Understanding the implementation of infrastructure projects

Speed of decision-making processes, participation and complexity levels of Dutch infrastructure projects

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Chapter 1 Understanding the implementation of infrastructure projects

1.1 A short review of the problem

During the past few decades the mobility of men and goods has increased enormously. To be able to facilitate the ever increasing mobility, the expansion of the infrastructural network is necessary. The general feeling is however that new infrastructure is often not implemented fast enough to be able to cope with the demand. In many (democratic) countries it appears to take too much time to get from ideas to the actual implementation of infrastructure. This is caused by, among other things, the complexity of spatial planning and implementation processes. The introduction of new spatial planning laws and regulations during the past few decades has slowed down the implementation processes. A good example in this respect concerns the effects of the implementation of new EU regulation for environmental protection which has certainly not simplified planning procedures for large spatial development projects.

Another important aspect that contributes to the growing complexity of planning and implementation processes is connected with the financial complexity of infrastructure projects. This financial complexity depends both on the considerable amount of costs that is usually involved with infrastructure development and the difficulties to derive income from the exploitation of infrastructure (infrastructure is therefore considered a *public good* in economic terms).

The complexity of infrastructure development has also increased because of the changes that took place in society and with respect to the relation between society and governmental organisations. Infrastructure used to be an exclusively public task, without

much involvement of market parties and/or society during the planning process. Society, however, has become much more involved in the planning process and their (legal) possibilities to protest against governmental decisions on infrastructural projects have also increased. Because of the simple fact that (line) infrastructure usually takes up large areas, many people are confronted with it and have the right to protest.

Finally, state agencies and market parties have been looking for a long time already for innovative solutions to improve the financing of infrastructure development. This has resulted i.e. in many types of public private partnerships and also in the introduction of many instruments for *value capturing*. Although many of these solutions have contributed to the improved implementation of infrastructure projects, it seems also clear that they have certainly not simplified the development process.

1.2 Objective of this paper

From the enormous amount of literature about the implementation of infrastructure projects one can easily conclude that the implementation of large infrastructure projects is problematic by nature. It seems to be the rule rather than the exception that large infrastructure projects exceed both financial budgets and time horizons (see i.e. Flyvbjerg et al., 2003). It is clear that state agencies face increasing complexity with respect to infrastructure development. The changing relations between state agencies on the one hand and market parties and the public on the other hand have, in combination with other factors, in many cases resulted in an undesired slow-down of decision-making processes for infrastructure development. The urgent need for expansion of infrastructure and the complexity and unsatisfying speed of decision-making processes has become a major

issue in many countries. To improve the efficiency of infrastructure development projects, the *OECD project on Global Infrastructures* suggests (among other things) that governments should strengthen the involvement of various stakeholders in the planning and implementation of infrastructure while there is a need for less complicated planning and implementation. These recommendations seem to contradict each other:

- On the one hand it is recommended that governments should strengthen the involvement of various stakeholders in the planning and implementation of infrastructures. (The need to consult more widely in a democracy).
- On the other hand it is recommended to reduce the complexity level of the planning and implementation process. (There is a need for less complicated planning and implementation procedures).

The contradiction is that involving more parties in the process will in theory cause more procedural complexity, whereas simplification is pursued.

The main question to be answered in the present paper is whether there is a way to reconcile these contradicting recommendations. Or in other words: *Can we find any possible pathways to resolve the paradox?*

The present paper does not intend to provide an overview of earlier studies of the implementation of infrastructure projects or to analyse in detail the results of empirical studies of infrastructure development. Instead, a rather pragmatic approach has been chosen. We look for success factors regarding the successful implementation of big infrastructure projects, both in terms of cost effectiveness and in terms of time. The paper

assumes that the successful (or: efficient) implementation of infrastructure projects depends very much on the complexity level of the development process and the level of interaction and / or co-operation between the public and private actors that are involved in these projects. We expect that a positive relation exists between low levels of complexity of infrastructure projects and the 'speed' of project implementation. We also suppose that a positive co-operation between the public and private actors that are involved in the infrastructure project may contribute to the successful implementation of the project.

The hypothetical relations will be tested by carrying out 15 case studies of Dutch infrastructure projects. To be able to assess the success factors to accelerate infrastructure development within a relatively short period of time we have selected a rather broad range of (well-documented) Dutch projects of which our research team has considerable knowledge already.

