MODELS FOR RESEARCH INTO DECISION-MAKING PROCESSES: ON PHASES, STREAMS AND DECISION-MAKING ROUNDS

GEERT R. TEISMAN

This article elaborates on the question of how complex decision making can be analysed. Three conceptual models are compared: the phase model, the stream model and the rounds model. Each model is based on specific assumptions about what decision making is and how it should be analysed. The phase model focuses on successive and distinctive stages in a process, i.e. defining a problem, searching for, choosing and implementing solutions. The stream model emphasizes concurrent streams of participants, problems and solutions, defining decision making as the connection between these streams. The rounds model combines elements of the other two models, in assuming that several actors introduce combinations of problems and solutions, and create progress through interaction. Each model generates specific insights, as is shown from the example of the 'Betuwe line', a railway line intended for the transport of cargo, in the Netherlands. The phase model concentrates on decisions taken by a focal actor; the stream model focuses on the coincidental links between problems, solutions and actors; and the rounds model on the interaction between actors.

1 MODELS FOR THE RECONSTRUCTION OF DECISION MAKING

Public administrationists agree that decision making has become more complex. Several reasons can be identified for this increased complexity. Two important ones are: increased uncertainty about the global economy and the rise of the power-sharing world or 'network society', where nobody is in charge (Bryson and Crosby 1992; Kickert *et al*.1997). This article is based on the assumption of increased complexity. Complexity raises the question of how researchers should handle this problem (Butler 1991; Mintzberg 1973; Teisman 1992, 1995, 1998). Furthermore, the question of complexity is part of the wider discussion on governance in networks (for example: in Germany, Marin and Mayntz 1991 and Scharpf 1997; in France Crozier and Friedberg 1980; in Great Britain, Rhodes 1996a and in the USA, E. Ostrom 1990; Smith 1998)

This article focuses on the question of how to depict decision making in societies that are confronted with network structures. I will concentrate on the characterization of successive decision-making activities and of concurrent decision-making activities. I will also discuss the assumed relations

Geert R. Teisman is Professsor in the Department of Public Administration at Erasmus University Rotterdam.

Public Administration Vol. 78 No. 4, 2000 (937–956)

between the activities, in sequential as well as parallel combinations. The following research questions can be formulated:

(1) Which assumptions are made with respect to chains of activities in decision-making processes? I will analyse different criteria to distinguish between: strands of activities, typologies of decision making as a whole and elements of this process, and signs of progress in decision making.
(2) What sorts of assumptions are made with respect to simultaneous activities in decision-making processes? Specifically, I will distinguish here between (more or less relevant) actors, the relationship between problems and solutions, and the content of decision making.

To analyse decision making, the researcher needs to make a reconstruction of the study object. Such a reconstruction will be selective in nature. Observation is not simply an effort to learn what is going on. Rather it is a process where observations are made to conform to sets of assumptions (Edelman 1971). The gathering and classification of empirical observations into meaningful information is based on the a priori images of decision making used. We cannot depict decision making without making assumptions about its appearance. Various terms are used to describe such a set of assumptions: model, image, metaphor, referential framework or methodology. In this article, the term 'model' will be used. Models help us to understand decision making in distinctive yet partial ways (Morgan 1997, p. 4).

Three models will be discussed in this paper. Two of these are generally accepted and respected, i.e. the so-called *phase model* and the *stream model*. The phase model is the most common approach, both in science (Anderson 1979; Bryson and Crosby 1992) and in policy practice (procedures are often based on the concept of phasing). Decision making is represented in terms of a number of distinct stages (Mintzberg 1976). Phase models distinguish between (at least) policy formation, policy adoption and policy implementation. Each phase has its specific characteristics and participants. Ministries, for instance, are often divided into departments that are responsible for policy formation and others responsible for implementation.

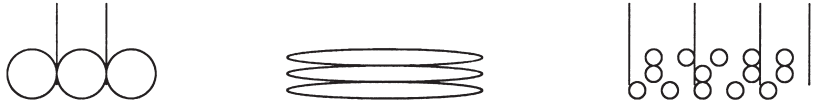
The stream model depicts decision making as a combination of three separate concurrent streams (Kingdon 1984). One stream consists of problems, another of policies/solutions, and a third one of politics/participants. Like the phases, streams have their own characteristics, but they exist side by side. A decision becomes the coincidence of streams.

In this article I will emphasize a third conceptual approach to decision making, the so-called *rounds model*. In this model, decision making is assumed to consist of different decision-making rounds. In all sets of rounds, the interaction between different actors results in one or more definitions of problems and solutions. All participants can score points in each round, in terms of a leading definition of the problem and the

(preferred) solution. By doing so they define the beginning of the next round. But at the same time each new round can change the direction of the match, new players can appear, and in some cases the rules of the game can even be changed. This rounds model was developed during years of research in the field of urban and infrastructural planning. I was fascinated by the long duration of decision-making processes and by the changes in course these processes often take. Another remarkable result of my research was that the actors involved in decision making often did not agree on the classification of a certain stage in the process, in terms of formation, adoption and implementation. Although I was able to identify several official decisions taken by ministers, Parliament, parliamentary committees etc., none of these decisions could be clearly depicted as the moment of adoption. Some of the official decisions were followed by actions which could not possibly be seen as the implementation of these decisions. Furthermore, the distinction between problems and solutions proved to be far more complicated than was assumed in the stream model. What was a solution for one actor could easily be a problem for another. Participants bring along closely intertwined problems and solutions.

