesive subgroup is central in the global social structure is of particular importance when multiple cohesive subgroups are present, it is less crucial in determining the extent to which policy outputs are likely to result from type II actions in policy networks that contain only one such group. Before presenting this argument, it is necessary to elaborate upon the factors that determine whether or not type II actions will result in policy outputs.

Type II actions are coordinated actions that aim to produce a policy output. The actors that engage in such coordinated action therefore agree on the preferred policy output. Type II actions will in fully connected networks always result in a policy output because each network actor agrees on the preferred course of action. If the cohesive subgroup however does not coincide with the global social structure, the policy network contains actors that have a policy position that differs from the policy position of the cohesive subgroup. Actors with different policy positions will oppose the course of the cohesive subgroup's type II actions. The extent to which such opposition is successful depends on the extent to which the opposition is coordinated amongst a subset of actors. Similar to type II actions, the extent to which actors can coordinate their opposition depends on the social structure. As argued earlier, coordination of action is facilitated by social cohesion. Policy networks that contain one cohesive subgroup, however, display limited degrees of density and transitivity in other parts of the global social structure. Coordination of opposition against the type II actions of a cohesive subgroup is therefore unlikely to occur. Therefore:

6. In policy network structures that contain one cohesive subgroup, type II actions are likely to result in policy outputs.

The analysis of local network structures and their embeddedness within the global social structure is of particular importance if policy networks contain more than one cohesive subgroup. Global social structures with multiple cohesive subgroups are locally centralised around these cohesive subgroups. The important difference with networks that contain just one cohesive subgroup is that multiple cohesive subgroups imply local centralisation rather than global

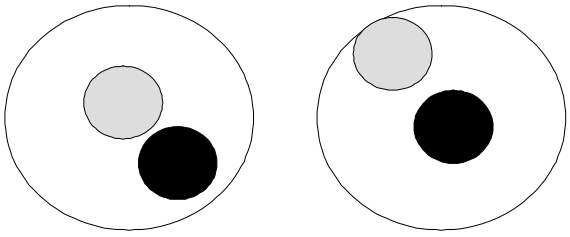
centralisation around these subgroups. This does not imply that the global social network structure is not centralised. One cohesive subgroup can be more central in the global social structure than other socially cohesive local structures. The extent to which one cohesive subgroup is more central in a global social structure than other cohesive subgroups depends on the ego-centred local network structures of the subgroups' actors. An actor can be part of a cohesive subgroup, while at the same time maintaining ties to actors located in other parts of the global social structure. The bridging ties between the cohesive subgroup and other parts of the global social structure determine the extent to which a cohesive subgroup is central relative to other cohesive subgroups in a policy network's global social structure.

It is in policy networks with multiple cohesive subgroups that the type II actions of a cohesive subgroup do not necessarily result in policy outputs, as the type II actions of any one of these cohesive subgroups are likely to meet opposition. As argued above, opposition requires coordination. Coordination requires certain degrees of density and transitivity. Policy networks in which multiple socially cohesive subgroups can be identified therefore have socially cohesive parts in their global social structures besides the cohesive subgroup that aims to produce a particular policy output. Opposition to the type II actions of one cohesive subgroup is more likely to occur in policy networks with multiple cohesive subgroups because of these additional socially cohesive local structures. Whether this opposition will prevent type II actions in resulting in a policy output depends on the ties that each cohesive subgroup maintains with other parts of the global social structure. In other words, whether or not type II actions of one cohesive subgroup are likely to result in policy outputs depends on the extent to which particular cohesive subgroups are central in the policy network.

Consider the global network structures displayed in figure 18. Both networks contain two cohesive subgroups. The cohesive subgroups that aim to produce a policy output via their type II actions are coloured grey in the figure. The black cohesive subgroups aim to oppose these type II actions. In the network on the left, the acting cohesive subgroup is more central in the global social structure than the opposing cohesive subgroup. This centrality of the cohesive subgroup indicates that it has more bridging ties to other parts of the global network structure than the black cohesive subgroup. These ties are important indicators of

the extent to which cohesive subgroups are able to mobilise actors embedded in other parts of the global social structure. More specifically, bridging weak ties connecting the cohesive subgroups to these other actors determine their capacity to mobilise these actors. In the left network, the black subgroup has fewer bridging ties than the grey cohesive subgroup. Moreover, the central position of the grey subgroup implies that its preferred policy output is more similar to that of many of the actors embedded within other parts of the global social structure than that of the black cohesive subgroup. The lack of sufficient weak ties and the difference between the policy position of the black cohesive subgroup and that of actors in other parts of the global social structure hamper the black subgroup's capacity to mobilise these actors. Opposition against the grey subgroup's type II actions is therefore less likely to be successful. Put differently, the type II actions of the central cohesive subgroup can result in policy outputs.

Figure 18: Global Network Structure with Two Cohesive Subgroups

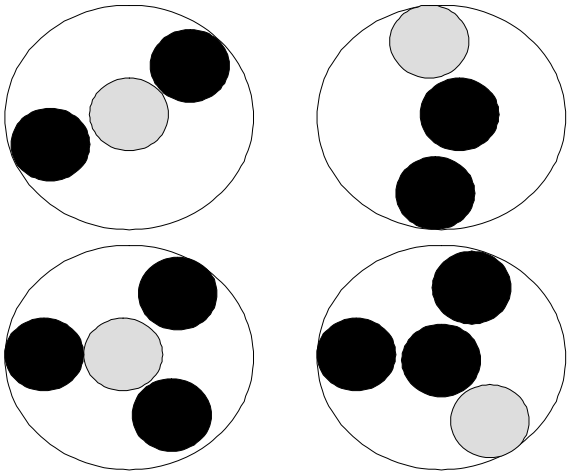


In the network on the right, however, the reverse argument applies . The global structure on the right is unlikely to produce policy outputs through the type II actions of the acting cohesive subgroup. The black subgroup is more central than the acting cohesive subgroup. The black subgroup is in an excellent structural location to form opposition against the type II actions of the acting cohesive subgroup. Furthermore, the black subgroup can produce a policy output not only preferred by its own members, but also by a significant proportion of actors embedded within the global social structure if it coordinates its actions of type II. Opposition against the type II actions of the grey subgroup is therefore more likely to be successful.

Similar arguments apply to networks that contain more than two cohesive subgroups. Only when the acting cohesive subgroup is central in the global social

structure of the policy network can type II actions result in policy outputs. In figure 19 below, the two networks on the left are therefore those most likely to see their type II actions translated into policy outputs. By contrast, the networks displayed on the right will not produce policy outputs based on the type II actions of the non-central acting cohesive subgroups.

Figure 19: Global Network Structures with Three and Four Cohesive Subgroups

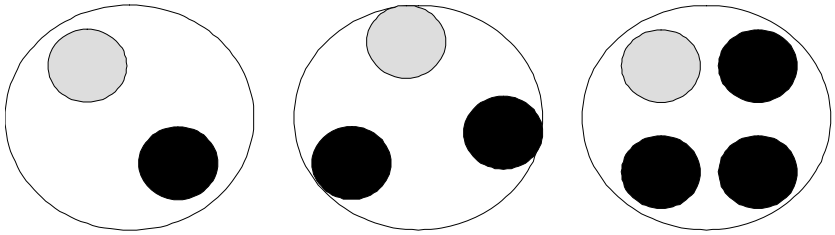


In addition to the importance of centrality, figure 19 illustrates another important point. The likelihood of a cohesive subgroup being central in the global social structure relative to other cohesive subgroups decreases as the number of cohesive subgroups increases. Furthermore, the significant presence of social cohesion in the global social structure facilitates the mobilisation of opposition. This implies that there is an inverse relationship between the number of cohesive subgroups embedded within the global social structure of a policy network and the extent to which policy outputs are likely to emerge. The analysis of policy networks in which multiple cohesive subgroups are present therefore allows the formulation of the following hypothesis:

7. In policy network structures that contain multiple cohesive subgroups, type II actions are only likely to result in policy outputs if the acting cohesive subgroup is central within the global structure.

Finally, the global social structure of a policy network can contain multiple cohesive subgroups of which none is central. Figure 20 displays these networks for global structures that contain two, three and four cohesive subgroups. The lack of centralisation of the global structure of the policy network implies that all cohesive subgroups are regularly equivalent. Ties exist between subgroups, and between cohesive subgroups and other parts of the global network structure, but none of these socially cohesive local structures have more ties to other parts of the global network than other subgroups.

Figure 20: Global Network Structures with Multiple Regularly Equivalent Cohesive Subgroups



In decentralised networks such as the three networks displayed in figure 20, type II actions of one of the cohesive subgroups are very likely to face considerable opposition from other cohesive subgroups embedded in the global network structure of the policy network. Opposition is easily mobilised between the black cohesive subgroups, as well as between the black subgroups and other parts of the global social structure. Therefore:

8. In decentralised policy network structures that contain multiple cohesive subgroups, type II actions are unlikely to result in policy outputs.

This section has illustrated that the extent to which type II actions are likely to result in policy outputs depends on the global structural characteristics of the policy network. More specifically, the ties between a cohesive subgroup and other parts of the network structure affect the likelihood of policy outputs. These bridging ties determine whether or not a cohesive subgroup is central in the

global social structure. The centrality of the cohesive subgroup in turn determines if its type II actions will result in policy outputs.

6.5 Concluding Remarks

The capacity of a policy network to produce policy outputs, this chapter has argued, depends on both the characteristics of its global social structure and on the characteristics of the local structures embedded within it. More importantly, both the number of ties and the pattern of ties present both within a local structure, as well as between a local structure and other parts of a policy network's social structure, determine the structural capacity of policy networks to produce policy outputs. Section 6.2 elaborated on the process of output production in policy networks. The various configurations of the global social structure over time will provide some actors with an incentive to engage in type II action rather than to continue the process of steering in networks. At different points in time actors in locally cohesive parts of the network will experience an incentive to attempt to produce a policy output, rather than to employ their individual attributes to further affect the network's social structure . In other words, during the process of steering in networks, the network structure will at certain points in time provide subsets of actors with an opportunity to coordinate their actions in an attempt to realise their policy position. Whether or not such type II actions will actually result in a policy output depends on the global structural characteristics of the policy network.

Section 6.3 specified the extent to which differently-structured elements within the global social structure of a policy network are likely to facilitate coordinated actions among subsets of actors. Based on arguments presented by Coleman (1966, 1986, 1988, 1990), it was argued that social cohesion facilitates the coordination of actions because social capital embedded within relations exerts constraints on individuals' behaviour. Section 6.3 also highlighted that despite the importance of social cohesion as a primary indicator of the capacity of a local structure to coordinate type II action, it is not an exclusive indicator, the extent to which such local structures are centralised being a second important indicator. Centralised local network structures facilitate information diffusion, including

information about the behaviour of individual actors. Information diffusion, in turn, is important for coordination and therefore for type II actions.

Section 6.3 concluded that the extent to which local network structures facilitate type II actions depends strongly on both the number of ties and the pattern of ties within such a local network structure. Conversely, the extent to which such type II actions are likely to result in policy outputs depends on the ties between the local network structure and other elements of the global social structure. These bridging ties that connect a cohesive subgroup to other parts of the global social structure determine the centrality of such a cohesive subgroup, which is important for its capacity to mobilise other actors. The more central a cohesive subgroup, the more bridging ties it has to other areas of the social network. Mobilisation, in turn is important for the extent to which type II actions are likely to result in policy outputs.

Section 6.4 analysed various policy networks with different structural characteristics. Based on this analysis, hypotheses were formulated upon the extent to which policy outputs were likely to result from the type II actions of cohesive subgroups within such global social structures. Section 6.4's main conclusion is that the type II actions of those cohesive subgroups that are central in the global social structure are most likely to result in policy outputs.

This chapter has thus illustrated that the relational variables of a policy network are not only important in terms of their capacity to facilitate coordinated actions, but also for the extent to which policy networks are likely to produce policy outputs. However, this thesis has thus far only focused on the variables of the policy network rather than on the extent to which policy networks might be an effective and efficient mode of governance. The process of steering by networks, as argued in chapter 4, aims to capture the relations between the policy goals of government, the policy network, and the expected utility of the policy outputs for both government and the individual network actors. Chapter 7 brings these policy goals back into the discussion and focuses on the extent to which policy networks with different global social structures are likely to influence, firstly, the extent to which individual actors can realise their preferred policy output, and secondly, the attainment of government's policy goals.