The case studies particularly analyse (at an aggregate level) three aspects that are relevant for the purpose of this paper:

- the level of participation of state agencies, market parties and 'the public';
- the complexity of the process and the procedures;
- the 'speed' of the planning and implementation process.

Chapter two pays attention to the operationalisation of these aspects.

This document contains the most important results of the case studies and our conclusions with respect to success factors to accelerate decision-making processes for

infrastructure development. Detailed information about the case studies can be found in the appendix document.

Chapter 2 Analytical model for the analysis of Infrastructure projects

2.1 Introduction

To be able to analyse the relations between 'speed of decision-making processes' and, respectively, the 'complexity' and 'participation level' more systematically we need to clarify these relations. To achieve a better understanding of the processes underlying the implementation of infrastructure projects, this chapter therefore shortly pays attention to the key themes that are relevant to the earlier mentioned hypothesis:

Explanatory variables:

- participation levels of public and private actors in (infrastructure) development projects;
- complexity levels in infrastructure projects;

Dependent variable:

- speed of decision-making processes with respect to infrastructure development.

The aim of this chapter is to develop an analytical framework that enables us to 'classify' the case studies, in terms of 'speed of decision-making processes', 'complexity' and 'participation level / type of public private partnership'.

2.2 Co-operation of public and private actors: participation levels

One of the reasons to carry out this study was the recommendation in the OECD Project on Global Infrastructures that governments should strengthen the involvement of various

stakeholders in planning and implementation of infrastructure. For the present study we have interpreted the 'levels of stakeholder involvement' in terms of 'participation levels'. Participation levels include, in our opinion, not only different types of consultation but also different types of public private partnerships. This 'broader' perspective of stakeholder involvement is relevant to our study, because we expect that solutions to accelerate the implementation of infrastructure projects can particularly be found in innovative public private partnerships. Debates about participation levels in relation to spatial development projects particularly concern the effectiveness of different types of public private partnerships. Nevertheless, a very considerable part of infrastructure projects – considered here as a specific type of spatial development projects - is probably still developed by the public sector exclusively. To be able to categorise levels of stakeholder involvement with regard to infrastructure projects we need therefore a broad definition of participation levels, rather than a definition of different types of public private partnerships or a definition of different types of consultation.

In the analytical model that is used for the case studies seven different levels of participation are distinguished (table 2.1). This distinction between participation levels is based on Pröpper and Steenbeek (1998) and was originally introduced by Arnstein (1969).

Public private partnerships – as type of governance – belong to the levels 'facilitative', 'co-operative', 'delegating' and 'participating' governance.

For each case study the level of participation will be analysed, distinguishing between the 'idea phase' of the project, the 'planning and decision-making phase' and the actual 'implementation phase'. Moreover, attention will be paid to the reasons why this level of

participation has been selected (historical background) and to the effectiveness of the co-operation between state agencies, market parties and 'the public'.

Table 2.1 Levels of participation for spatial planning processes[1]

Type of governance	Role of state agency	Role of participant
Facilitative	State agency supports participants (market parties) in decision-making process	Participant is initiator and decides on project implementation
Co-operative	State agency and participants take equal position in decision-making process	Participant and state agency jointly decide on project implementation
Delegating	State agency offers framework for project implementation by participants	Participant decides on project implementation within framework and is responsible for project implementation
Participating	State agency offers the opportunity for participants to discuss planning design	Participant is able to discuss planning design and to advice on implementation
Consultative	State agency offers the opportunity for participants to discuss planning design within strict design rules	Participant is able to comment on proposed planning design
Open authorative	State agency informs participants about decision with respect to project implementation	Participant gathers information about project implementation
Closed authorative	State agency does not inform participants about project implementation and takes its own decision	No role for participant in decision-making process

1 Based on Pröpper and Steenbeek (1998)

2.3 Complexity and uncertainty in infrastructure projects

Most infrastructure projects belong to the category of complex or unstructured problems. Monnikhof (2006: p. 80) characterises complex problems (or projects) by 'many involved actors, including many decision makers, with many relations, dependencies, organisational backgrounds, power imbalances, imbalances in knowledge and information, differing values, differing problem perceptions and strategic behaviour'. And moreover: '(t)hey are volatile over time and consist of a bundle of problems tied together without an unambiguous problem description' (ibid.: p. 80). Complex projects

also often include many possible alternatives with (partially) uncertain outcomes and the necessary knowledge with respect to goals and means, as well as the values involved, is often missing.