In order to understand the dynamics and variety of perceptions, I gradually altered my conceptual definition of decision making. Because the central decision could not be found, I began to collect all the decisions that were taken in a certain case. Secondly, I no longer assumed that the decisions were arranged on the basis of an a-priori order and hierarchy. On the contrary, it was the task of research to clarify the empirical relation between decisions. In order to do so, decision making was redefined as an intertwined 'clew' of a series of decisions taken by various parties, leading to a new analytical model. Progress is described in terms of rounds. This rounds model is dealt with in section 4. After all three models have been examined, they will be compared with each other in section 5. In section 6 a three-fold analysis of decision making about the Betuwe freight railway line will be carried out, and finally I shall draw some conclusions regarding the added value of the stream and rounds models as compared to the phase model.

FIGURE 1 *A depiction of three models for the analysis of decision-making processes*



The phase model

Distinct stages of formation, adoption and implementation

The stream model

Concurrent streams of problems, solutions and participants

The rounds model

Series of interacting decisions taken by several actors

2 CONCEPTS WITHIN AND PRINCIPLES OF THE PHASE MODEL

In many policy process analyses 'policy can be understood and examined as a combination of several processes, which are interrelated but can still be conceived as distinct components that are determinants of government actions' (Sato 1999). The phase model assumes that decision making is 'the succession of different situations in the formulation, adoption, implementation and evaluation of a policy' (Bryson and Crosby 1992, pp. 57–66). In this article we will not deal with the question of evaluation. Often formation is divided into a phase of problem definition and a phase where solutions are presented.

> The first stage of the traditional policy process, problem definition, involves the emergence and recognition of some problem or crisis. Second, policy to address specific problems is formulated by various governmental and non-governmental actors such as legislators, executive branch officials, the courts, citizens and special interest groups. Special policy proposals are adopted in the third stage. The fourth stage is policy implementation, wherein the adopted alternatives are executed by administrative units. Finally, in the policy evaluation stage, policymakers determine whether the policy has achieved its goals (Altman and Petkus 1994).

Policy formulation is described as 'the collecting and analysing of information and the formulating of advice regarding the policy to be followed'. Parts of this phase are: recognition, diagnosis, search for information, design and evaluation of the different alternatives that are designed. Policy adoption involves the 'taking of decisions about the contents of a policy'. During implementation the chosen means are applied: 'Decision-making is a sequence of steps which, if followed, should lead to the best solution; that is, to action which optimises the decision maker's utility' (Butler 1991, pp.43–4).

Analysts using the phase model are aware of the fact that reality does not reflect the assumption of the model: 'Planning in shared-power situations hardly ever follows a rigidly structured sequence from developing problem definitions and solutions to adopting and implementing proposals. Serious difficulties arise when people try to impose this rigidly sequential approach on situations in which no one is in charge' (Bryson and Crosby 1992, p. xiv). 'Nonetheless, to be steadily effective, it is essential to have an organised approach of some sort' (ibid., pp. xiv). Several scientists reach the same conclusion (Hoogerwerf 1982; Mintzberg, Raisinghani and Therot 1976). They are aware that empiricism deviates from this, but feel it is worthwhile to reconstruct policy making as though it was taking place in phases. The phase metaphor allows scientists to develop different theories regarding the various stages. To reconstruct the policy formation phase, concepts such as *'problem definition'*, *'generating alternative solutions'* and *'policy design'* are used. To analyse the adoption of policies, analysts look for

the central decision which demarcates the transition from formation to implementation. During this phase, the policy proposal needs to be determined that is optimally suited to achieve the set objectives. Many parties are involved in this phase, but in the end only one or two actors determine which means are used to achieve the objectives. During the implementation phase, the researcher focuses on how chosen means were used and how any opposition was handled.

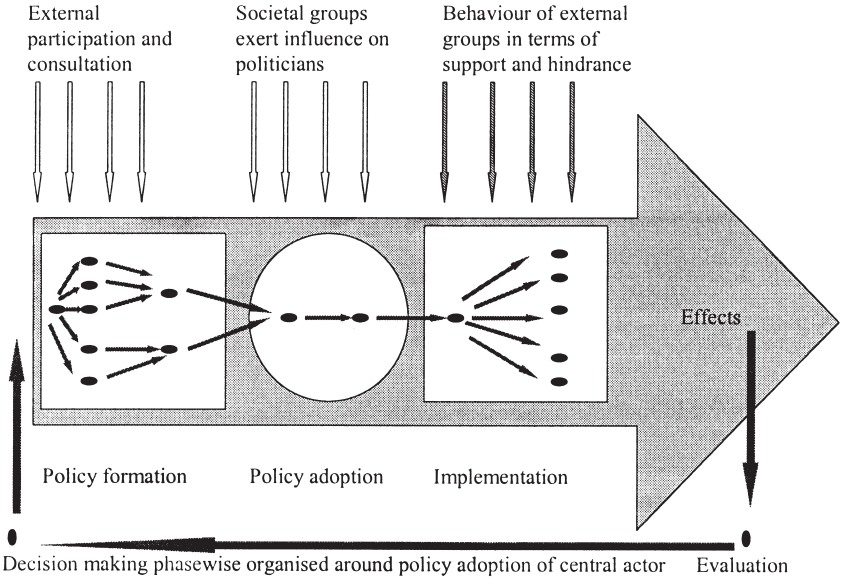
Problems preceding the search for and choice of solutions

Scientists using the phase model assume that decision making is problem-oriented (Scharpf 1997). There is, or at least there should be, one actor whose decision supersedes those of others and who therefore determines the problem and the policy. 'We therefore define public policy as substantive decisions, commitments, and actions made by those who hold or affect government positions of authority, as they are interpreted by various stakeholders' (Bryson and Crosby 1992, p. 63). Even though Bryson and Crosby (1992, p. 159) agree with Rittel and Webber (1973) that public problems are 'wicked' in the sense that they have no definite formulation, cannot be solved immediately and are unique, they still assume that problems do exist and should be known before a search for solutions can begin. Developing a 'Problem Definition to Guide Action' is seen as the first and most important phase in decision making, which should be carried out before the adoption of a policy by the policy maker can take place. Bryson and Crosby also assume that a solution can be formulated at a single point and place (see figure 2). It is on these points that the stream and rounds models use different assumptions.