7 Steering in and by Policy Networks

7.1 Introduction

Previous chapters have explained two important aspects of steering in and steering by policy networks. Chapter 5 elaborated how the social structures of a policy network could change over time. It argued that changes in network structures are caused by the type I actions of actors embedded within policy networks. The analysis presented in chapter 6 has taken the structural outcomes of the process of steering in networks as its point of departure. It has illustrated why certain policy networks have a structural capacity to produce policy outputs, dependent upon two factors. The first factor is the extent to which the policy network has the structural capacity to facilitate coordinated type II actions among a subset of actors. The second factor is the extent to which the global social structure facilitates these type II actions in resulting in policy outputs.

This thesis has thus far established how network structures might change over time and which of these structural outcomes might have structural capacity to produce policy outputs. One important aspect still requires eloabration in the current chapter, namely linking the initial social structures of a policy network to policy outputs which is important for several reasons. The initial structural characteristics determine the structural developments over time. The structural outcome, in turn, determines the capacity of a policy network to produce policy outputs. The initial network structures are therefore important for policy outputs. Combining the arguments presented in chapters 5 and 6 allows the formulation of hypotheses on the likelihood of initial policy network structures resulting in policy outputs. It would however not indicate what would be.the characteristics of such outputs

The characteristics of policy outputs, this chapter argues, are important because these characteristics determine the utility of policy outputs for individuals and governments. The characteristics of policy outputs depend on the

range of feasible type II actions. As argued throughout this thesis, the social structures of a network affect action. The structural configuration of a network offers opportunities for actions whilst imposing constraints on actions, both those of type I and those of type II. Furthermore, social structures do not only affect the opportunities to act, but also the range of action. The effects of the social structure on the range of type II actions in turn affect the characteristics of any potential policy output resulting from successful type II actions.

The initial social structure of a policy network is thus important for the characteristics of policy outputs. These policy output characteristics in turn, determine their utility for both individual actors and government. However, before the utility of a policy output for either individual actors or government can be assessed, indicators of this utility are needed. Section 7.2 focuses on the indicators of the utility of a policy output for individual actors and under which structural conditions actors can maximise their individual utility of a policy output. Section 7.3 focuses on the utility of policy outputs for governments and elaborates upon the characteristics of policy outputs. Furthermore, it aims to answer the question which initial policy network structures are likely to produce policy outputs whose characteristics maximise the utility of government. The chapter ends with some concluding remarks that are presented in section 7.4.

7.2 The Utility of Policy Outputs for Actors

The policy outputs of a policy network are the result of a coordinated effort, but not by definition of collective type II actions. Type II actions that aim to produce a policy output are, as chapter 6 has illustrated, often an effort of cohesive subgroups embedded within the global social structure of a policy network. These type II actions are more likely to be taken by such subsets of actors than by all actors because of the heterogeneous character of policy networks. Only if the policy network is entirely homogenous, are global type II actions likely to occur. Such fully connected homogenous social structures are however an unlikely network structure. Policy outputs will therefore often result from the type II actions of subsets of actors.

The fact that policy outputs are likely to be the result of the efforts of subsets of actors rather than of all actors in the policy network has some important implications for the utility of these outputs for individual actors. This section illustrates why policy outputs are likely to be of greater use to some network actors than to others. To assess the utility of policy outputs for individual network actors, it is necessary to determine an indicator of utility. The analysis of the utility of a policy output for an individual actor requires a multi-level network analysis. The analysis of network structures at the level of the individual, at the level of subsets of actors within a global network structure, and at the level of the global social structure are all of importance to assess the utility of policy outputs for individual actors. The section will first elaborate upon such a multi-level analysis before theorising on the relations between initial network structures and the utility of policy outputs for individual actors.

To illustrate the importance of the analysis of network structures at multiple levels, it is necessary to focus on the processes of steering in networks and the production of policy outputs from the perspective of one individual actor. Such an ego is embedded in the initial policy network. The social structure of that policy network consists of a set of composition variables and a set of states. Ego has certain attributes and maintains ties to other actors in the global social structure. One of ego's attributes is its policy position. The policy position of an actor is of particular importance because it determines ego's location in the global social structure. Moreover, the policy position of ego in the initial network structure represents the policy output most preferred by ego. Ego cannot, however, realise such a policy output in the initial network structure. The interdependency of actors in policy networks implies that none of the actors embedded within the global social structure of the policy network can unilaterally produce a policy output. Ego therefore needs to engage in a bargaining process over policy positions with other network actors before a policy output can be produced.

The bargaining over policy positions between actors is structured by the social structure of the policy network. Actors attempt to affect other actors' policy positions by means of their type I actions. The network structures provide opportunities to act, but at the same time impose constraints on these type I actions of actors. More specifically, the ego-centred local network structures affect

ego's opportunities to bargain over policy positions. The ego-centred local network structure comprises that part of the global social structure that ego is able to oversee. Ego determines its type I actions based on its perceptions of the opportunities offered and the constraints imposed by this ego-centred local network structure.

Ego's type I actions are thus determined by the extent to which ego is embedded in the social structure. The ego-centred local network structure affects ego's choice for particular type I actions in two distinct ways. The ego-centred local network structure offers opportunities to ego to act upon. But these network structures do not only affect the number of opportunities for type I actions but also the range of feasible type I actions. The range of type I actions is influenced by the ego-centred local structure because of the social capital that is embedded within the ties in the structure. Some ties between ego and alter might be strong. Strong ties exert social control over the behaviour of ego. Such strong ties therefore limit the range of possible type I actions. Weak ties, conversely, have a positive effect on the range of type I actions ego can take. Rather than social control, weak ties transmit social resources that ego can employ to its advantage.

Ego thus attempts to steer in its ego-centred local network structure within the limits of these structures. However, ego is not the only actor embedded in the global network structure seeking to affect others' policy positions. Each individual actor embedded within the global social structure of a policy network has an incentive to steer in the policy network. This incentive is the result of the interdependency between actors. Ego therefore also experiences pressure to change its own policy position. This pressure is caused by the type I actions of those actors that aim to make ego change its policy position. At the level of the individual actor this implies that ego not only attempts to steer in the network, but is also subject to the attempts of others to steer in the network.

The extent to which ego is able to steer in the policy network, as well as the extent to which ego is subject to the steering of other actors in the network are thus important for the development of the social structure of the policy network. For ego, the most pertinent question is the extent to which it can maintain its initial policy position while at the same time affecting those of others. This depends on the centrality of ego in its ego-centred local network structure relative to the centrality of others in their ego-centred local network structures. As chapter

5 explained, high levels of degree centrality, betweenness centrality, and closeness centrality facilitate ego's attempts to steer in its ego-centred local network structure. Conversely, if ego is less central in its ego-centred local network structure compared to other actors in their individual ego-centred structures, ego's policy position is likely to change as a result of other actors' type I actions. Such possible shifts in ego's policy position have one important implication for the utility ego experiences of potential policy outputs.

Ego's initial policy position represents its' most preferred policy output. In other words, no other policy output than the one reflected by ego's initial policy position would benefit ego to the same extent. If the type I actions of other actors embedded in the policy network steer ego away from this initial policy position, ego adopts a less preferable policy position. But given its location in the network and the ties it maintains with others, ego might still be able to maximise the utility of a policy output given the structural constraints of the network. Ego could not translate its initial policy position into a policy output because of its structural disadvantage compared to others. The newly adopted policy position therefore represents the policy output ego prefers given the constraints of the social structure at that particular point in time. Ego will, if necessary, keep shifting policy positions until the expected utility of the policy output represented by a certain policy position is zero.

The utility of a policy position that an individual actor adopts over time thus depends on the extent to which it represents ego's initial policy position. Such an adopted policy position, however, only represents the utility of potential policy outputs. Although the process of steering in networks is important for the production of policy outputs, shifts in policy positions do not result in policy outputs . The changes in the ego-centred local network structures are important not only for the extent to which ego can maintain its initial policy position, but also for the capacity of a policy network to produce policy outputs. Steering in networks changes the global social structure via the changing configuration of actors' ego-centred local network structures. Although ego might not be able to oversee the social structures beyond its ego-centred local network structure, the global network structure does affect ego. More specifically, the global network structure affects the extent to which ego's policy position at any point in time can result in a policy output.

The social structures of a policy network are important for the emergence of policy outputs in two distinct ways. Policy outputs result from type II actions, earlier defined as coordinated actions that aim to produce a policy output. This implies that type II actions are coordinated amongst a subset of actors. Such coordination of activities is more likely to occur in certain social structures than in others. Chapter 6 explained that social cohesion is the primary indicator of a social structure's capacity to coordinate type II actions. The ties within a local social structure are of particular importance for this type of action. In socially cohesive local network structures, the social control exerted on actors by the many strong ties they maintain limits deviant actions. If such deviant individual type I actions do occur, these actions are likely to provoke retaliation by other actors. If retaliation will cost an individual actor more than the likely gain from its type I actions, the actor will choose to engage in coordinated type II actions rather than to attempt to steer in the network any further. Given the constraints of the network structure, the actor's policy position reflects the policy output that would maximise the actor's utility at that particular moment. This is true for each actor embedded within the cohesive subgroup. The policy positions of actors embedded in a cohesive subgroup are therefore the same.

Besides the facilitation of type II actions, the global social structure affects the extent to which policy outputs are likely to emerge in a second important way. Not all type II actions will result in policy outputs, and this is due to the global social structure of a policy network. Although the occurrence of type II actions depends on the structural characteristics of a local network structure, the success of such actions depends on the global social structure. It is the ties between the cohesive subgroup and other parts of the global social structure are of particular importance. These ties between a cohesive subgroup and other parts of the global social structure determine the extent to which the cohesive subgroup is central. Chapter 6 illustrated why only the type II actions of those cohesive subgroups that are central in a global social structure can result in policy outputs.

Policy outputs are thus the result of the type II actions of a cohesive subgroup that is central in the global social structure. At any discrete point in time, actors within a cohesive subgroup have the same policy position. Differences between these actors in terms of their initial policy positions have been resolved by the process of steering in networks. The policy output resulting from the cohesive

subgroup's type II actions will reflect this shared policy position. The utility of the policy output is therefore maximal for each individual actor embedded in the cohesive subgroup given the structural conditions at that particular point in time. However, this does not mean that the utility of the policy output is the same for each of these actors, but rather depends on the extent to which it represents this actor's initial policy position.

Throughout the process of steering in networks, some actors will be forced to adopt policy positions that differ from their initial policy position. Other actors can at the same time maintain a policy position that maximises their individual utility. The extent to which such shifts in policy positions occur depends on the extent to which an actor is central in its ego-centred local network structure relative to other actors. Actors that are more central in their ego-centred local network structure are in a better structural location to steer in the network. Such actors will therefore maintain their policy position. At the same time, these more central actors can steer less central actors to adjust policy positions closer towards their own. The shifts in policy positions of some actors increase the social cohesion in that particular part of the network structure, but they also have an important implication for the actors subject to this steering in the network. Their shifts in policy position imply that given the structural conditions, these actors cannot realise their preferred policy output. However, these actors can attempt to maximise the utility of the policy output by adopting an altered policy position. A cohesive subgroup will therefore adopt the policy position of the actor that was most central in its initial ego-centred local network structure relative to the centrality of the other actors embedded within the cohesive subgroup. The utility of a policy position that an individual actor adopts over time thus depends on the extent to which it represents ego's initial policy position. When ego's policy position at a certain point in time becomes a policy output, the utility of this output for ego is therefore determined by the extent to which it represents ego's initial policy position.

It is at this point possible to formulate some hypotheses on the utility of policy outputs for individual actors. But before presenting these hypotheses, it is necessary to underline two important conditions that apply if an individual actor experiences any utility from a policy output. Firstly, policy positions can become policy outputs only if the policy position is shared among the members of a

cohesive subgroup that manages to coordinate its type II actions. This implies that ego must be part of a cohesive subgroup. And secondly, the cohesive subgroup in which ego is embedded must be central in the global social structure because only the type II actions of central cohesive subgroups are likely to result in policy outputs. Given these conditions one can argue that:

9. The utility of a policy output for ego is determined by the extent to which it reflects ego's initial policy position.

10. Given the structural conditions, a policy output maximises the utility of ego.

And:

11. The more central ego is in its initial ego-centred local network structure, the higher the utility of the policy output for ego will be.