Klijn et.al. (2006) identify six dimensions with respect to the complexity of spatial development projects that are typical for those projects:

- *Variety of scale:* spatial development projects often include various government levels at the same time and require the co-ordination of state agency activities on local, regional, national (and sometimes even European) level;
- *Involvement of many participants:* inhabitants, property developers, voluntary organisations and other organisations are often involved in those projects;
- *Variety of approaches possible in decision-making process:* different approaches lead to different solutions (i.e. economic efficiency versus spatial efficiency, speed of project implementation versus precision);
- *Many objectives and goals underlie decision-making process:* spatial development projects usually serve more than one objective, i.e. safety, spatial quality, accessibility, market demand;
- *Ambiguous 'by nature' and subject to changes during the decision-making process:* since decision-making processes for spatial development projects usually take a long time, projects may be subject to changing preferences, changing policies, changing neighbourhood opinions, etcetera, during the decision-making process;
- *Complicated relations to other development projects:* spatial development projects are often closely related to other spatial development projects. Decisions with respect

to one project may have far reaching consequences for the outcome of another project.

The second to fifth dimension refer to the position and interaction of participants. The first and sixth dimension refer to procedural issues and in particular the sixth dimension also to (financial) programming.

The case studies particularly pay attention to three aspects that can be related to complexity and that are assumed to be most relevant to infrastructure development:

- the number of participants involved in the project;
- the 'financial' complexity of the project (including i.e. processes of value capturing);
- the 'procedural' complexity of the project (including i.e. changes in land use plans and obligatory impact analyses).

2.4 Speed of decision-making processes

The speed of decision-making is often rather difficult to measure: '(t)he beginning and the end of a project are usually difficult to determine precisely, and decision-making speed may differ from the one project or mode to the other. Decision-making speed, in reality, is often an impression instead of a precise measure' (De Jong, 1999). Accelerating the 'process time' for the implementation of projects is not necessary to be preferred in all circumstances: '(q)uick decisionmaking may have a number of important disadvantages. Because of the emphasis on pushing certain decisions through, it is possible that the contractor has little or no consideration for arguments and contributions of opponents' (De Jong, 1999).

Empirical studies of the length of decision-making processes are scarce. Table 2.2 provides some information on international differences with respect to decision-making processes of both road and rail infrastructure projects.

Table 2.2 Average length of decision-making processes (exclusive of implementation phase) measured annually until 1990; in years

Transport mode	**Switzerland**	**Germany**	**Netherlands**	**England**	**France**
Roads	16	16	24	20	6
Railroads	12	15	9	5	7

Source: Ecorys, 1994

With regard to the empirical analysis of Dutch infrastructure projects it would be insufficient to evaluate the speed of the decision-making process only. The 'time-efficiency' of infrastructure projects also depends on the time that is consumed in the first phase of *idea development* and the final phase of project implementation. The empirical analysis pays therefore attention to all three phases.

2.5 A conceptual model for identifying successful infrastructure projects

The analytical model that will be used in chapter 3 to analyse the impact of, respectively, project complexity and participation level on the speed of decision-making processes

with respect to infrastructure development (fig. 2.1) is based on the present chapter's operationalisation of these aspects.

Figure 1 Analytical model

Interaction level according to the ladder of participation	From first idea to planning process	Open authorative to facilitative	
	Planning process	Open authorative to facilitative	
	Implementation process	Open authorative to facilitative	
Complexity of the process and the procedures*	*Complexity of the process*	+ to +++++	Combined score of the 'complexity level' + to +++++
	- Number of governments involved	+ to +++++	
	- Number of market parties involved	+ to +++++	
	- Financial complexity	+ to +++++	
	- Complexity regarding the content of the plan	+ to +++++	
	Complexity of procedures	+ to +++++	
	- Number of procedures	+ to +++++	
	- Weight of procedures	+ to +++++	
Speed of the process*	From first idea to development	+ to +++++	Combined score of the 'speed of the process' + to +++++
	Planning process	+ to +++++	
	Implementation process	+ to +++++	

* On a scale from + to +++++, where + is very low/slow and +++++ is very high/fast.

Chapter 3 Results of the case studies

3.1 Introduction

In this chapter the results of the case studies are discussed. First of all we would like to emphasize that every project has its own specific characteristics that to a certain extent determine the decision-making processes. What we mean to say with this is that the 'speed' of all projects depends to a large extent on project-specific details. The case studies however do provide us with some indications of 'success factors' to accelerate the implementation of infrastructure projects and the relations between 'speed' of project implementation and, respectively, complexity level and participation level.