3 CONCEPTS WITHIN AND PRINCIPLES OF THE STREAM MODEL

Some researchers assume that the horizontal division of activities is a more crucial distinction in analysing processes than the vertical division used in the phase model. In their view, the analysis of the various phases does not result in specific theories on policy formation, policy adoption and implementation. Based on this point of view, the so-called stream model was developed in 1972 by Cohen, March and Olsen. In 1984 Kingdon elaborated this model further. His model was based on the idea that policy making consists of three streams: problems, solutions/policies and politics. As opposed to the phase model, here decision making is dissociated from a specific participant. The idea is that decision making consists mainly of a stream in which problems are discussed, a stream in which solutions are discussed and a stream consisting of things such as the attitude of the public, campaigns by pressure groups, and ideological contributions (Kingdon 1984, p. 152). Politicians can determine the problems and solutions they wished to concentrate on. For this reason they are likely to rush from one combination of problem and solution to the other. As a result of this the

FIGURE 2 *The concept of decision making used in the phase model*



Note: (Grey arrow is decision making; black dots are decisions and dots in the circle represent policy adoption)

level of participation in decision making is likely to vary strongly. Partly because of this, processes have an unpredictable development (March and Olsen 1976, pp. 10–23). Thus, the temporal sequence of the phase model is replaced by the postulate of simultaneousness (Koppenjan 1993, p. 26). The three streams exist simultaneously. 'They are largely independent of one another, and each develops according to its own dynamics and rules' (Kingdon 1984, p. 20). There are three separate worlds where specific products are developed and transformed into their own dynamics and therefore are not linked in any temporal sequence. 'While there are indeed different processes, they do not necessarily follow one another through time in any regular pattern' (Kingdon 1984, p. 83). Actors with solutions in the policy stream are looking for problems and political commitment, while politicians are looking for both solutions and problems with which they can 'score'. According to this conceptual model, major policy changes are likely to occur only if the three streams become linked. Such linkages can occur especially if there is a favourable momentum, a so-called 'policy window' (Kingdon 1984, p. 174; Anglund 1999). The researcher can make decision making transparent by investigating to what extent links are forged and why they are forged. Thus decision making is not primarily separated into vertical strands, in the sense of consecutive steps over time, but rather in

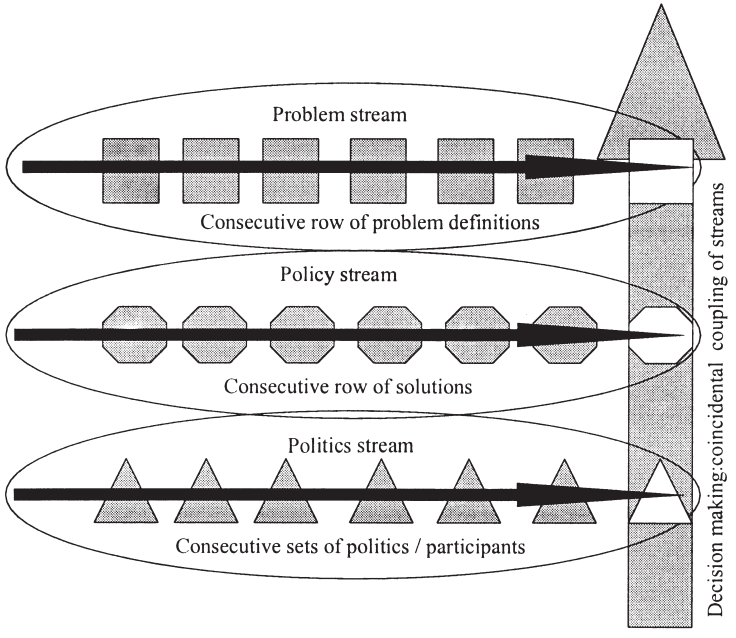
horizontal strands, in the sense of streams existing simultaneously side by side (figure 3).

4 THE ROUNDS MODEL

In the rounds model actors are once again the focal point of analysis. The assumption here is that solutions/policy and problems are relevant to a policy process, insofar as they are presented by an actor during this process (Scharpf, Reissert and Snabel 1978; Teisman 1998). In contrast to the phase model, here the researcher assumes that problems and solutions are not linked to a single actor (policy maker) and are therefore not fixed at the single moment at which the policy is adopted. Many actors are involved in decision making, and they will introduce their own perceptions of relevant problems, possible solutions and political judgement. To understand decision making, the researcher focuses on the variety of actors, objectives and solutions, their dynamics as well as the interaction between these elements. Complex decision making involves many policy makers who take decisions.

The rounds model can be seen as an interactive approach (Scharpf 1997). Policies, in terms of the actual interventions that take place in society, do not stem from an intended course of action formulated by one actor, but

FIGURE 3 *The concept of decision making used in the stream model*



Note: (Grey arrow on the right indicates the momentum of decision making as linking three separate streams)

result from of a series of decisions taken by different actors (see figure 3 from Teisman 1992, p. 33).

> Political scientists ... should be interested in the fact that many or most of the well-designed policy proposals will never get a chance to become effective. The reason is that public policy is not usually produced by a unitary actor with adequate control over all required action resources and a single-minded concern for the public interest. Rather it is likely to result from the strategic interaction among several or many policy actors, each with its own understanding of the nature of the problem and the feasibility of particular solutions, each with its own individual and institutional self-interest and its own normative preferences, and each with its own capabilities or action resources that may be employed to affect the outcome (Scharpf 1997, p. 11).