This section has elaborated on the utility of policy outputs for individual actors. It has illustrated that the extent to which an actor is able to steer in a policy network is of particular importance for its opportunities to produce a beneficial policy output. An actor's capacity to steer in a policy network depends on the structural opportunities offered and constraints imposed by its ego-centred local network structure. The section has also illustrated why an analysis at the individual level does not suffice to determine the utility of a policy output for a particular actor. The changes in the ego-centred local network structures of an actor affect the configuration of the global social structure. These changes in the global social structure are important for policy outputs. Policy outputs are the result of coordinated type II actions. Such coordination can only occur if local structures embedded within global policy networks are sufficiently cohesive. Furthermore, type II actions will only result in policy outputs if such a cohesive subgroup is central in the global social structure. To benefit from policy outputs, an actor therefore needs to be part of the most central cohesive subgroup. To become part of such a cohesive subgroup might imply that an actor needs to adjust its policy position. Such a shift in policy position might limit the benefits of the prospective

policy output for the actor. It does however offer the actor with an opportunity to maximise its utility given the structural constraints the policy network imposes on this actor.

7.3 The Utility of Policy Outputs for Government

Now that the previous section has illustrated how the utility of a policy output for an individual actor can be assessed, the current section focuses on the utility of such outputs for government. The utility of policy outputs for government, similar to the utility of policy outputs for actors, depend upon the characteristics of the policy output. These characteristics of policy outputs are determined by the range of feasible type II actions. In the case of an individual actor, the utility of a policy output is indicated by the extent to which the output reflects the actor's initial policy position. In a similar vein, the utility of a policy output for government is determined by the extent to which it reflects government's policy goals. However, different from the policy positions of actors, government's policy goals are not part of the social structure of the policy network. Government can be represented in the policy network by actors. Policy goals are in such a case translated into the policy positions of such actors. These actors are subject to the same type of interdependence as other network actors. They might steer in the network, but also be subject to steering in the network. In the process of steering by networks, government's policy goals are an independent variableand therefore do not change due to interactions in the policy network. This exogenous nature of policy goals has some important implications for the analysis of the utility of policy outputs for governments. This section will firstly elaborate upon these implications and introduce the indicators of the utility of policy outputs for government. After that, the section will focus on different initial network structures and the expected utility of policy outputs for government.

Steering by policy networks implies that government employs a policy network as an instrument to steer society. The choice to use a policy network rather than leaving an issue to the market, or employing hierarchical command-and-control is often based on the characteristics of government's policy goals. Policy networks are often considered a more effective and efficient mode of

coordination than other modes of coordination to obtain certain policy goals. One of these policy goals is to facilitate the production of a policy output that is supported by a variety of stakeholders. Such broad societal support can increase the legitimacy of the policy output (a.o. Marsh & Rhodes, 1992; Marsh & Smith, 2000; Richardson & Jordan, 1979; Van Waarden, 1992; Wilks & Wright, 1987). Furthermore, the consultation of many actors' interests in the policy network is often considered to affect implementation. Policy outputs resulting from policy networks are considered to meet less resistance in the implementation process than policy outputs of hierarchies. Policy networks are sometimes also utilised as a tool to overcome increasing degrees of functional differentiation in modern societies (cf. Benz, 1992; Börzel, 1998; Kenis & Schneider, 1991; Mayntz, 1997a, 1997b; Pappi & Henning, 1999; Skogstad, 2005). Policy networks are in such cases considered to have the capacity to acquire the resources necessary for effective and efficient policy formulation and implementation. And finally, policy networks are sometimes considered to be able to produce policy outputs that are more innovative than the outputs of other modes of societal coordination (cf. Kickert & Koppenjan, 1997; Klijn, 1997, 2005; Provan & Kenis, 2007; Provan & Sebastian, 1998; Scharpf, 1978, 1994).

Policy networks can thus be employed by governments as an instrument to obtain three generic policy goals. This implies that government utilises these policy networks as an instrument to steer society. Employing a policy networks does not guarantee that its policy outputs reflect the policy goals government had in mind. The policy goals of government are exogenous to the policy network. They are not part of the structure of the policy network. Government might have some control over the initial policy network, but cannot control or steer the interactions between interdependent network actors. It can nevertheless participate in the policy network as an actor subject to the same processes as other network actors. Policy goals therefore serve as an input in the policy process.

The fact that government's policy goals are exogenous to the policy network has one important implication. Policy goals are not subject to the process of steering in networks. Shifts in policy positions of at least some network actors are necessary within the policy network because of the interdependency between actors. This is not the case with government's policy goals. Government is rather independent from the policy network because it has the executive and legislative

power to produce policy outputs. It does not rely on the policy network for a policy output *per se*. In other words, policy networks operate in the shadow of the hierarchy (cf. Mayntz, 1997a, 1997b).

Government's policy goals are thus an independent variable in the process of steering by networks. The policy network is an intervening variable, and the policy output the dependent variable. The policy network is therefore a variable in the process of steering by networks. This does however not imply that the variables of the policy network are irrelevant for the process of steering by networks. The utility of policy outputs for government depends on two factors. The first factor is endogenous to the policy network. The utility of a policy output for government depends on the initial network structure and its dynamics over time. This process of steering in networks determines not only if policy networks have sufficient structural capacity to produce policy outputs, but also which policy position will be translated into an output. The characteristics of a policy output are therefore determined within the social structures of the policy network. The process of steering by networks therefore depends upon the process of steering in networks.

The second factor is exogenous to the social structure of the policy network. The utility of policy outputs for government depends on the extent to which policy outputs reflect the policy goals formulated by government. The utility of a policy output for government is therefore determined by the absolute characteristics of actors' initial policy positions. This is best explained by an example. Suppose that government's policy goal is to employ a policy network that will produce an innovative policy output. The characteristics of the policy output that results from this policy network therefore need to have an absolute level of innovativeness if the policy goal is to be reached. These characteristics are however, determined by the type II actions of a subset of actors. The process of steering in networks determines around which policy position a cohesive subgroup will form that coordinates its type II actions. Therefore only if the policy position that is translated into a policy output is innovative in an absolute sense, is its utility for government maximal. The extent to which these absolute characteristics of actors' policy positions allow the attainment of government's policy goals is an empirical question. It is therefore impossible to generalise on the utility of policy outputs for governments in an absolute sense. It is

nevertheless possible to theorise on the relations between an initial network structure and the policy position that is translated into a policy output. It is therefore necessary to identify structural indicators of those characteristics of policy outputs that relate to government's policy goals. The remainder of this section will first attempt to identify these indicators for policy goals geared towards innovation, legitimacy, and overcoming functional differentiation respectively.

The extent to which a policy output might be characterised as innovative depends on the characteristics of the policy position that is translated into an output. The innovativeness of an actor's policy position relative to the policy position of other network actors is indicated by the actor's structural location in the initial policy network. Innovative ideas emerge at the edges of a social structure (cf. Coleman, 1988, 1990; Granovetter, 1973, 1983). The actors located at the periphery in a policy network have policy positions that have few elements in common with the positions of few other network actors. Conversely, actors located at the core of the global social structure have policy positions that have many elements in common with others. A policy output will therefore display innovative characteristics if it reflects the policy position of an actor located at the edges of an initial social structure. If the policy output reflects the policy position of an actor that was originally located at the core of a policy network, the policy output will be less innovative.

For the extent to which a policy output is experienced as legitimate by network actors, the process of steering in networks is of particular importance. Unlike the extent to which a policy output might display innovative characteristics, the endogenous legitimacy of an output is not primarily indicated by the content of the policy output, but by the support of network actors. The extent of support for a particular policy output is determined by the number of actors that have engaged in type II action and produced a policy output accordingly. The coordination of such type II action implies that these actors form a cohesive subgroup in the global social structure. The size of this cohesive subgroup relative to the number of actors that are embedded in the global network structure therefore indicates the extent to which a policy output might be experienced as legitimate by the network actors.

Functional differentiation implies that society is increasingly specialised and fragmented. It indicates a complex balance of interdependence and independence between societal subsystems. Policy networks might be able to deal with such functional differentiation more effective and efficient than hierarchies or markets. It is however impossible to theorise on the structural capacity of differently-structured policy networks to overcome functional differentiation. In other words, there are no structural characteristics of policy outputs that indicate the extent to which such a policy output overcomes functional differentiation. It rather depends entirely upon the absolute characteristics of the variables of the policy network. The extent to which a policy output might overcome functional differentiation in society will therefore not form a part of the analysis presented in the remainder of this section.

Now that the structural indicators of the characteristics of policy outputs have been introduced, it is possible to elaborate upon the utility of policy outputs for government under different structural conditions. Differences in the initial social structures of policy networks affect its dynamics. These differences in the development of network structures affect the capacity of a policy network to produce a policy output. Furthermore, these differences affect the characteristics of policy outputs. The remainder of this section focuses on various initial policy network structures. It presents a set of hypotheses on the extent to which these initial policy network structures are likely to produce policy outputs with different structural characteristics.

Consider a global network structure that is initially very sparse. The sparse social structure of the policy network implies that the actors have policy positions that differ considerably from one another. It also indicates that there are few ties between the actors. The actors in such an initial policy network structure are effectively regularly-equivalent because each actor has ties similar to others. The opportunities to steer in the network are limited. The regular equivalence indicates that actors have similarly structured ego-networks and ego-centred local network structures. This similarity in their immediate surroundings limit the opportunities actors have to steer in the network because few, if any, actors have a structural advantage over others. The process of steering in networks is however crucial for the structural capacity of a policy network to produce policy outputs. Steering in networks implies that some actors will affect the policy

positions of other actors via their type I actions. Such adaptations of policy positions are necessary for the production of policy outputs. These shifts of some actors' policy positions towards the position of other actors result in increased degrees of social cohesion in the network structure. The degree of social cohesion, in turn, is important for the policy network's structural capacity to produce policy outputs.

In a policy network that is initially sparse, however, the type I actions of individual actors are unlikely to have a significant effect on the social structure. The social structure is such that none of the actors is central in its ego-centred local network structure relative to others. The utility of a policy output for an individual actor depends on the extent to which such a policy output represents its initial policy position. A shift away from the initial position would imply a loss in prospective utility, given the constraints of the social structure at that particular point in time. Actors will therefore be inclined to maintain their initial policy position and the social structure remains relatively sparse. This lack of social cohesion implies that the network structure does not contain any cohesive subgroups that might coordinate their type II actions. Since policy outputs are the result of such type II actions, sparse network structures are therefore unlikely to produce any policy outputs. Hypotheses on the characteristics of these outputs can therefore not be formulated.

Next to the very sparse network structures another extreme initial structure can be identified. Networks that are both very dense and transitive are socially cohesive. In such policy network each actor has ties to (almost) all the other actors. Actors in very dense and transitive structures are therefore to a large extent structurally equivalent. Based on the arguments of homophily, these actors therefore also have the same or very similar policy positions. Steering in these networks is not possible due to this structural equivalence, but it is also not necessary. Policy networks whose initial social structures are socially cohesive form a global cohesive subgroup. The local network structure in such a case coincides with the global social structure. Type II actions can quickly be coordinated amongst all the actors. These type II actions will result in policy outputs because there is no opposing cohesive subgroup. The policy output is thus supported by each actor in the network. The legitimacy of the policy output

is therefore maximal given the structural constraints of the policy network structure.

Dense and homogenous policy networks are thus a very effective and efficient policy instrument if the policy goal is to produce policy outputs that are experienced as legitimate by the network actors. Such socially cohesive and decentralised structures also imply that none of the actors is located at the edges of the policy network. The actors embedded in its structure are structurally equivalent and therefore have the same policy position. The social structure of the initial policy network is therefore less likely to have the structural capacity to produce policy outputs with innovative characteristics.

Most policy networks, however, will not be structured as are the two extremes previously described. Some actors will have structural advantages over others and will therefore have more opportunities to steer in the network. As shown in chapter 5, the extent to which an individual actor can steer in the network depends on its centrality. The variation in actors' centrality indicates the extent to which a policy network is centralised. The more centralised a global network structure, the more opportunities certain actors have to affect others' policy positions. The degree to which the initial global social structure of a policy network is centralised is therefore important for the structural capacity of the network to produce policy outputs that can be characterised as legitimate or innovative. Furthermore, policy networks might contain differently-structured parts. Some initial policy network structures are likely to be more (locally) socially cohesive than others. Such social cohesion affects the extent to which type II actions, and therefore policy outputs, are likely to occur.