This chapter will analyse in the first place the 'successful' projects, characterised by a relatively fast decision-making process, and tries to identify the determining factors that can be held responsible for the success and/or the 'satisfying' speed of decision-making. Second, we will analyse the less successful projects, characterised by relatively long-lasting decision-making processes and identify the determining factors in these cases.

3.2 Successful projects: determining factors in the decision-making process

The first group of successful projects consists of 'RijnGouwe Line' and 'Rush Hour Lanes'. In both cases relatively low complexity levels seem to be primarily responsible for the positive speed of project implementation. In both cases the 'new', to be implemented infrastructure partially makes use of existing roads/rail. This enormously simplifies planning procedures. Moreover, both projects are generally expected to have

positive consequences for many stakeholders, so resistance to the implementation of those projects is almost absent. Regarding the implementation of the Rush Hour Lanes the law was even adjusted to shorten several procedures.

Two other rather successful projects are Sijtwende (road construction combined with property development) and Zuidas Amsterdam (public transport infrastructure combined with property development). Both projects are characterised by the initiating role of private investors. Sijtwende is a special case. For decades there has been a conflict of interest between several state agencies and acceptable solutions appeared not to be available. The municipality on the one hand wanted to build houses in this area, while state agencies (national and provincial) on the other hand aimed to construct road infrastructure. However, in 1995 a private consortium came up with the idea to reconcile the conflicting ideas and to combine infrastructure development with housing development. The private initiative to change the project scope resulted in constructive co-operation with all state agencies involved and ultimately a smooth decision-making process. It is clear that the involvement of the market party has been to a large extent responsible for the progress that has been made since 1995. The project is nowadays considered as an exemplary project for successful public-private partnerships for infrastructure development.

In the project Zuidas the participation level was very high from the beginning. In fact it was 'the market' that put the location in the picture, while the municipality of Amsterdam at that time still focussed on the IJ river banks. This project is an exceptional case, because it is one of the very few projects where the national government has decided to

participate financially in the project development. It seems that the willingness of the national government to invest in this project and the willingness of the market, from the very first beginning of the project to invest in the location resulted in a successful process of decision-making.

Typical for the next two projects, The Hague Central Station and Arnhem Central Station, is the strong entrepreneurial position of the municipal authorities involved. The project 'The Hague Central Station' (reconstruction of the central railway station combined with the redevelopment of the surrounding area) is also considered a successful project. Characteristic in this case is the separated responsibility concerning the development of the railway station (public) and the development of the surrounding area (private). The municipality is responsible for land development for the whole plan area, while the project is subdivided into five partial projects that fall under the integral responsibility of the municipality of The Hague. For the development of the railway station (financial) agreements were made with the national government. For the partial projects concerning the development of the surrounding area, separate agreements were signed between the municipality and private parties. The determining success factor for this project seems to be the municipality's ability to 'keep the project simple' by taking full responsibility for the land development process itself and subdividing the project into five separate projects. Additionally, the national government's rather early decision to finance part of the project costs and the willingness of private parties to participate in the subprojects have played a positive role in the decision-making process as well.

Arnhem Central Station is another successful example of the station area redevelopment projects that belong to the national government's *nieuwe sleutelprojecten* (key development projects). At first the intention was to develop the project within a public-private partnership, but because the main private investor (ING) and the municipality of Arnhem were unable to synchronise their interests, the municipality decided to develop the project by itself. The willingness of various state agencies to contribute financially and the relatively low complexity level seem to be responsible for the progress that was made. This project is again a good example of a municipality taking its responsibility, prepared to act as the project initiator. Moreover and despite the fact that a formal public private partnership is lacking, the municipality and the property developers involved agreed on a financial contribution of the developers (based on their profits of real estate developments) to the infrastructure implementation costs.

Finally, the project A59 (reconstruction of a provincial road into a national highway) belongs to the category of successful projects. At first, to implement this project, a 'traditional approach' was chosen, but lack of (public) financial resources prevented the project from being implemented. The province then took over the initiative from the national government and was able to find a private consortium interested in the project. This resulted in the pre-financing of the project by a private consortium (within a DBFM-contract) and a gain of at least five years (because the shortcoming financial budget was the bottleneck of the project so far). Moreover, the cost-effectiveness of the project was high, because the costs appeared to be considerably lower than had been pre-calculated in

the previous tendering procedures. In this case it seems clear that the willingness of the private consortium to pre-finance is the determining success factor.