The focus, therefore, should be on the interaction among purposeful actors. To gain insight into policy making, the researcher depicts which actors are participating at what time. Actors are units capable of developing a recognizable course of action (individuals, groups or collective/corporate entities). To separate strands of decision making, the train of thought of the phase model is combined with that of the stream model. On the one hand, a *vertical* classification of decision making is made, by looking at the series of decisions that were taken in that time. On the other hand, a *horizontal* classification is applied by looking at interactions concerning the same subject, even if actors are unaware of each other's decisions at the moment they take these decisions. The division into time periods differs from that of the phase model in a number of respects. It is not the feature of the time period as such (i.e. 'this is preparation and this is implementation') that is being determined, but rather the starting and concluding points of a certain period. Such a period is called a 'decision making round'. The researcher demarcates decision-making rounds by determining the most crucial decisions of decision making in retrospect. This concerns particularly the choice of decisions that in a later period of decision making serve as an important point of reference for the behaviour of the actors that are present at the time (Teisman 1998).

It is possible that one participant characterizes his activities in terms of policy implementation, the other in terms of policy development. This depends on the point of reference, more than on the activities as such. Referring to an adopted plan an activity can be defined in terms of implementation, while another party can perceive the same activities as helpful for the preparation of a project. This difference in how an activity is experienced can also be attributed to the fact that actors are involved solely because they possess means that are considered indispensable by others. If such a party becomes involved in the policy process, it probably will link an ambition to the means it is supposed to donate. This constitutes a formation process.

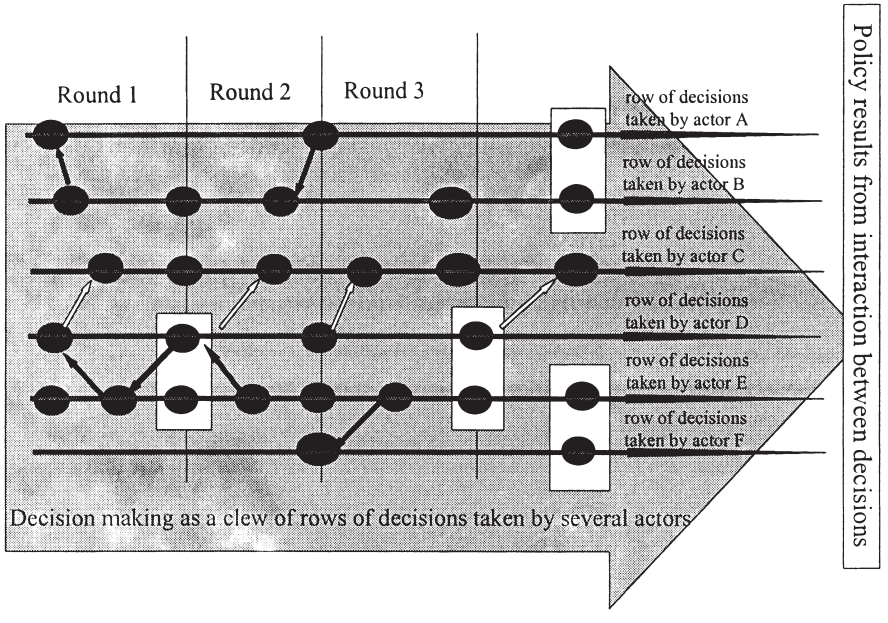
The application of the rounds model yields a picture of decision making, particularly focusing on the ability of parties to handle their dependency on other parties in interaction.

5 A COMPARATIVE ANALYSIS TO HIGHLIGHT THE ADDED VALUE OF THE ROUNDS MODEL

In the previous paragraphs we have examined three models. The phase model provides insight into the subsequent stages a focal actor goes through. The stream model focuses on links between problems, solutions and politics. Finally, the rounds model provides insight into the interaction between actors. Mutual adjustment (by way of co-operation, conflict or avoidance) leads to policy results (table 1).

In order to argue what the added value of the rounds model can be, three themes will be dealt with. The first theme looks at the issue of actors, problems and solutions, the second one deals with policy adoption as a yardstick, event or result and a third one deals with criteria for the evaluation of decision making. Finally, the rounds model will be considered as a useful tool in developing further the governance theories.

FIGURE 4 *The concept of decision making used in the rounds model*



Note: Grey arrow is decision-making, the black dots depict decisions taken by the various actors, and the policy result stems from the interaction between decisions (building upon decision of others <black small arrows), anticipation upon future decisions <white arrows> and covenanting results <white rectangles)

TABLE 1 *Comparative perspective on the phase model, the stream model and the rounds model*

	Phase model	Stream model	Rounds model
Criteria for the separation of strands of activities	Stages a focal organization goes through	Different concurrent streams of problems, solutions and politics	Rows of decisions taken by actors, creating rounds through interaction
Characterization of decision making	Sequence of formation, adoption and implementation	Coincidental or organized links between streams	Interaction between decisions taken by various actors
Assumptions about the nature of the process	One moment of policy adoption holds sway over other decisions and guides the process	A simultaneous stream of problems, solutions and politics, linked more or less at random	Decisions that conclude a round and initiate a new round, without fixing its progress
Assumptions about the content of the process	A focal actor adopts a dominant definition of the problem solution, creating governmental policy	Dynamics within and links between streams determine major policy changes	Interdependent actors take decisions separately or jointly, leading to governance policies

Actors, problems, solutions and interactions

It is generally accepted that various actors are involved in decision making. The phase model, however, places certain actors in a more central position than others on an a-priori basis. The rounds model refrains from this preoccupation. When dealing with complexity, it is not sensible to exclude actors in advance or to assume that certain actors can be characterized on a-priori grounds as policy designers, adopters or implementers. Rather, it is advisable to start out with all (potential) participants who perform in decision making. In the rounds model decision making is not about a single issue, nor about separated streams of problems, solutions and participants, but about dynamic combinations of sets of problems and solutions represented by different actors. Complications in decision making often appear when a solution adopted by one or more actors constitutes a problem for others. Progress is often made when a solution is provided which deals with sets of problems and the ambitions of several of the actors involved. For this reason the rounds model focuses on the *interaction* between actors, during which they can negotiate acceptable combinations of problems and solutions.