Consider a global social structure of a policy network that is initially strongly centralised. The centralised social structure implies that the most central actor has major structural advantages over other actors embedded in the network. This actor is therefore in an excellent position to steer in the network while maintaining its initial policy position. The central actor can steer others in the policy network towards adopting its preferred policy position. In terms of network dynamics, this implies that a cohesive subgroup will emerge around the central actor. The actors in this cohesive subgroup have all adopted the policy position of the most central actor. As the process of steering in networks continues, more actors will experience an incentive to adopt that particular policy

position. This incentive is a result of the constraints that the network structure imposes on these actors to realise their preferred policy position. This process of adaptation continues until an actor faces higher costs of adaptation than benefits of the potential policy output. Policy outputs emerging from the type II actions of cohesive subgroups that have formed around an initially central actor are therefore likely to reflect a 'lowest common denominator' policy position rather than a policy position that many actors are opposed to. Initially centralised policy network structures are therefore likely to produce policy outputs that are experienced as legitimate by most actors in the global structure.

The structures of initially centralised networks have a different effect on the characteristics of the policy output in terms of its innovativeness. Innovative ideas are considered to emerge at the edges rather than at the core of the network. On the range of policy positions present in the initial global social structure of the network, the central actor is positioned in the middle. The relative degree of innovativeness of its position is therefore the lowest possible given the structural capacity of the policy network. The social structure of a policy network that is initially centralised therefore does not have the capacity to produce policy outputs with innovative characteristics.

The same arguments apply as much to policy networks with one cohesive subgroup in their initial network structure as to policy networks that are initially centralised around one actor. If only one cohesive subgroup is present in the global social structure of a policy network, this subgroup is by definition central. Cohesive subgroups in a global social structure imply that actors in cohesive subgroups have more ties to subgroup members than to other actors. At the same time, actors that are not embedded in that particular locally cohesive structure have few ties. The degree centrality of subgroup actors is therefore higher than the degree centrality of actors in other parts of the global social structure. The policy network is therefore centralised around the cohesive subgroup. Actors within such a central subgroup share the same policy position. Furthermore, their central location in the network provides them with structural advantages that enable these actors to steer in the network. Similar to policy networks whose global social structures are initially centralised around one actor, network structures initially containing one cohesive subgroup are likely to diffuse the policy position of the cohesive subgroup through the network structure. The

policy outputs of such initial network structures are therefore likely to be experienced as legitimate. The social structure does, however, not have the capacity to produce policy outputs with innovative characteristics.

The initial social structures of a policy network can also contain multiple cohesive subgroups. In such an initial social structure, some actors will have the same positions, while other actors share a different position. Actors that share a policy position are part of a cohesive subgroup. Policy networks in which multiple cohesive subgroups are present are therefore locally cohesive, but globally fragmented. This global fragmentation of a network structure has some important implications for the extent to which policy outputs are a likely result of type II actions. Chapter 6 explained that type II actions of one cohesive subgroup in such a network structure do not necessarily result in a policy output. Although ties within the cohesive subgroup facilitate type II action, it is the ties between the cohesive subgroup and other parts of the network which determine if these actions result in policy outputs. Only if the acting cohesive subgroup is central in the global social structure will its type II actions produce policy outputs. If however the opposing cohesive subgroup has more ties to other parts of the network structure, type II actions will not result in policy outputs.

The centrality of a cohesive subgroup is thus important at the time that type II actions are taken. It is equally important in the initial network structure because it affects the characteristics of policy outputs. Consider an initial policy network structure with multiple cohesive subgroups of which one is central. The centrality of this cohesive subgroup indicates that its actors have more bridging weak ties to other parts of the policy network than other cohesive subgroups. This implies that the central cohesive subgroup is in a better structural position to steer actors in the non-cohesive parts of the global social structure. Actors in those other parts of network structure might experience an incentive to shift their initial policy position towards the position of the central cohesive subgroup. The number of actors that will adapt this policy position of the central cohesive subgroup is however significantly lower in these network structures than in networks (of equal size) that contain only one cohesive subgroup. More cohesive subgroups in an initial network structure decrease the centrality of each group in the global social structure. Each cohesive subgroup, including the most central one, will therefore have fewer opportunities to steer in the network. This reduction in the

opportunities to steer in the network implies that fewer actors will adopt the position of the central cohesive subgroup. The policy outputs of these network structures are therefore experienced as legitimate by fewer actors than policy networks containing initially only one such subgroup.

The policy outputs of policy networks that initially contain multiple cohesive subgroups of which one is central are nevertheless unlikely to have innovative characteristics. The same arguments as presented above apply. The innovativeness of a policy position is determined by a cohesive subgroup's location in the initial global social structure. The cohesive subgroups that are not central have policy positions with more innovative characteristics than the central cohesive subgroup. In other words, the policy position of the central cohesive subgroup does not reflect the most innovative policy position available in the global social structure. The policy outputs of such initial network structures are therefore unlikely to display innovative characteristics.

The initial social structures of a policy network can also contain multiple regularly equivalent cohesive subgroups. In such a situation, each cohesive subgroup has different, but equally innovative policy positions. In policy networks that display such initial structural characteristics, the process of steering in networks is particularly important. The initial social structure is locally cohesive, and globally fragmented. Each cohesive subgroup is equally central in a local part of the global social structure. Each cohesive subgroup is therefore in an excellent position to steer in these local parts. The global social structure is nevertheless decentralised. Centrality only occurs at the local levels, but of these local parts, none is more central than others. As long as this regular equivalence of the cohesive subgroups is present, policy outputs are unlikely to emerge, because other groups can mobilise sufficient opposition. The cohesive subgroups therefore need to steer in the network to such an extent that their group becomes the most central one in the global social structure.

Steering in local network structures will not further advance a cohesive subgroup's global centrality. Steering in networks will therefore rather be aimed at bridging the structural holes present between its own policy position and that of another cohesive subgroup. The regular equivalence between two cohesive subgroups implies that the network structure does not offer one cohesive subgroup any structural advantages to steer in the network over another cohesive

subgroup. Cohesive subgroups therefore need to shift away from their initial policy positions towards that of another. This process continues until two groups adopt the same policy position. What were initially two different cohesive subgroups have become one such group due to the steering in the network. If an initial policy network structure contains only two of these cohesive subgroups, steering in the network leads to a situation where the innovative aspects of each group's initial position are discarded. The policy output will in such a case not display the innovative characteristics of the initial policy positions.

If policy networks start out with a social structure in which at least three cohesive subgroups are regularly equivalent, policy outputs can display innovative characteristics. Although the cohesive subgroups must still move away from their initial policy position because of the global social structure, not all innovative aspects have to be negated. A cohesive subgroup might be able to shift its position along the edges of the social structure towards the position of another cohesive subgroup. This allows the innovative aspects the subgroup had in common with the cohesive subgroup adjacent to it to remain part of the adopted policy position. The two cohesive subgroups merge into one and thereby become central in the global social structure, allowing the production of policy outputs. In such a case, only a relatively limited proportion of the network actors are likely to form part of the merged cohesive subgroup. Compared to the initial structures discussed earlier, the social structure of this particular network is likely to remain relatively globally fragmented, despite the clustering that takes place locally. The policy outputs of initial network structures that contain at least three regularly cohesive subgroups are therefore supported by only a limited number of actors. The legitimacy of these policy outputs is therefore limited.

At this point it is possible to formulate some hypotheses on the endogenous structural capacity of policy networks with different initial social structures to produce policy outputs with certain characteristics. The hypotheses are only valid if the initial network structure provides at least one actor with a structural advantage over others. The hypotheses are therefore invalidated in the case of policy networks with either of two initial network structures. The first of these policy networks is one that is initially very sparse. The second network structure is a policy network that is fully connected. For all the other initial structures discussed in this section, the following hypotheses apply:

12. The more centralised an initial network structure, the more legitimate its policy outputs will be experienced by its actors.

13. The more centralised an initial network structure, the less innovative its policy outputs will be.

14. The more cohesive subgroups a policy network's initial social structure contains, the less legitimate its policy output will be experienced by its actors.

One additional hypothesis can be formulated around the extent to which a policy network is likely to produce a policy output with innovative characteristics, although this hypothesis is only valid under specific conditions. Only if an initial policy network structure contains at least three cohesive subgroups that are regularly equivalent in the global social structure, the following applies:

15. The more cohesive subgroups a policy network's initial social structure contains, the more innovative its policy outputs will be.

This section has elaborated upon the process of steering by networks. It argued that the extent to which policy networks are an effective and efficient policy instrument depends on the contribution of the policy outputs to government's policy goals. More specifically, the utility of policy outputs for governments depends on the characteristics of these outputs. The section explained that the extent to which a policy network can produce a policy output that facilitates the attainment of government's policy goals depends on both the absolute capacity and the structural capacity of the policy network. The absolute capacity refers to the characteristics of the variables of the network. The absolute capacity of a policy network to produce policy outputs that maximise government's utility is therefore an empirical question. The structural capacity of a policy network to contribute to the attainment of policy goals can be derived for two policy goals. The section argued that the location of an actor in the initial policy network indicates the relative innovativeness of its policy position. Furthermore, it was

argued that the legitimacy of an output depends on the number of actors that support such an output. This support is indicated by the number of actors that engage in the type II actions that result in a policy output.

Based on these indicators of the structural capacity of a policy network, different initial social structures were analysed. The conclusion is that, with the exception of two extreme types of structures, centralisation increases the legitimacy of a policy output. At the same time, the analysis illustrated that centralisation reduces the capacity of a policy network to produce policy outputs with innovative characteristics. Furthermore, policy outputs that can be considered innovative within the structural constraints of the policy network are only likely to occur under very specific structural conditions. Only if an initial policy network structure contains at least three regularly cohesive subgroups can innovative policy positions be translated into a policy output. These structural conditions however decrease the legitimacy of an output. One important conclusion emerges from the analysis presented in this section. Regardless of their initial network structure, policy networks lack the requisite structural capacity to produce policy outputs that are both legitimate and innovative. Policy network structures can only facilitate steering by networks for one policy goal at the time. This does not mean that policy networks are unable to simultaneously contribute to multiple government policy goals. Whether this happens depends upon the absolute capacity of the policy network and is therefore an empirical question.

7.4 Concluding Remarks

This chapter has linked the initial social structures of a policy network to policy outputs. The linkage of initial policy network structures to policy outputs is important for several reasons. The initial structural characteristics of a policy network determine the network's structural developments over time. These structural outcomes of the process of steering in networks determine in turn the network's capacity to produce policy outputs. Furthermore, the structural characteristics of a policy network affect the structural characteristics of its policy outputs. These characteristics of a policy output are important because they

determine its utility for both individual network actors and government. The initial social structures of a policy network are therefore not only important for the process of steering in networks. They are equally relevant for the process of steering by networks.

Section 7.2 elaborated on the utility of policy outputs for individual network actors. It argued that such an analysis is necessary because policy networks are heterogeneous rather than homogenous. Type II actions are not global, but rather the collective actions of a local structure embedded within the policy network, because of differences between network actors.. The utility of a policy output differs therefore between actors. Section 7.2 argued that the indicator of the utility for an individual actor is the extent to which the policy output reflects the actor's initial policy position.

The utility of a policy output for an individual actor can be assessed by performing a multi-level network analysis. An analysis of an actor's ego-centred local network structures is necessary because these structures determine the actor's capability to steer in the network. Furthermore, the ego-centred local network structures of other actors determine the extent to which an actor is subject to steering in the network. An analysis at this level thus provides information about the extent to which ego can maintain its initial policy position. Although knowledge about the extent to which an actor is able to maintain its initial policy position is important, it is not insufficient to determine what utility an actor will derive from policy output. An actor will only experience any utility if its position is translated into a policy output. Policy outputs are the result of the type II actions of a subset of actors embedded in the global social structure of the policy network. Only those local network structures that are sufficiently socially cohesive can coordinate such type II actions. An actor therefore needs to be part of such a cohesive subgroup. The identification of such subgroups and their members requires an analysis of differently-structured elements within the global network structure. Furthermore, it is necessary to analyse the location of an acting cohesive subgroup in the global social structure. The type II actions of cohesive subgroups are only likely to result in policy outputs if the cohesive subgroup is central in the global social structure. The utility of a policy output for an individual therefore depends, firstly, on the extent to which an actor could

maintain its initial policy position, and secondly, on the position of the actor in the global social structure when type II actions occur.

Section 7.3 elaborated upon the process of steering by networks. It argued that the extent to which a policy network is an effective and efficient policy instrument depends on the utility of its policy outputs for government. Section 7.3 explained that the characteristics of policy outputs depend not only on the structures of a policy network, but also on the characteristics of elements within these structures. Policy networks therefore have both an absolute and a structural capacity to produce policy outputs with certain characteristics. The absolute capacity of policy networks to facilitate the attainment of government's policy goals is an empirical question. The structural capacity of a policy network can nonetheless be assessed from the network's initial structures.