Summarizing, we identified the following success factors:

- relatively low procedural complexity;
- strong initiating role of private investors;
- strong entrepreneurial attitude of local government;
- 'smart' public-private partnerships, based on risk-taking by private partners;
- innovative (temporary) legislation may contribute in some cases to success of decision-making.

3.3 Unsuccessful projects: determining factors in the decision-making process

This section pays attention to infrastructure project that are generally considered less successful, in terms of the speed of the decision-making processes.

One of the largest, most expensive and controversial infrastructure projects ever conducted in the Netherlands is the project Betuwe Line (railroad of approximately 160 kilometres from Rotterdam to Germany for heavy transport only). In this project a very high complexity level is combined with a very low participation level. Because the spatial impact of the Betuwe Line is substantial and not many stakeholders benefit directly from the project, resistance was (and still is!) very high. The national government did not conduct a proper cost-benefit analysis prior to the decision-making and during the process several setbacks like enormous budget exceedings and delays were encountered.

Although many stakeholders (private as well as public) tried to influence the decision-making of the project (because, for one thing, the economic benefit of the project remains undisputed), the national government remained stubborn and convinced that the project was of national interest and therefore should be implemented. The railroad is expected to be operational in 2007.

The high procedural and financial complexity level on the one hand and the very low participation level on the other hand seem to be the determining factors for the problems that occurred in this project.

Another large and also (but to a lesser extent) controversial project is the construction of the HSL-South (high speed line for passenger trains) from Amsterdam to Antwerp. This project not only had to deal with procedural and financial complexity, but also with technological complexity. For the building and operation of the HSL-South, public-private partnerships were setup, this in contrary to the Betuwe Line project.

While initiating the HSL-South project, the national government was convinced that it was of national importance to link up with the European High Speed Train network. Without a proper cost-benefit analysis the decision to construct the HSL-South was pushed through, resulting in many delays and budget exceeding. The HSL-South project as well as the Betuwe Line project also had to deal with new (i.e technical) requirements during the implementation phase.

Because of the discontent with the developments with respect to both the projects HSL-South and the Betuwe Line within the Dutch parliament, a commission was set up in 2006 to investigate the role of the government in large infrastructure projects. The

conclusion of this investigation is that the decision to build the HSL-South and the Betuwe Line was taken without proper analysis prior to the decision-making and that during the first phases of the process the responsible governmental agencies did not communicate openly. In other words: the participation level was insufficient and perhaps a higher participation level in the early stages of the project (especially prior to the actual decision-making) might have prevented the national government from making unfounded decisions.

A third line infrastructure project considered as rather unsuccessful in terms of speed of the decision-making process is the Hanze Line (construction of a railway track of approximately 50 kilometres between the cities of Lelystad and Zwolle). The project falls under the responsibility of ProRail (a government task organisation) and is financed by the Ministry of Transport, Public Works and Water Management; private parties are not involved. The project is divided into several subprojects. Some of these subprojects will be tendered traditionally, while for a few subprojects innovative contracting will take place. Insufficient public financial budgets, combined with changing priorities of the national government are held responsible for the postponement of the planned opening date.

The A4 Midden Delfland project (road construction in combination with integrated area development between the towns Delft and Rotterdam) is generally considered as very unsuccessful in terms of speed of the decision-making process. The project concerns the construction of a missing link of 7 kilometres in the national motorway network between

Delft and Rotterdam in a vulnerable rural and urban area. Many stakeholders with conflicting interests are involved and the need is disputed because there are alternative solutions and the negative environmental impact is large. As a result the complexity level is very high. The project can be characterised as a traditional infrastructure project under the direct responsibility of RWS (Rijkswaterstaat, part of the Ministry of Transport and Public Works). For many decades the participation level was very low. The high complexity level and the low participation level causing a lack of consensus seem to be the determining factors for the lack of progress during many years. In 2000 however steering committee was installed, involving various societal parties, increasing thus the participation level. This finally led to a solution to the impasse. The scope of the project changed from mono-functional infrastructure development to an integral development of the area between Delft and Schiedam. This contributed to the rise of the support by the 'public'. Raising the participation level and changing the scope appeared to have had a positive influence on the decision-making process.