Policy adoption, yardstick, event or result

The phase model assumes that policies are set at a certain moment. The stream model assumes that policy steams from an event in which the streams coincide. The rounds model in contrast assumes that this moment

does not exist. Policies result from a series of decisions taken by various actors. The dynamics of combining problems and solutions and the relation between the two accounts for the course of decision making. A round of decision making begins and ends with the adoption of a certain combination of a problem definition and a (virtual) solution by one or more actors. The assumption is that the actors assess to what extent other actors share their definition of reality and proceed to interact on this basis. In contrast to the phase model, none of the definitions are seen as final or permanent. Research based on the rounds model will focus on perceived problems and solutions and will subsequently analyse whether and how actors have managed to combine perceptions to such an extent that they are willing to support a joint solution (Termeer 1993, p. 44, 48–51). Adoption then becomes the consolidation of a problem-solution combination over a longer period of several decision rounds.

Policy evaluation and evaluation criteria, shifting from a government to a governance approach

In the phase model the public interest as defined by the focal organization is often used as a guideline for evaluating. Evaluation focuses on the 'fit' between policy result and policy formulated in advance by the focal organization. The rounds model questions this criterion. Policy intentions at the beginning of a process are not necessarily the best indicator of public interest. It could be argued that a-posteriori opinions and judgements are at least as good an indicator. Secondly, it is assumed that network society as a whole, and the government in particular, are fragmented. As a result, the representation of the public interest is distributed over various parts of government and organizations outside the government. Policy evaluation becomes more meaningful if all these intentions are taken into account in the analysis. A fitting overall concept is joint interest (Teisman 1992, p. 91–2). Evaluation then no longer focuses on the question whether the policy result agrees with a single policy intention, but whether it responds to the objectives of all the parties involved at the moment policy effects can be distinguished.

The shift in orientation from government to governance

By doing so, the rounds model can contribute to the discussion about the shift from government to governance within several scientific communities involved in public administration. In Great Britain, for instance, the Westminster model has been criticized:

> The study of British central government has been dominated almost throughout the twentieth century implicitly and explicitly by the Westminster model. Whilst from the 1960s onwards political scientists through behavioural and institutional studies began to question the Westminster model, they remained very much within this paradigm. …

> The Westminster model is built on the assumption that there is parliamentary sovereignty (Gamble in Dunleavy and Gamble 1990; Judge 1993).

'All decisions are made within the authority of the Crown-in-Parliament and there is no higher authority. … Decisions are taken by Cabinet and implemented by a neutral civil service' (Smith 1998, p. 46). 'The Westminster model prescribed both what government did and the way it was examined. It also provided the agenda for the focus of empirical work on central government ….' Even though the Westminster model did reflect reality to a certain extent, in the first place it represented a normative view and 'subsequently led to misconceptions about both the nature of power and the location of the focus of research' (Smith 1998, p. 46).

In response to empirical studies by Mackintosh (1977) and Jones (1975), which undermined some of the assertions of the Westminster model, Rhodes (in Rhodes and Dunleavy 1995) suggested a new framework of analysis. This framework should focus on the complex web of institutions, networks and practices surrounding the Prime Minister, Cabinet, cabinet committees and their official counterparts, i.e. the less formal ministerial 'clubs' or meetings, bilateral negotiations, interdepartmental committees, etc. (Rhodes in Rhodes and Dunleavy 1995, p.12). From this insight it was a logical next step to focus on complexity of interactions between actors (Smith 1998, p. 47). Government is depicted as an institutional framework, not as an actor. Governance is about steering without presuming the presence of hierarchy (Rosenau 1992, pp. 14). It refers to relational contracting, organized markets in group enterprises, clans, networks, trade associations and strategic alliances (Jessop 1995). Departments have to be seen as one of many competing centres of authority (Rhodes 1996b).

The same type of discussion is going on in Germany. Here the terms 'Politikverflechtung' (the intertwining of policies) and 'policy networks' are being used (Marin and Mayntz 1991; Scharpf 1997). 'Policy networks are 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, quoted by Börzel 1998, p. 260). And: 'Under the conditions of … uncertainty and … overlap of sub-systems, policy networks as a mode of governance offer a crucial advantage over the two conventional forms of governance, hierarchy and market'(Börzel 1998, p. 260). Members of the Max-Planck-School seem to believe in the advantages of networks. 'Networks are able to intentionally produce collective outcomes despite diverging interests of their members through voluntary bargaining' (Kenis and Schneider 1991, and Mayntz 1993, quoted in Börzel 1998, p. 262). At the same time they are concerned about the slowness and occasional inertia of networks.

It is in this perspective that the rounds model must be placed. Consider-

ation should be given to the idea of using the rounds model in empirical research focusing on governance. The model offers a way to reconstruct a basically unlimited complexity of events that can be combined into a decision-making process. This will provide us with additional, more detailed insights into these processes, thereby creating a basis for more management theories about networks (Kickert *et al*. 1997).

6 A THREEFOLD ANALYSIS OF THE BETUWE RAILWAY LINE

In this paragraph a survey will be presented of decision-making processes regarding the construction of a new freight railway line between Europe's largest port, Rotterdam, and Germany. This so-called 'Betuwe line' is one of the most disputed projects of the last decades in the Netherlands. The parties involved have even called it a 'battle'. (Between 1991 and 1997 the project director wrote a book on the subject and gave it the title *The Battle of the Betuwe Line* (Boom 1997).) Despite all the problems and opposition, construction of the railway line is still continuing. Therefore we may consider this a successful decision-making process, in which the ministry, the Cabinet and the Parliament were able to realize a strategic project that fitted in with their policies. At the same time, however, many questions can be raised. The expected growth of freight transport by rail did not take place. It is far from clear whether or not the German part of the line can support the amount of trains needed to make the Betuwe railway line a success. There are no private parties that want to invest in the line or exploit it, even though this was assumed by the Cabinet when the policy was being adopted. Recent studies questioned the positive environmental impact of rail as compared to road and waterways. The costs of the line have risen from 2.5 billion initially to 9.35 billion in 1998. And recently the Transport Minister decided to forgo the Northern branch of the Betuwe line in order to combat any further increase in expenses. A threefold analysis of this case is presented here.