The section continued with an analysis of different initial policy network structures. Based on the initial policy positions of actors, the relative degree of innovativeness of a policy output was analysed. Next to the extent to which policy networks display innovative characteristics, section 7.3 focused on the extent to which policy outputs might be experienced as legitimate. The hypotheses presented point to an important conclusion. Regardless of the initial social structure, policy networks do not have the structural capacity to produce policy outputs that are simultaneously innovative and experienced as legitimate by many network actors. If government aims to reach multiple policy goals by steering by a policy network, then it is both the absolute and the structural capacity of the policy network that determine its effectiveness and efficiency.

8 Summary and Reflections

8.1 Introduction

This study has explored the opportunities to strengthen policy network literatures by the development of a network theory rooted in social network analysis. Part one of this thesis had the task of reviewing the state of the art in the network literature. Part two focused on the development of a theoretical framework of steering in and steering by policy networks. Part three consists of the current chapter. This final chapter's task is to provide an overview of the development of the theoretical framework of steering in and steering by policy networks. It elaborates upon the main question that has guided this research:

> To what extent can a theory be developed that captures both the process of steering in policy networks and the process of steering by policy networks?

In order to provide an answer to this research question, the chapter focuses on the conceptual anchors derived from the network literature and employed in the modeling in part two. Furthermore, the chapter focuses on two specific processes of steering as identified in the introduction to this book. The distinction between these processes of steering in policy networks and steering by policy networks are considered crucial to advancing the explanatory value of policy network models. They form the basis for the theoretical elaborations presented in part two of this thesis. A second task of this chapter is to reflect on the theoretical explorations and the resulting model. The choices for particular theories and approaches and the assumptions made throughout part two have affected the outcome of this research. Different choices might have led to different hypotheses on the relations between network structures and policy outputs. The chapter will elaborate upon both the opportunities offered by the various theories upon which the model of steering in and steering by policy networks builds, but will also point to the

limitations of these theories. The final task of this concluding chapter is to highlight and suggest opportunities for further research.

The chapter is structured as follows. Section 8.2 summarises the main findings of the chapters. The section is structured along the lines of the research questions posed in the introduction to this thesis. It will reflect on the literature reviews presented in part one. The section then pays specific attention to the second part of the thesis, focusing in particular on the theoretical foundations and elaborations presented earlier. Section 8.3 reflects on the extent to which choices for particular theories and assumptions affect the potential utility of the model of steering in and by networks. Furthermore, the section reflects on the opportunities and limitations of the model of steering in and by networks. The final section indicates opportunities for further research.

8.2 Steering in and Steering by Policy Networks

This section presents a summary of part one and part two of this thesis. Part one comprised chapters 1, 2 and 3 and was occupied with an introduction of the processes of steering in and steering by policy networks, as well as a review of the network literature. The first chapter introduced the background of the study and pointed to the need for a more specific view on the process of steering in policy networks and the process of steering by policy networks. Furthermore, chapter 1 set out the questions guiding the research presented in subsequent chapters. The research presented in chapters 2 and 3 was guided by the following research question:

- Which concepts and theories of the network literature are relevant for the processes of steering in networks and steering by networks?

Chapter 2 focused on identifying the main concepts and approaches in policy network literatures. The chapter argued that policy network literatures developed in three distinct cycles, each with its own conceptualisation and specification of the variables and processes to policy networks. The first cycle comprised two perspectives. One of these perspectives is interest intermediation, which focuses

on the interactions between government and various interest groups in differently-structured policy networks. This strand of literature developed several typologies. These typologies are based on various dimensions along which policy networks might vary. Next to interest intermediation, the first cycle literature comprises the governance approach to policy networks. This approach views policy networks as a mode of governance, distinct from hierarchies and markets. Rather than focusing on the characteristics of different policy networks, the governance school pays specific attention to the differences between the modes of governance.

Critics of the early policy network literature have pointed to the lack of explanatory value of both the interest intermediation literature and the governance approach. Their arguments focus on three weaknesses of the policy network approach in particular. The first argument points to the tendency of the literature to focus on actors and the characteristics of these actors, without offering a clear concept identifying relations between these actors. Also related to this criticism is the argument that the policy network literature tends to characterise policy networks as a unified variable, rather than focusing on the differences within these networks. The final point of criticism stresses that neither the interest intermediation approach nor the governance school offers a clear conceptual link between the policy network and policy outcomes. Due to these theoretical problems, the first cycle analysis has often been considered a metaphor, or a heuristic tool.

The second cycle literature developed from a more managerial perspective rather than as a response to the debate between the interest intermediation school and the governance approach to policy networks. The network management literature focuses explicitly on network steering, distinguishing generally between two management strategies. One strategy is aimed at influencing the interactions between interdependent network actors in such a way that cooperation can be achieved. The second strategy attempts to change the institutional characteristics of a policy network to enhance its capacity to produce policy outcomes. Such steering of a policy network, the network management literature argues, is performed by a network manager.

The network management literature does not focus explicitly at solving the conceptual issues related to policy network analysis. It does however contribute

one aspect of particular importance to the policy network literature. The second cycle literature underlined the necessity of studying the dynamics of policy networks, and in particular the changes in policy networks due to steering. This steering, however, is attributed to a network manager. Such a network manager is treated as an outsider that provides the impetus for changes within a policy network. This external character of the network manager implies that there are two important assumptions in this body of literature. Firstly, the network manager is considered to be able to completely assess the policy network and determine its steering strategies accordingly. And secondly, changes in a policy network are the result of the efforts of a network manager, and not of the actors embedded within it.

The introduction of network dynamics is a valuable contribution of the second cycle literature. The problems related to the first cycle literature have, however, proven to be rather persistent. Policy network analysis in the first and second cycle has a strong empirical focus. The models and concepts introduced in both cycles are not generalised to an extent that a policy network theory has emerged. The third cycle of policy network literature has taken up the task of strengthening the conceptual anchors of policy network analysis. Based on social network analysis, this third cycle offers two approaches to policy networks. One approach is geared towards providing *ex post* explanations of the policy outcomes of policy networks. The second approach focuses rather on the changes in the structures of a policy network over time. The third cycle of policy network literature appears to have dealt with one of the core problems of policy network analysis. The application of a social network definition to policy networks allows the identification of relational variables which earlier policy network approaches often lacked. Furthermore, the application of social network analysis provides the opportunity to deal with another important weakness of policy network analysis. If a network structure is defined as a set of composition variables and relational variables, the data collected on these variables offers the chance to study differences within a policy network.

The opportunities which social network analysis offers for strengthening policy network analysis have thus been highlighted by the most recent strand of policy network literature. One major problem nevertheless persists. The conceptual link between the policy network and its potential policy outcomes is

still missing. Explanations of policy outcomes are *ex post* and derived from organisational theories rather than network theories. Chapter 3 focused on the social network literature and the theories upon which it builds in more detail. The chapter aimed to assess if such a conceptual link between network and outcome might be derived from this body of literature. After presenting the historical evolution and main concepts of social network analysis, chapter 3 elaborated on different modes of social network analysis. Based on the sociological notions of social roles and social positions, a network analysis can be performed in two distinct, but not mutually exclusive, ways. Positional analysis gives primacy to positions, statuses, and structures. Role analysis on the other hand focuses on how different positions mutually relate due to the associations among relations.

The two modes of network analysis are particularly important for empirical network analysis, and provide concepts and variables to map the social structures of a network. The modes of network analysis do not however offer the tools to interpret these social structures. Chapter 3 therefore also presented a range of models of network structures. These models are based on mathematical properties and their applicability differs between the two modes of analysis. Furthermore, the models have been developed to characterise social structures at different levels of analysis. Social network analysis generally distinguishes between three such levels of analysis. The lowest level is concerned with the individual network actor. At an intermediary level the social structures of subsets of actors can be studied. Social network analysis also offers models that can characterise a network's global social structure, indicating the degree of social integration among a defined set of actors.

The models of network structure are important tools for characterising social structures, but they do not offer explanations of the extent to which a social structure affects action. Such explanations are offered by theories building on social capital. Social capital is a form of capital embedded in the relations between pairs of actors. It cannot be attributed to an individual actor. Social capital can be both a resource an actor can utilise to its advantage and a constraint on an actor's actions. Social structures offer individual actors opportunities to act. The social capital embedded within an actor's weak ties to other network actors facilitates such actions. Conversely, strong ties exert social control on individual actors and thus constrain their opportunities to act. Social control can nevertheless also be an

important resource. By constraining individual actions, it facilitates collective actions. Whereas weak ties are of particular value for individuals, strong ties are thus important for groups of actors.

The models of network structure and the theories that interpret the effects of social structures on actors offer some interesting opportunities to strengthen policy network analysis. Based on the analysis of the state of the art of the policy and social network literature in part one, the second part of this thesis utilised the opportunities offered by both network approaches. It focused on the development of a policy network model that includes both the process of steering in and of steering by policy networks. Part two was guided by the following three research questions:

- Can a model be developed that links the structural characteristics of a policy network to its structural outcomes?
- Can a model be developed that links the structural characteristics of a policy network to its policy outputs?
- What are the implications of the processes of steering in networks and steering by networks for:
    - the utility of a policy network for network actors?
    - the utility of a policy network as a policy instrument for government?

Chapter 4 focused in particular on defining the causality between the relevant concepts and variables identified in part one. It argued that the horizontal bargaining over policy positions between network actors comprises the process of steering in the policy network. Actors have different policy positions regarding their preferred policy outputs. These policy positions are an important actor attribute that determine an actor's location in the global social structure of a policy network. A policy output cannot be realised unilaterally, making actors in a policy network interdependent. This interdependency implies that at least some actors need to adopt a different policy position if the policy network is to produce a policy output. Such shifts in policy positions do not come about voluntarily. Each actor embedded within the policy network will attempt to affect others' policy positions, while maintaining their own. These attempts are an actor's type I

actions. Type I actions are therefore individual actions that aim to change the social structure of a policy network. The model of steering in policy networks thus links the initial social structure of the policy network to its future structure via the type I actions of the actors.

Steering by policy networks, chapter 4 argued, is a process that takes place at a different level to the process of steering in networks. Steering in networks takes place within the structures of the policy network. The interdependency between actors requires that, in order to produce a policy output, at least several actors must adopt a policy position that differs from their initial position. These interactions between network actors change the policy network structures. The structural outcome resulting from the bargaining over policy positions determine a policy network's capacity to produce policy outputs. Because of the need for coordination that results from the interdependency between actors, type I actions and their effects on network structure are crucial. These changes in the social structure of the policy network determine whether or not it has sufficient structural capacity to produce policy outputs. If the process of steering in networks results in a policy network in which a number of actors adopt the same policy position, policy outputs may emerge. Such policy outputs are the result of the type II actions of actors that have formed a cohesive subgroup around a certain policy position. Type II actions are therefore coordinated actions that aim to produce a policy output.

Although chapter 4 presented the conceptual framework, it did not theorise on the process of steering in policy networks and steering by policy networks. A theoretical elaboration of the model of steering in policy networks followed in chapter 5, introducing a distinction between states and events as two types of relational variables. States were subsequently conceptualised as relations between actors that are continuous in nature and contain social capital. Events are rather discrete in nature and channel actors' type I actions. This distinction between states and events is crucial because of the implications it has for the definition of network structure. The generic definition of network structure as a set of composition variables and a set of relational variables can be further specified due to the distinction between states and events. The social structure of a policy network is defined as a set of composition variables and a set of states. Events are

due to their function as channels for type I action not considered part of the network structure.

Network structures are thus defined as a set of actors, their attributes and the states between these actors. Based on this definition, chapter 5 further specified the changes in the social structure of a policy network over time. It argued that the process of steering in policy networks builds on two distinct but related functions. The first of these two functions specifies the extent to which the type I actions of network actors are affected by the network structure. The second function describes how such type I actions are likely to affect the social structure of the network. In order to develop hypotheses on the relations between network structures and the structural outcomes of the process of steering in networks, a multi-level analysis of networks with different structural characteristics was presented. Explanations of an individual actor's opportunities to steer others in a policy network towards a different policy position were offered based on ego-network analysis and the analysis of ego-centred local network structures. The result of this analysis is that an important indicator for an actor's ability to steer in a policy network is the extent to which an actor is central relative to others. More specifically, the analysis showed that an actor's degree centrality is of particular importance for its opportunities to perform type I actions, whereas its betweenness and closeness centrality affect its range of feasible type I actions.

Centrality measures are an important indicator for the extent to which individual actors can steer in a policy network, but they cannot indicate the structural outcomes of the global social structure. The dynamics of a policy network at the global network level are important because the structural outcomes determine a policy network's capacity to produce policy outputs. Chapter 5 therefore characterised the global social structures of policy networks in terms of their social cohesiveness and extent of centralisation. Based on these indicators of network structure it elaborated upon the effects of type I actions on the global social structures of initially differently-structured policy networks. This analysis resulted in three hypotheses on the structural outcomes of the process of steering in policy networks:

1. Over time, network structures are likely to become more socially cohesive due to the process of steering in networks.

2. Over time, centralised network structures are likely to become more decentralised due to the process of steering in networks

3. Over time, decentralised network structures are likely to become more centralised due to the process of steering in networks.

Hypotheses (2) and (3) imply that global structures that are initially decentralised will first develop into more centralised structures due to actors' type I actions. As soon as a certain degree of centralisation is reached, actors that are less central have an incentive to establish new ties. The establishment of ties by less central actors decreases the variation in centrality and therefore the extent to which the network is centralised. A fourth hypothesis can therefore be formulated:

4. Over time, network structures are likely to become more socially cohesive and decentralised due to the process of steering in networks.

Chapter 5 concluded that the structural outcomes of the process of steering in policy networks are rather similar, regardless of initial structures, but differ in the amount of time it takes to reach such a structural outcome. In the process leading to a socially cohesive and decentralised network structure, chapter 6 argued, some actors in the policy network might experience an incentive to attempt the production of a policy output. Such outputs, however, cannot be the result of a single actor's actions. Policy outputs are the result of a subset of actors' coordinated type II actions. Chapter 6 explained that at different points in time the social structure of the policy network will provide some actors with an incentive to engage in type II actions. Actors will opt to coordinate their actions with others if the prospective policy output has a higher utility for them than might result from any further steering in the network. However, type II actions can only occur if the social structure of the policy network displays certain characteristics.

The extent to which subsets of actors are able to coordinate their actions in an attempt to produce a policy output depends primarily on the extent to which such actors are integrated. Social cohesion in a local network structure facilitates

type II actions because the many ties present in cohesive subgroups exert significant amount of social control over individual actors' behaviour. Defective actions of one actor are therefore likely to provoke retaliation by other members of the cohesive subgroup. Furthermore, a cohesive subgroup indicates that the actors embedded in this local network structure have adopted the same policy position. Type II actions rather than type I actions are therefore the rational choice for cohesive subgroup members. Type II actions nevertheless do not necessarily result in policy outputs. The occurrence of type II actions depends strongly on the ties within a local network structure. Whether these type II actions result in a policy output depends on the ties between the cohesive subgroup and other parts of the policy network. The ties between a cohesive subgroup and other parts of a network structure are important because these ties determine the extent to which a cohesive subgroup is central in the global social structure. The centrality of a cohesive subgroup determines its capacity to mobilise actors. The more central the cohesive subgroup, the more bridging ties it has to other parts of the policy network. These bridging ties are an important resource for the mobilisation of actors. This mobilisation process, in turn, determines the feasibility of type II actions to result in policy outputs.

Whether policy outputs are likely to result from a policy network depends thus on two functions. The first function describes the extent to which the social structure of the policy network facilitates subsets of actors in coordinating their type II actions. The second function captures the extent to which under the existing structural conditions such type II actions are likely to result in policy outputs. Chapter 6 analysed various policy networks with different structural characteristics to determine the capacity of these networks to produce policy outputs. This analysis resulted in the following four hypotheses:

5. A policy network is only likely to produce policy outputs if its network structure contains at least one cohesive subgroup.

6. In policy network structures that contain one cohesive subgroup, type II actions are likely to result in policy outputs.

7. In policy network structures that contain multiple cohesive subgroups, type II actions are only likely to result in policy outputs if the acting cohesive subgroup is central within the global structure.

And:

8. In decentralised policy networks that contain multiple cohesive subgroups, type II actions are unlikely to result in policy outputs.

The relational variables of a policy network are thus not only important in terms of their capacity to facilitate both type I and type II actions, but also in influencing the extent to which policy networks are likely to produce policy outputs. The differences between the composition variables, however, are of particular importance for the characteristics of policy outputs. These characteristics of a policy output are important because they determine its utility for both individual network actors and governments. Chapter 7 elaborated upon both these issues. It argued that the utility of a policy output differs between actors in heterogeneous policy networks. The utility any individual might experience from such an output is captured by the difference between the policy position that was translated in a policy output and an actor's initial policy position. At the level of an individual actor, ego's initial embeddedness in the policy network is of particular importance. The structural opportunities that an actor has to steer in the network determine the extent to which it can steer others towards its own policy position. At the same time, the opportunities the social structure offers to other network actors to be able to steer in the policy network determine the extent to which an actor can maintain its initial policy position. In some cases an individual actor will adjust its policy position because that gives this actor an opportunity to maximise its prospective utility of a potential policy output given the structural constraints of the network. Such an adjustment of ego's policy position occurs if other actors have a structural advantage over ego. The process of steering in networks is thus important for the extent to which actors will adopt policy positions that differ from their initial positions. It is nevertheless not sufficient to determine the utility of a policy output for an individual actor. Only if their policy position is translated into a policy output will actors experience any utility.

Such policy outputs can only occur if the actor is part of a central cohesive subgroup that coordinates its type II actions. The utility of a policy output for an individual actor can therefore be reflected in the following three hypotheses:

9. The utility of a policy output for ego is determined by the extent to which it reflects ego's initial policy position.

10. Given the structural conditions, a policy output maximises the utility of ego.

And:

11. The more central ego is in its initial ego-centred local network structure, the higher the utility of the policy output for ego will be.

Next to the utility of policy outputs for individual actors, chapter 7 also elaborated on the utility of policy outputs for governments. The extent to which steering by policy networks is an effective and efficient mode of governance depends on the utility of the network's policy outputs for government. Steering by policy networks is a process that depends on the interactions within the policy network. Policy networks are utilised by governments in an attempt to attain one or more of three generic policy goals. The first of these generic policy goals is to provide a platform where various societal actors can interact. The aim of this goal is to increase the legitimacy of a policy output by including many stakeholders. Such increased legitimacy can have positive effects in the implementation stage of the policy process as well. Policy networks can also be used as a tool to produce policy outputs that are potentially more innovative than could be produced by other modes of coordination. And finally, policy networks are sometimes employed to overcome the effects of increasing degrees of functional differentiation in modern societies. The model of steering by networks relates these policy goals to policy outputs via the network.

The capacity of a policy network to produce policy outputs with those characteristics that facilitate the attainment of government's policy goals is not exclusively dependent upon structural factors. Chapter 7 argued that the

characteristics of elements within the policy network are equally important for the utility of policy outputs for government. The absolute capacity of a policy network to facilitate the attainment of government's generic policy goals is therefore an empirical question. It is nevertheless possible to assess the structural capacity of different initial policy network structures to produce policy outputs with certain characteristics. Taking the initial location of network actors as indicators, the relative innovativeness of policy outputs was analysed in differently-structured networks. Furthermore, the endogenous legitimacy of a policy output was assessed by focusing on the support for a particular type II action and therefore the policy output. The analysis resulted in three hypotheses that are valid only for policy networks in which at least one actor has a structural advantage over others:

12. The more centralised an initial network structure, the more legitimate its policy outputs will be experienced by its actors.

13. The more centralised an initial network structure, the less innovative its policy outputs will be.

14. The more cohesive subgroups a policy network's initial social structure contains, the less legitimate its policy outputs will be experienced by its actors.

Furthermore, the analysis of the utility of policy outputs resulting from different initial policy network structures for government pointed to the structures that are most likely to produce innovative outputs. If an initial policy network contains at least three cohesive subgroups that are regularly equivalent, the following applies:

15. The more cohesive subgroups a policy network's initial social structure contains, the more innovative its policy outputs will be.

The final chapter of part two thus highlighted an important conclusion regarding the utility of policy networks by which to steer society. Regardless of their initial

structures, policy networks are unlikely to have the structural capacity to produce policy outputs that are both innovative and simultaneously experienced as legitimate, in terms of being supported by many network actors It is important to underline here that this conclusion refers only to the structural capacity of a policy network. The absolute capacity of a policy network to produce policy outputs that are experienced as legitimate and innovative depends on the absolute characteristics of its actors, and is therefore an empirical question. If government aims to reach two policy goals simultaneously by steering by a policy network, the network must have the absolute capacity to produce one of these goals. The extent to which policy networks are an effective and efficient mode of governance therefore relies on both the structural capacity and the absolute capacity of a policy network.

8.3 Reflections

Following from the summary of the study presented in the previous section, the current section reflects on the theoretical explorations and the resulting model, reflecting on the choices made for particular theories. These choices for particular theories over others certainly affected the outcome of this study. Additionally, the current section reflects on the model of steering in and steering by policy networks, and the assumptions upon which it builds. It aims to highlight those factors explicable through a model of steering in networks and steering by networks, alongside those factors beyond its scope.

This study has aimed to develop a model of steering in and steering by policy networks rooted in social network analysis. The study has limited itself to two network approaches. These two network approaches were reviewed in part one of this book. There are other scientific approaches to networks. One such network approach can for example be found in economics, as well as the in sciences increasingly focused on network explanations of natural and biological phenomena. The restriction to policy network and social network approaches was a conscious choice. Nevertheless, concepts and variables identified in different network approaches could be of equal value for the development of a model of steering in and steering by policy networks.

The concepts and variables empirically proven important by others for policy networks were reconceptualised from a social network perspective in chapter 4. Social network analysis is rooted predominantly in structural perspectives within sociology. Despite the opportunities social network analysis offers to describe the interactions between structure and action, social structures are taken as a point of departure. This is also the case in the present study. The model developed in part two offers a structural approach to both processes of steering. Relations were given primacy over action. Only if actors have structural capacity were they considered able to act. Furthermore, the relations actors maintain with one another were considered more important for actions than attributes. Attributes can only facilitate actions if social structures within which actor are embedded provide them with opportunities to act. The extent to which such a structural approach is valid is a theoretical debate beyond the scope of this thesis. A choice for either a structural approach or an action-oriented approach nevertheless must be taken because the relations between structure and action are thus far theoretically unclear, with this thesis choosing the former over the latter. More specifically, the model of steering in and steering by policy networks is rooted in structural individualism.

The choice for structural individualism has certain implications for the assumptions upon which part two builds. The first of these assumptions is that actors are characterised by bounded rationality. Actors are considered to act rationally within the constraints of the social structure in which they are embedded. Although the assumption is necessary to predict any type of action, this thesis has employed the rational actor approach in a specific way. The rationality as applied in the modelling allows for one policy round only. This application is similar to single game approaches in game theory. However, the empirical policy network literature has indicated the importance of linking issues in multiple policy rounds. That would imply that the same actors form multiple policy networks rather than a single network. These policy networks contain the same actors, and this has implications for which actions can be considered rational. More specifically, what might be considered the rational strategy in a single policy round with only one policy issue at stake, can be a suboptimal strategy if multiple issues are at stake. As game theory indicates, the mere prospect of repeated interactions can certainly affect actors' behaviour.

The second assumption underlying the model is that actions are sequential rather than simultaneous. Actors are considered to act upon the opportunities a network structure offers them and in response to changes in these social structures. These changes are caused by the type I actions of others embedded within the network. This assumption allows the formulation of hypotheses on the expected structural outcomes of the process of steering in networks. If, however, actors act simultaneously rather than in response to one another, structural outcomes might emerge that cannot be explained by the model. The assumption of sequential actions is therefore a rather strong assumption. It is however justified in order to allow the formulation of expectations on the structural outcomes of the process of steering in networks.

A third assumption that is of particular importance for the model of steering in networks is that changes in the social structures over time are considered the outcome of a Markov process. A Markov process indicates that the structural outcomes of the network are exclusively a function of the current network. The implication for the model developed in part two of this book is that all the information needed to predict the structural outcomes of steering in networks is included in the initial network structure. The Markov assumption thus excludes every variable that is external to the network. In empirical settings, however, the context that these external variables form might have varying degrees of influence on the network. In a policy network, one can image that the context will have a particularly important influence on the interactions within the network. Society creates the context of a policy network and rather than being external to society, the policy network is in fact embedded within this larger social structure. The context will therefore affect the variables of the network in empirical policy networks. The Markov assumption is a necessity nonetheless. The effects of variables that are external to the network on the variables of the policy network cannot easily be captured for two reasons. Firstly, it is unlikely that all variables that might affect the policy network can be identified. And secondly, the relations between these external variables and the variables of the network cannot be defined causally.

The model of steering in and steering by policy networks thus does not cover all aspects that might be relevant to empirical policy networks. It has nonetheless offered a perspective on policy networks that differs from previous approaches.