1 Application of the phase model: a central actor, a defined problem and a good solution

In the Netherlands the central government, specifically the Ministry of Traffic and Waterways, is responsible for the planning of new infrastructure. To properly organize decision making, the ministry uses a formal procedure known as the 'Planning Central Decision Procedure' (in Dutch: PKB). At the end of the 1980s the ministry was faced with congestion on existing freight connections from Rotterdam to the hinterland, combined with an expected growth in freight transport. In previous policy memoranda government had designated the distribution sector as a core activity for the Dutch economy. The two Dutch mainports, Schiphol Airport and the port of Rotterdam, should be enabled to function optimally and the main transport lines should be provided with sufficient capacity. The capacity of the hinterland connection could be increased by three alterna-

tive means: road, waterways or a new railway line. Because road traffic was seen as having a negative impact on the environment and transport by water was not seen as a viable option, the ministry decided in 1989 that a new railway link was needed.

The ministry adopted the plan for a railway through the region of the Betuwe in 1989: a freight line due to be realized before 1997. To implement this policy, the ministry set up the necessary procedures to determine its trajectory and its incorporation into the landscape. But while going through these procedures, the ministry encountered opposition from civilians and local authorities. In order to delay implementation regional actors asked for additional studies regarding the possible construction of an underground tunnel. Although the ministry indicated that this was not a realistic plan, the Second Chamber let itself be persuaded into investigating this alternative. This was the signal for other parties to present the Chamber with other new alternatives, such as a deeper construction of the railway line inside a groove. The involvement of Parliament resulted in a considerable series of amendments and an increase in cost. While the first plans were expected to require 4 billion Dutch Guilders, recent calculations have found that the line will cost more than 9 million Guilders. At the end of 1993 the project was adopted by Parliament. Decision making was complicated, however, by the parliamentary elections of 1994. One supporter of the project left the Cabinet and was replaced by someone who opposed the project. To deal with this new situation, the new Cabinet installed a Committee of Experts chaired by a member of the opposition. In January 1995 this committee issued a positive opinion, thus persuading the opposition to revise their point of view. In early 1997 all complaints were rejected by the Administrative Court. The construction work could begin.

2 Application of the stream model: insights into solutions, problems and support looking for each other

The first additional insight is that the solution of a freight railway line had existed long before being placed on the political agenda of the Cabinet in 1989. Already in the early 1980s this idea had been discussed in Rotterdam. Transport to the German hinterland was only possible by road and inland waterways. Road transport was vulnerable as a result of environmental restraints, whilst any growth in water transport was questioned because of its rigid institutional nature. But the attractive third solution, the construction of a freight railway line, could not at that moment be combined with problems and participants at the national level. Years later it was taken up again by the new enterprise responsible for freight railway transport. This organization resulted from the division of the monopolist Dutch Railway Company into two separate companies, one for passengers and one for freight. The latter saw the Betuwe railway line as a solution to its own unprofitable position. The line was defined as a prerequisite for growth of

cargo transport by train. However, there was no link with politics, and in 1988 the Transport Ministry turned down the proposal.

However, suddenly in 1989, the ministry became interested in the solution, even though its characteristics had not changed. An explanation for this can be found within the ministry itself. It was preparing a strategic plan for transport investments in the next decade, and became aware in 1989 that a major key project was lacking in this plan, also other projects were faced with delays. A ministerial committee was set up; this committee advised the minister to adopt the Betuwe railway line. Owing to budget deficits, financial problems remained. These were solved in two ways. Firstly, it was assumed that it would be co-financed by private parties, and secondly it was assumed that exploitation of the line would be profitable. It was this combination of problems and solutions that convinced Parliament in 1993. The policy was adopted.

3 Application of the rounds model: additional insights into internal and external dynamics

In the rounds model attention is paid to streams of decisions taken by several actors. The following groups of actors can be distinguished: the Rotterdam Port Authority, the freight railway company NS Cargo, the Transport Ministry, Parliament, local and national environmental groups, the German Railway Company, and European and German governments. Five different rounds are distinguished. During the first round, which started at the beginning of the 1980s, supporters of the Rotterdam port called for an additional freight link to the hinterland, in addition to the existing roads and waterways. They were the ones initiating the process. The aim was to increase the amount of transport modalities that could be used. They were less interested in the use of rail as such, but rather in increasing the range of options. This idea was discussed locally and shelved after some time, partly because of a negative opinion given by the Chamber of Commerce in Rotterdam. For this reason the first round was terminated, and it seemed as though the proposal had disappeared into a desk drawer for good.

A second round was started in 1987 by NS Cargo. It had been recently separated from its parent, the Dutch Railway Company, and was facing a weak market position. To strengthen its position it proposed to build a line specifically for freight transport. This had not been proposed in the past, for reasons that no powerful actor had been responsible thus far for freight transport by rail. In the former Dutch Railway Company, freight had always been subordinated to passenger transport. At the birth of NS Cargo the railway line had obtained its policy entrepreneur. However, NS Cargo had no legal or financial means to realize the railway line and began a lobbying process. Until 1989 the ministry did not show any interest. In that year, a third round of decision making was begun in which the ministry now played the leading part. The line was placed high on the government's agenda and has held this position ever since. Decision making was speeded

up by the minister, and just one year later a concrete route was proposed and the fourth round of decision making begun. In this round the ministry still played an important role, but was at times outclassed by Parliament. This stemmed directly from the role played by local and regional governments and environmental groups. At the beginning of the process, national environmental groups supported the choice in favour of transport by rail. As a result of the speeding-up of decision making, however, and a total lack of communication with local and regional governments, resistance grew quickly in 1992 and 1993, and national environmental groups felt forced to withdraw their support. The Betuwe line became the Dutch example of a non-communicative central government giving priority to the traditional economy (main port, quantities) instead of the environment and the quality of life, or a more modern type of economy (main port, added value). The ministry rejected all the alternatives presented by the local authorities and other groups in society. Parliament was more flexible, however, and a range of amendments resulted, raising the cost to almost 10 billion guilders. The Betuwe line appeared to have been accepted by the government. The fifth round began with the parliamentary elections and the shift in coalition of the governing parties, already mentioned. More interesting here is that under the surface of party-political manoeuvring, a lot of interaction was going on in terms of financing the project, exploiting the line when ready and creating competing European network of freight railway services. These decisions will be crucial to the success of the Betuwe line.

Several rounds of decision making are yet to come. Decisions need to be taken about financial support from private parties, exploitation of the line, harmonizing European exploitation arrangements, and so on. These decisions will determine whether or not a parliamentary inquiry will be set up in the next century, to answer the question why so much public money was used for something that worked out so unsuccessfully. Thus far, decision making on this issue has already had two important unforeseen but desirable results. The expected competition by the railway has forced the inland waterways shipping sector to make institutional changes and adopt a more competitive approach. This has already led to an enormous increase in inland shipping. Secondly, cargo transport by road is becoming ecologically more sound. Ironically, it is now being argued that both these improvements tend to make the Betuwe railway line superfluous.

7 CONCLUSION

Decision making has become complex during the past decades. There is a growing variety of relevant actors and definitions of problems and solutions. In this article the question is answered of how to conceptualize decision making in order to generate useful insights for the understanding of complexity. Three conceptual models are presented: the phase model, the stream model and the rounds model. In the phase model the focus is on decisions taken by a focal actor, targeting a specific problem. In the

TABLE 2 *Events in decision making on the Betuwe line and a threefold research result*

Empirical events	*Interpretations based on the phase model*	*Interpretations based on the stream model*	*Interpretations based on the rounds model*
The Rotterdam Port Authority proposes a railway link to Germany (1985)	Irrelevant (Ministry did not respond to proposal)	Solution was unable to find a problem and sufficient participants	Start of first round; the port authority aims to increase the range of transport modalities
New enterprise for railway freight transport adopts Betuwe railway line (1987)	Lobbying activity resulting in a ministerial committee in 1989 (still not relevant)	Problem of a lack of profit was combined with the solution of a new line	The start of second round of decision making aiming to create a viable freight train enterprise
A ministerial committee is set up to investigate the viability of the Betuwe line (1989/90)	Minister begins decision making by setting up a committee (starting point for analyses)	The department is faced with a lack of major key projects in its new strategic plan	Start of third round leading to the adoption of the project as part of the strategic plan of the ministry
The minister points out a concrete route (1992), starts PCDP and organizes popular participation	The official start of the central decision planning procedure (policy formation)	Choosing a concrete route was seen by the policy community as a solution to solve the problem of slow decision making	Start of fourth round, aiming to speed up decision making, but actually generating and activating opposition against project
Parliament adopts proposal (1993)	Central decision is taken (policy adopted)	Coupling of problem, solution and participants	End of fourth round
Parliamentary elections resulting in a new Cabinet (1994)	The central decision is reconsidered in a opaque political arena	Second coupling in which new participants introduce new policy definitions	Fifth round helps party to change position and is used by societal groups to get additional proposal accepted
The Administrative Court overrules all written objections (1997)	Official start of construction activities; the implementation really starts	Confirmation of the existing coupling between political, policy and problem stream	In sixth round opponents activate potential coalition in business, criticizing added value of project
The Cabinet decides not to build northern branch of the Betuwe railway line (1999)	Partial policy termination due to new information	New linking of politics with alternative problems or solutions	In seventh round minister is convinced by influential actors that public money is needed elsewhere

stream model the focus is on the linking of three more or less independent streams, i.e. problems, solutions and politics. The rounds model focuses on the interaction between the various decisions taken by different actors. If we analyse reality from these three models, different images of reality are obtained, each of which provides a partial insight into reality.

Thanks to the use of the phase model we now know a great deal about how a single actor defines policy in terms of problems and solutions, policy adoption, implementation and evaluation. Attention is paid to a focal actor, often the central government, and the way in which this central actor organizes its own policy processes. The phase model focuses mainly on the intended policy of this focal actor. This is both its strength and its weakness. The case study on the Betuwe railway line presents a national government that is dedicated to its realization and was able to successfully protect it against attacks from the outside.

The stream model attends the fragmentation of the decision-making world into problems, solutions and politics as separate streams. If these streams meet by chance, progress can be made. Not the intended policy of one actor, but the links between the streams are crucial. The case study shows that different problems were linked to the Betuwe line solution. The lack of alternative solutions was an important reason for this project's being placed on the central government's agenda. New solutions looking for money still are a threat for the project.

The rounds model focuses on the interaction between interdependent actors. Every new actor entering decision making introduces new problems and solutions. Particularly on these points, the rounds model offers a number of additional possibilities to enhance insight into decision making. Not just accepting that there are various actors, but also accepting that all these actors contribute to the decision-making process and can even influence the results helps to understand the complexity and obtain insight into interaction patterns which are used for governance of the network society. The model emphasizes that achieving satisfactory results depends not only upon decisions taken by individual actors but, to an increasing extent, upon the interaction between decisions taken by several actors. By using the rounds model the researcher can analyse the interactions between decisions. All actors involved in governance can benefit from these insights.