The model conceptually clarified that there are indeed two modes of steering and that these take place at different levels. Furthermore, these modes of steering affect the policy network, the interactions within the policy network, and the potential policy outputs.

8.4 Opportunities for Further Research

This final section will briefly elaborate upon the opportunities this study offers for further research. It will firstly point towards possible theoretical elaborations of the model. Falsification of the hypotheses presented here in an empirical setting is the second point that will be elaborated upon. And finally, the section indicates the possibilities of applying the model to networks other than policy networks.

In terms of theory, the model could be strengthened by including a perspective that would allow for multiple policy rounds. The rationality of actors has in the current model been limited to one policy issue, but in the empirical reality issue linkage is a common phenomenon. The validity of the model would therefore be strengthened by an expansion that would allow multiple policy rounds. Game theory could prove a useful point of departure for such an elaboration of the model. Game theory has proven that what might be a rational strategy in a single game is not by definition the optimal strategy if multiple games are played. The extent to which actions are affected by the prospect of repeated interactions would therefore form an interesting point of departure for a further elaboration of the model of steering in and steering by policy networks.

A second theoretical expansion might be along the lines of stochastic models of network dynamics. Unlike the perspective employed in this study, these models of network dynamics simultaneously model changes in ties and attributes. Stochastic models of network dynamics represent the frontier of theoretical social network research. Although to date they remain empirically unproven, the results from experiments and simulations are promising. These currently experimental models of network dynamics might prove a valuable point of departure to predict the effects of the process of steering in policy

networks not only for the relational variables, but also for individual actors' attributes.

Another opportunity for further research lies in the empirical realm. The hypotheses developed here need to be tested to assess the explanatory value of the model of steering in and steering by policy networks. Such testing would require that the variables are operationalised and that data is subsequently collected. This might prove a difficult task. The relevant composition variables and relational variables need to be defined in order to assess network boundaries. The choice of whether to include certain relations while excluding others might particularly affect the outcomes of the falsification process. Furthermore, the data must include information on social capital within relations between actors. Despite these challenges, empirical validation and a falsification of the hypotheses might prove an interesting opportunity for further research.

Besides assessing the validity of the model for policy networks, a final opportunity might be found in applying the model to different types of networks. One such opportunity might be found in the field of science and technology studies, applying the model to networks of researchers. Networks of researchers from different institutions are increasingly employed on the premise that such inter-institutional collaboration results in innovative research projects. Rather than producing a policy output, these networks tend to produce research proposals. In a similar vein, the model might be applied to scientific disciplines, and interdisciplinary fields. It could be utilised as a point of departure to analyse if scientific breakthroughs are more likely to occur in interdisciplinary mode 2 fields or within disciplines fields. Other opportunities would be to study how the global political and economic systems evolve, how groups of people make decisions, and how the relations between employers affect the occupational mobility of employees. Before such a wider application of the model is appropriate, it remains necessary to further explore sociological literatures and make use of knowledges available in various social science disciplines.

Nederlandstalige Samenvatting

Netwerken: Structuur en Actie. Sturing in en Sturing met Beleidsnetwerken

Beleidsnetwerken worden in toenemende mate ingezet als sturingsinstrument door overheden. Deze ontwikkeling wordt vaak geassocieerd met een nieuw paradigma in het publieke bestuur. In plaats van hiërarchische aansturing worden beleidsnetwerken ingezet om oplossingen voor maatschappelijke problemen te vinden. Het samenbrengen van verschillende maatschappelijke actoren in beleidsnetwerken zou de effectiviteit en efficiëntie van het beleidsproces op meerdere vlakken ten goede komen. Overheden geven om deze redenen in toenemende mate de voorkeur aan de inzet van beleidsnetwerken boven hiërarchische sturing of marktwerking.

Netwerktheorieën van het beleidsproces hebben tot op heden echter slechts ten dele kunnen verklaren onder welke voorwaarden en op welke wijze beleidsnetwerken een effectief en efficiënt beleidsinstrument zijn. Het belang van actoren en de kenmerken van actoren wordt universeel onderstreept, evenals het belang van een zekere mate van wederzijdse afhankelijkheid tussen actoren. Een onderbelicht aspect van beleidsnetwerktheorieën blijft echter de mate waarin de afhankelijkheidsrelaties tussen actoren de uitkomsten van het beleidsproces beïnvloeden. Deze wederzijdse afhankelijkheidsrelaties zijn van belang om twee redenen. Ten eerste bepalen zij de mate waarin actoren elkaar kunnen beïnvloeden. Ten tweede bepalen de afhankelijkheidsrelaties de capaciteit van een beleidsnetwerk om oplossingen op maatschappelijke problemen te formuleren. Deze invloeden van netwerkstructuren op de capaciteit van een beleidsnetwerk om op effectieve en efficiënte wijze beleidsvoorstellen te formuleren is tot op heden onduidelijk.

In deze studie is onderzocht op welke wijze de theoretische basis van beleidsnetwerkbenaderingen versterkt zou kunnen worden met sociale netwerkperspectieven. De centrale vraagstelling van het onderzoek luidt daarom:

In hoeverre kan een theorie ontwikkeld worden die de processen van sturing in een beleidsnetwerk en sturing met een beleidsnetwerk omvat?

Deze centrale vraagstelling is verder uitgewerkt in de volgende vier onderzoeksvragen:

1. *Welke concepten en theorieën in de netwerkliteratuur zijn van belang voor de processen van sturing in en sturing met een netwerk?*
2. *In hoeverre en op welke wijze kan een model ontwikkeld worden dat de structurele kenmerken van een beleidsnetwerk relateert aan de structurele uitkomsten?*
3. *In hoeverre en op welke wijze kan een model ontwikkeld worden dat de structurele kenmerken van een beleidsnetwerk relateert aan eventuele beleidsuitkomsten?*
4. *Wat zijn de implicaties van de processen van sturing in en sturing met een netwerk voor:*
    a. *het nut van een beleidsnetwerk voor individuele actoren?*
    b. *het nut van een beleidsnetwerk voor overheden?*

In de eerste hoofdstukken van deze dissertatie is de netwerkliteratuur in kaart gebracht. Hierbij is in het bijzonder aandacht geschonken aan de theoretische achtergronden van zowel beleidsnetwerkbenaderingen als sociale netwerkperspectieven. Na een inventarisatie van de netwerkliteratuur zijn een aantal elementen geïdentificeerd die van specifiek belang zijn voor het bestuderen van netwerken. Deze elementen vormen de variabelen op basis waarvan een netwerk gedefinieerd wordt. Actoren en de attributen die deze actoren ter beschikking hebben vormen tezamen de compositievariabelen van een netwerk. Actoren zijn echter met elkaar verbonden door relaties. Deze relatievariabelen zijn van groot belang voor zowel het sturen in een beleidsnetwerk, als voor het sturen met een beleidsnetwerk.

Het tweede deel van dit onderzoek heeft zich gericht op de ontwikkeling van een theoretisch model dat zowel sturing in als sturing met netwerken omvat. De causale relaties tussen de in deel 1 geïdentificeerde variabelen zijn in hoofdstuk 4

uiteengezet. Sturing in een beleidsnetwerk is het horizontale proces waarin actoren onderhandelen over beleidsposities. Actoren verschillen van mening over de gewenste beleidsuitkomsten. Deze verschillende voorkeuren worden gereflecteerd in hun individuele beleidsposities. Dergelijke beleidsposities zijn van belang omdat zij de locatie van een actor in het beleidsnetwerk bepalen. Een belangrijk kenmerk van heterogene beleidsnetwerken is dat geen van de actoren unilateraal een beleidsuitkomst kan forceren. Actoren zijn dus wederzijds afhankelijk. Deze afhankelijkheidsrelaties impliceren dat verschuivingen in beleidsposities van ten minste een aantal actoren een noodzakelijke voorwaarde is om tot een beleidsuitkomst te komen. Dergelijke verschuivingen zullen echter niet vrijwillig plaatsvinden. Iedere actor in het beleidsnetwerk zal pogen om de eigen positie te behouden, en tegelijkertijd de positie van anderen te beïnvloeden. Deze pogingen om anderen van positie te doen veranderen zijn type I acties. Type I acties zijn daarom gedefinieerd als individuele acties die tot doel hebben de sociale structuur van het beleidsnetwerk te veranderen. De structurele uitkomsten van type I acties zijn belangrijk omdat de structurele capaciteit van het netwerk om beleidsuitkomsten te produceren hierdoor wordt bepaald. Wanneer sturing in het netwerk resulteert in een sociale structuur waarbinnen een aantal actoren dezelfde beleidspositie hebben aangenomen, heeft het beleidsnetwerk de structurele capaciteit om uitkomsten te produceren. Beleidsuitkomsten zijn het resultaat van de acties van een groep actoren binnen een netwerk. Dergelijke acties verschillen wezenlijk van de individuele type I acties die verband houden met sturing in het netwerk. Type II acties zijn de acties van een cohesieve subgroep die zich in een beleidsnetwerk gevormd heeft rond een bepaalde beleidspositie. Type II acties zijn daarom gecoördineerde acties die tot doel hebben een uitkomst te produceren.

De theoretische onderbouwing van het model van sturing in beleidsnetwerken is verder uitgewerkt in hoofdstuk 5. Daar is een onderscheid gemaakt tussen twee soorten relatievariabelen. De eerste soort relatievariabele is een 'staat'. Een relatie die aangemerkt kan worden als staat bevat sociaal kapitaal en wordt gekenmerkt door een continu karakter. De tweede soort relatievariabele is een evenement. Evenementen kanaliseren type I acties en zijn van nature discreet. Het onderscheid tussen deze twee relatievariabelen is van belang omdat het implicaties heeft voor de definitie van een sociale netwerkstructuur. De generieke

definitie van een sociaal netwerk als een set van compositievariabelen en een set van relatievariabelen kan op basis van deze differentiatie worden gespecificeerd. De sociale structuur van een beleidsnetwerk is gedefinieerd als een set van compositievariabelen en een set van staten. Evenementen worden vanwege hun functie als kanalen voor type I acties en hun *ad hoc* karakter niet als een onderdeel van de sociale structuur beschouwd.

Hoofdstuk 5 heeft de veranderingen over tijd in de sociale structuur van een beleidsnetwerk verder gespecificeerd op basis van de definitie van een netwerkstructuur als een set compositievariabelen en een set staten. Het proces van sturing in netwerken en de veranderingen in netwerkstructuren door de tijd wordt afhankelijk geacht van twee verschillende, maar gerelateerde functies. De eerste functie beschrijft de mate waarin de individuele type I acties van actoren beïnvloed worden door bestaande netwerkstructuren. De tweede functie beschrijft de mate waarin dergelijke type I acties de initiële netwerkstructuren veranderen. Het onderzoek heeft vervolgens een analyse van netwerken met verschillende structuren op meerdere analyseniveaus gepresenteerd. Verklaringen voor de mogelijkheden van individuele actoren om te sturen in een netwerk en daarmee de beleidsposities van anderen te beïnvloeden vloeien voort uit de analyse van ego-netwerkstructuren en ego-gecentreerde lokale netwerkstructuren. De uitkomst van deze analyse is dat een belangrijke indicator voor de mogelijkheden van een individuele actor tot sturing in een netwerk te vinden is in de mate waarin deze actor centraal is in de sociale structuur ten opzichte van andere actoren. De analyse toonde aan dat in het bijzonder de relatiecentraliteit van een actor het aantal mogelijkheden voor type I acties bepaald. Tegelijkertijd zijn de intermediërende centraliteit en nabijheidscentraliteit van een actor van specifiek belang voor de haalbaarheid en het bereik van verschillende type I acties.

Hoewel de verschillende vormen van centraliteit van belang zijn om de mate waarin een individu in een netwerk kan sturen te bepalen, kan op basis van deze indicatoren geen uitspraak gedaan worden over de structurele uitkomst van een beleidsnetwerk. De dynamiek van het globale netwerk is van belang omdat de structurele uitkomsten de capaciteit van het netwerk om tot uitkomsten te komen bepaalt. De globale structuur van een beleidsnetwerk kan gekarakteriseerd worden aan de hand van twee indicatoren. Ten eerste is de mate sociale cohesie

van belang. De tweede indicator is de mate waarin het globale netwerk gecentraliseerd is. Op basis van deze twee indicatoren zijn netwerken met verschillende initiële structuren geanalyseerd en verwachtingen betreffende de gevolgen van type I acties voor deze sociale structuren geformuleerd. De uitkomst van deze analyse resulteert in de volgende drie hypothesen die betrekking hebben op de uitkomsten van het proces van sturing in netwerken:

1. Naarmate de tijd verstrijkt is het waarschijnlijk dat de sociale cohesie in netwerken toeneemt als gevolg van het proces van sturing in netwerken.