REFERENCES

Altman, J.A. and E. Petkus. 1994. Towards a stakeholder-based policy process: an application of the social marketing perspective to environmental policy development, *Policy Sciences* 27, 37–51.

Anderson, J. 1979. *Public policy making*. New York: Praeger.

Anglund, S.M. 1999. 'Policy feedback: the comparison effect and small business procurement policy', *Policy Studies Journal* 27, 1, 11–27.

Boom, H. 1977. *Slag om de Betuwe Route*. Leuven: Balans.

Börzel, T.A., 1998. 'Organizing Babylon – on the different conceptions of policy networks,' *Public Administration* 76, 253–73.

Bryson, J.M. and B. C. Crosby. 1992. *Leadership for the common good, tackling public problems in a shared-power world*. San Francisco: Jossey-Bass.

Butler, R. 1991. *Designing organizations: a decision-making perspective*, London: Routledge.

Cohen, M.D, J.G. March and J.P. Olsen. 1972. 'A garbage can model of organizational choice,' *Administrative Science Quarterly* 17, 1, 1–25.

Crozier, M. and E. Friedberg. 1980. *Actors and systems: the politics of collective action*. Chicago: University Press.

Dunleavy, P. and A. Gamble. 1990. *Developments in British Politics 3*.

Edelman, M. 1971. *The symbolic uses of politics: mass arousal and quiescence*. Chicago: Markham Publishers

Heritier, A., C. Knill and S. Mingers. 1996. *Ringing the changes in Europe; regulatory competition and redefinition of the state*. Berlin: De Gruyter.

Hoogerwerf, A. (ed.). 1982. *Public policy; an introduction in the policy science*. (in Dutch, title *Overheidsbeleid; een inleiding in de beleidswetenschap*). Alphen a/d Rijn: Samsom Tjeenk Willink. 1985 (3rd edn.); 1989 (4th edn.).

Jessop, B. 1995. 'The regulation approach, governance and post-Fordism', *Economy and Society* 24, 307–33.

Jones, G. 1975. 'Development of the Cabinet,' in W. Thornhill (ed.), *The modernisation of British government*. London: Pitman.

Judge, D. 1993. *The parliamentary state*. London: Sage.

Kickert, W., E-H. Klijn and J. Koppenjan. 1997. *Managing complex networks*. London: Sage.

Kingdon, J.W. 1984. *Agendas, alternatives, and public policies*. Boston: Little, Brown and Company.

Koppenjan, J. 1993. *Management of policy processes* (in Dutch: *management van de beleidsvorming*). The Hague: Vuga.

Mackintosh, J.P. 1977. *The politics and government of Britain*. London: Hutchinson.

March J.G. 1988. *Decisions and organisations*. Oxford: Basil Blackwell Ltd.

March J.G. and J.P. Olsen. 1976 (1st. edn.), 1979 (2nd. edn.). *Ambiguity and choice in organisations*. Bergen: Universityforlaget.

Marin, B. and R. Mayntz (eds.). 1991. *Policy networks; empirical evidence and theoretical considerations*. Frankfurt am Main: Campus Verlag.

Mintzberg, H. 1973. *The nature of managerial work*. New York: Harper and Row.

—1976. 'Planning on the left side and managing on the right,' *Harvard Business Review* 54, 49–58.

Mintzberg, H., D. Raisinghani and A. Therot. 1976. 'The structure of unstructured decision processes,' *Administrative Science Quarterly* 21, 2 (June), 246–75.

Morgan, G. 1997 (2nd edn.). *Images of organisation*. London: Sage.

Ostrom, E. 1990. *Governing the Commons: the evolution of institutions for collective action*. Cambridge: Cambridge University Press.

Rhodes, R.A.W. 1996a. 'Governing without governance: order and change in British government'. Inaugural Lecture, University of Newcastle, 18 April.

— 1996b. 'The new governance: governing without government', *Political Studies* 44, 652–67.

Rhodes, R.A.W. and P. Dunleavy (eds.) 1995. *Prime Minister, Cabinet and core executive*. London: Macmillan.

Rittel, H.W.J. and M.M. Webber. 1973. 'Dilemmas in a general theory of planning', *Policy Studies* 4, 155–169.

Rosenau, J. 1992. 'Governance, order and change in world politics', in J.N. Rosenau and E-O. Czempiel (eds.), *Governance without government*. Cambridge: Cambridge University Press.

Sato, H. 1999. 'The advocacy coalition framework and the policy process analysis: the case of smoking control in Japan', *Policy studies journal*, 27, 1, 28–44.

Scharpf, F. 1997. *Games real actors play; actor-centered institutionalism in policy research*. Boulder USA: Westview Press.

Scharpf, F., B. Reissert and F. Schnabel. 1998. 'Policy effectiveness and conflict avoidance', in K. Hanford and F.W. Scharpf (see above).

Smith, M.J. 1998. 'Reconceptualizing the British state: theoretical and empirical challenges to central government', *Public Administration* 76, 1, 45–72.

Smith, M.J., D. March and D. Richards. 1993. 'Central government departments and the policy process'. *Public Administration* 71, 567–94.

Teisman, G.R. 1992 (1st edn.), 1995 (2nd edn.), 1998 (3rd edn.). *Complex decision-making, a pluricentric view* (in Dutch: *Complexe Besluitvorming*). The Hague: Vuga.

Teisman, G.R. (with E.-H. Klijn) 1997. 'Strategies and games in networks', pp. 98–118, in Kickert *et al*. (see above).

Termeer, C. 1993. *Dynamics and inertia in manure policy* (in Dutch: *dynamiek en inertie in mestbeleid*). The Hague: Vuga.

Date received 4 June 1999. Date accepted 8 February 2000.