2. Naarmate de tijd verstrijkt is het waarschijnlijk dat gecentraliseerde netwerken gedecentraliseerd raken als gevolg van het proces van sturing in netwerken.

3. Naarmate de tijd verstrijkt is het waarschijnlijk dat gedecentraliseerde netwerken gecentraliseerd raken als gevolg van het proces van sturing in netwerken.

Uit hypothesen (2) en (3) blijkt dat de globale structuren van initieel gedecentraliseerde netwerken in eerste instantie gecentraliseerd raken als gevolg van de type I acties van actoren. Echter zodra een bepaalde mate van centralisatie is bereikt worden de minder centrale actoren gestimuleerd om nieuwe relaties aan te knopen. Het aangaan van nieuwe relaties door minder centrale actoren leidt tot een afnemende variantie in de centraliteit van individuele actoren, waardoor tevens de centralisatie van het globale netwerk afneemt. Daarom kan hypothese (4) als volgt geformuleerd worden:

4. Naarmate de tijd verstrijkt is het waarschijnlijk dat netwerken in toenemende mate sociaal cohesief en gedecentraliseerd raken als gevolg van het proces van sturing in netwerken.

Eén van de conclusies van hoofdstuk 5 is dat de structurele uitkomsten van het proces van sturing in netwerken vergelijkbaar zijn ongeacht de initiële netwerkstructuur. Verschillende netwerkstructuren vergen echter verschillende

hoeveelheden tijd om tot dezelfde structurele uitkomst te komen. Gedurende het proces dat leidt tot een sociaal cohesieve en gedecentraliseerde netwerkstructuur zullen sommige actoren een prikkel ervaren om een poging te doen een uitkomst te produceren in plaats van te sturen in het netwerk. Dergelijke uitkomsten kunnen echter niet door individuele actoren gerealiseerd worden, maar enkel wanneer een subgroep van actoren hun type II acties coördineert. In hoofdstuk 6 is uitgelegd dat op verschillende punten in de tijd de sociale structuren van netwerken sommige actoren zullen stimuleren om over te gaan tot acties van type II. Actoren kiezen voor het coördineren van hun acties wanneer de verwachte uitkomst een hoger individueel nut heeft dan verdere sturing in het netwerk. Type II acties kunnen echter enkel plaatsvinden wanneer de sociale structuur van het netwerk bepaalde kenmerken heeft.

De mate waarin een subgroep van actoren in staat is haar acties van type II te coördineren met als doel het produceren van een uitkomst is primair afhankelijk van de mate van sociale integratie van deze subgroep. Sociale cohesie in een lokale netwerkstructuur faciliteert type II acties omdat het sociale kapitaal in de vele relaties in de cohesieve subgroep een significante mate van sociale controle uitoefent op het gedrag van de subgroepleden. Daarnaast hebben de actoren in een cohesieve subgroep door de tijd dezelfde beleidspositie aangenomen. Type II acties zijn daarom voor de leden van een cohesieve subgroep de rationele keuze. Type II acties resulteren echter niet per definitie in een uitkomst. Waar het coördineren van acties van type II primair afhankelijk is van de relaties in een cohesieve subgroep, is de mate waarin dergelijke acties succesvol zijn primair afhankelijk van de relaties tussen de cohesieve subgroep en andere delen van het globale beleidsnetwerk. De relaties tussen de subgroep en de rest van het netwerk zijn van belang omdat deze relaties bepalen in hoeverre het netwerk gecentraliseerd is rond de cohesieve subgroep. De centraliteit van de cohesieve subgroep bepaald de mate waarin actoren die niet tot de subgroep behoren gemobiliseerd kunnen worden. Des te centraler de cohesieve subgroep, des te meer overbruggende relaties de leden van de subgroep onderhouden met andere delen van het netwerk. Deze overbruggende relaties faciliteren de mobilisatie van actoren, waarmee tevens de kans van slagen van type II acties wordt bepaald.

De realisatie van uitkomsten wordt tevens bepaald door twee functies. De eerste functie beschrijft de mate waarin subgroepen actoren gefaciliteerd worden

door de sociale structuur van het beleidsnetwerk om type II acties te coördineren. De tweede functie geeft de mate aan waarin, onder de bestaande structurele condities, dergelijke type II acties in uitkomsten kunnen resulteren. Hoofdstuk 6 heeft vervolgens netwerken met verschillende structurele kenmerken geanalyseerd om de capaciteit van deze netwerken om uitkomsten te produceren te bepalen. Deze analyse heeft tot de volgende vier hypothesen geleid:

5. Enkel wanneer een beleidsnetwerk op zijn minst één cohesieve subgroep bevat zijn uitkomsten waarschijnlijk.

6. In beleidsnetwerken die één cohesieve subgroep bevatten is het waarschijnlijk dat type II acties in uitkomsten resulteren.

7. In beleidsnetwerken die meerdere cohesieve subgroepen bevatten is het enkel waarschijnlijk dat type II acties in uitkomsten resulteren wanneer de cohesieve subgroep die tot actie overgaat centraal is in de globale netwerkstructuur.

8. In gedecentraliseerde beleidsnetwerken die meerdere cohesieve subgroepen bevatten is het onwaarschijnlijk dat type II acties in uitkomsten resulteren.

De relatievariabelen van een beleidsnetwerk zijn dus niet enkel belangrijk omdat ze acties van zowel type I als type II faciliteren, maar tevens omdat deze variabelen bepalen in hoeverre een beleidsnetwerk een uitkomst kan produceren. De verschillen tussen compositievariabelen (actoren en hun attributen) zijn echter van groot belang voor de kenmerken van uitkomsten. Deze kenmerken van uitkomsten bepalen het nut van een uitkomst voor zowel individuele actoren als overheden. In hoofdstuk 7 is uitgelegd dat het nut van een uitkomst in heterogene netwerken verschilt voor actoren. Het nut van een uitkomst voor een individuele actor wordt bepaald door de mate waarin de uitkomst verschilt van de oorspronkelijke beleidspositie van een actor. Voor een individu is daarom de mate waarin deze actor ingebed is in de oorspronkelijke netwerkstructuur doorslaggevend. De structurele mogelijkheden die de initiële netwerkstructuur

een actor biedt om te sturen in het netwerk bepaalt de mate waarin de actor zijn eigen beleidspositie kan behouden en tegelijkertijd de posities van anderen kan beïnvloeden. In sommige gevallen is het rationeel voor een actor om zijn beleidspositie aan te passen vanwege de structurele kenmerken van het netwerk. Een actor zal echter enkel zijn positie aanpassen wanneer anderen een structureel voordeel hebben ten opzichte van hem. Het proces van sturing in een netwerk is daarom belangrijk voor de mate waarin het voor actoren waarschijnlijk is af te wijken van hun initiële beleidspositie. Het is echter niet toereikend om enkel naar de mate van sturing in een netwerk te kijken om het nut van een uitkomst voor een individuele actor te bepalen. Alleen wanneer de al dan niet aangepaste beleidspositie van een actor wordt vertaald in een uitkomst zal een actor enig nut ervaren. Dergelijke uitkomsten kunnen vanuit het perspectief van een individu enkel voorkomen wanneer de actor onderdeel uitmaakt van de cohesieve subgroep die via type II acties een uitkomst realiseert. Het nut van een uitkomst voor een individuele actor kan daarom gereflecteerd worden in de volgende drie hypothesen:

9. Het nut van een uitkomst voor een individuele actor wordt bepaald door de mate waarin deze uitkomst de oorspronkelijke beleidspositie van de actor reflecteert.

10. Onder de gegeven structurele condities is het nut van een uitkomst voor een individuele actor maximaal.

11. Des te centraler een actor is in zijn initiële ego-gecentreerde lokale netwerkstructuur, des te hoger het nut van een uitkomst voor deze actor.

Naast het nut van uitkomsten voor individuele actoren, heeft hoofdstuk 7 aandacht besteed aan het nut van uitkomsten voor de overheid. De mate waarin sturing met netwerken effectief en efficiënt is hangt af van het nut van de uitkomsten van het netwerk voor de overheid. Beleidsnetwerken worden door de overheid ingezet voor drie generieke doelstellingen. Ten eerste kunnen zij een platform vormen waar interacties tussen verschillende maatschappelijke actoren kunnen plaatsvinden. De doelstelling in een dergelijk geval is om uitkomsten te

genereren die als legitiem ervaren worden door de belanghebbenden. Een dergelijk waarborgen van de legitimiteit kan tevens positieve effecten hebben in de implementatiefase. Beleidsnetwerken kunnen tevens ingezet worden als een instrument om tot uitkomsten te komen die potentieel innovatiever zijn dan de uitkomsten die andere beleidsinstrumenten zouden kunnen genereren. Ten slotte worden beleidsnetwerken soms ingezet om de gevolgen van functionele differentiatie in de maatschappij tegen te gaan. Het model van sturing met netwerken koppelt deze doelstellingen aan de uitkomsten van het beleidsnetwerk.

De capaciteit van een beleidsnetwerk om uitkomsten te produceren met kenmerken die het behalen van de doelstellingen van de overheid faciliteren is niet enkel afhankelijk van structurele factoren. Hoofdstuk 7 heeft uiteengezet dat de kenmerken van compositievariabelen minstens even belangrijk zijn voor het nut van uitkomsten voor de overheid. De absolute capaciteit van een beleidsnetwerk om het behalen van de doelstellingen van de overheid te faciliteren is daarom een empirisch vraagstuk. De structurele capaciteit van een beleidsnetwerk om uitkomsten te genereren die bijdragen aan het behalen van dergelijke doelstellingen is desalniettemin wel af te leiden uit de netwerkstructuur. Wanneer de initiële posities van netwerkactoren als indicatoren genomen worden voor de relatieve mate van innovativiteit van hun beleidsposities, kunnen uitspraken gedaan worden over de mate van relatieve innovativiteit van uitkomsten. Daarnaast kan de endogene legitimiteit van een uitkomst afgeleid worden door het aantal actoren dat de type II acties en uitkomsten ondersteunt ten opzichte van het totale aantal actoren in het netwerk te analyseren. Deze analyse heeft geresulteerd in een drietal hypothesen die enkel geldig zijn voor netwerken waarin ten minste één actor een structureel voordeel heeft ten opzichte van andere actoren:

12. Des te gecentraliseerder de initiële structuur van een beleidsnetwerk, des te legitiemer de uitkomst door de actoren zal worden ervaren.

13. Des te gecentraliseerder de initiële structuur van een beleidsnetwerk, des te geringer de innovativiteit van de uitkomst.

14. Des te meer cohesieve subgroepen een initiële netwerkstructuur bevat, des te minder legitiem de uitkomst door de actoren zal worden ervaren.

Daarnaast heeft de analyse van het nut van uitkomsten voor overheden uitgewezen dat beleidsnetwerken met een bepaalde structuur het meest waarschijnlijk zijn om innovatieve uitkomsten te produceren. Wanneer een initiële structuur ten minste drie cohesieve subgroepen bevat waarvan er niet één meer centraal is dan de anderen, is de volgende hypothese geldig:

15. Des te meer cohesieve subgroepen de initiële structuur van een beleidsnetwerk bevat, des te innovatiever de uitkomsten zullen zijn.

Een belangrijke conclusie vloeit voort uit de analyse van het nut van beleidsnetwerken als een beleidsinstrument. Ongeacht de initiële structuur, is het onwaarschijnlijk dat beleidsnetwerken de structurele capaciteit hebben om uitkomsten te genereren die simultaan zowel innovatief zijn en als legitiem ervaren worden. Hierbij moet echter aangetekend worden dat deze conclusie enkel de structurele capaciteit van een beleidsnetwerk betreft. De absolute capaciteit van een netwerk om uitkomsten te produceren die gelijktijdig innovatief zijn en als legitiem ervaren worden hangt af van de absolute karakteristieken van de actoren, en is daarom een empirische vraag. Wanneer een overheid tot doel heeft door middel van sturing met een beleidsnetwerk twee doelstellingen gelijktijdig te realiseren, moet het beleidsnetwerk de absolute capaciteit hebben om ten minste één van deze doelstellingen te realiseren. De mate waarin beleidsnetwerken een effectief en efficiënt instrument zijn is daarom afhankelijk van zowel de structurele capaciteit als de absolute capaciteit van het netwerk.

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