Another project with a long history is the project N201+, which concerns the renewal and diversion of a provincial road. For many years the high complexity, conflicting interests and a lack of (public) financial resources, appeared to be the determining factors that resulted in an impasse. During the nineties public-private partnership was seen as a possible solution. In the years that followed, the project scope was changed to an integral approach and together with a higher participation level this resulted in new progress in the decision-making process. As some of the other case studies also seem to show (i.e.

Sijtwende, A4 Midden Delfland), a scope enlargement may positively contribute to the success of the decision-making process.

The case study Railroad tunnel Delft is about the construction of a railroad tunnel, as a replacement for the current viaduct that runs right through the city, in combination with the development of the surrounding area. Although many stakeholders were in favour of the plans to construct a tunnel, a lack of (public) financial resources appeared to be the determining factor / bottleneck in the slow decision-making process. A very intensive (and long-lasting) lobbying with the national government of the municipality and the market parties involved eventually resulted in a large financial contribution of the national government and other stakeholders. A broad (integral) project scope created possibilities for value-capturing. The implementation of the project seems very likely to start now in 2008.

The project A2 Maastricht is also considered as 'less successful' in terms of the speed of the decision-making process. It concerns the reconstruction of a part of the national highway A2, which runs right through the city of Maastricht. During the 1980's responsibility for project planning was with the Directorate-General for Public Works and Water Management (RWS). It was then considered as a mono-functional infrastructure project. However, plans never got passed the status of preliminary ideas. Regional public parties took over the initiative and together with a change of the project scope from a mono-functional to an integral approach (road construction linked with property development) this resulted in new progress. It seems that in this case the low participation level and the limited scope are the main determining factors for the lack of

progress during the first phases of the decision-making process. The regional public agencies have chosen for a high participation level and challenge private parties to come up with one integral plan.

Finally, the project Rotterdam Central Station (reconstruction of a railway station combined with the redevelopment of the surrounding urban area) is considered a less successful project. A high complexity level combined with a high participation level (early involvement of private parties) resulted in very ambitious plans, which appeared impossible to finance. The plans were rejected by the national government and some of the market parties decided to withdraw from the project. The private parties had high demands, but were not willing to co-finance the new railway station, which was one of the main reasons of the public agencies to get them involved in the first place. New (less ambitious) plans had to be made and are now being implemented under the joint responsibility of the municipality of Rotterdam and the national government. The main determining factors for the problems that occurred during the decision-making process seem to be the high complexity level and the high participation level in a very early stage of the process, which resulted in too high (and too expensive) ambitions. Next to that the intention of the public parties to get private parties involved seemed to be mainly financial, which did not result in a constructive co-operation.

Summarizing, we identified the following factors that seem to be responsible for lack of success:

- too centralised approach neglecting support from public, decentralised authorities and market parties;

- technological, financial and procedural complexity;
- too high ambitions causing too high costs;
- insufficient participation / involvement of major stakeholders;
- no finishing of public debate on necessity and added value of the project.

Chapter 4 Success factors to accelerate infrastructure development

4.1 Introduction

In chapter 3 we have been able to distinguish between successful and less successful projects, concerning the speed of decision-making processes, and to identify the determining factors that are held responsible for the level of success. In order to find *possible pathways to solve the paradox*, the present chapter aims to bring the analysis on a more general level and tries to develop some general rules *how to accelerate decision-making processes with respect to infrastructure development*.

From this perspective are the explanatory variables for successful infrastructure development explored in section 4.2. Additionally, section 4.3 pays attention to the distinction between node development projects versus line infrastructure development projects. Finally, section 4.4 contains a number of recommendations how to accelerate infrastructure development.

4.2 Explanatory variables for successful infrastructure development

Figure 4.1 shows the results of the assessment for each case study of, respectively, the participation level, the complexity level and the speed of the decision-making process. Based on the scores for these three aspects we are able to identify three different groups of projects. The first group, which we consider as the group with the most successful projects, concerns projects that are characterised by ‘average to high’ participation levels (public private partnerships), ‘average to low’ complexity and ‘average to high’ speed of

decision-making processes. The second group consists of two projects that are both characterised by relatively fast decision-making processes ('RijnGouwe Line' and 'Rush Hour Lanes'). The success of those two projects can be explained by the low complexity and participation level. Finally, the third group can be characterised by 'average to low' participation levels, 'average to high' complexity levels and relatively slow decision-making processes.

Figure 4.1 Evaluation of case studies: speed of decision-making process, participation level and complexity level

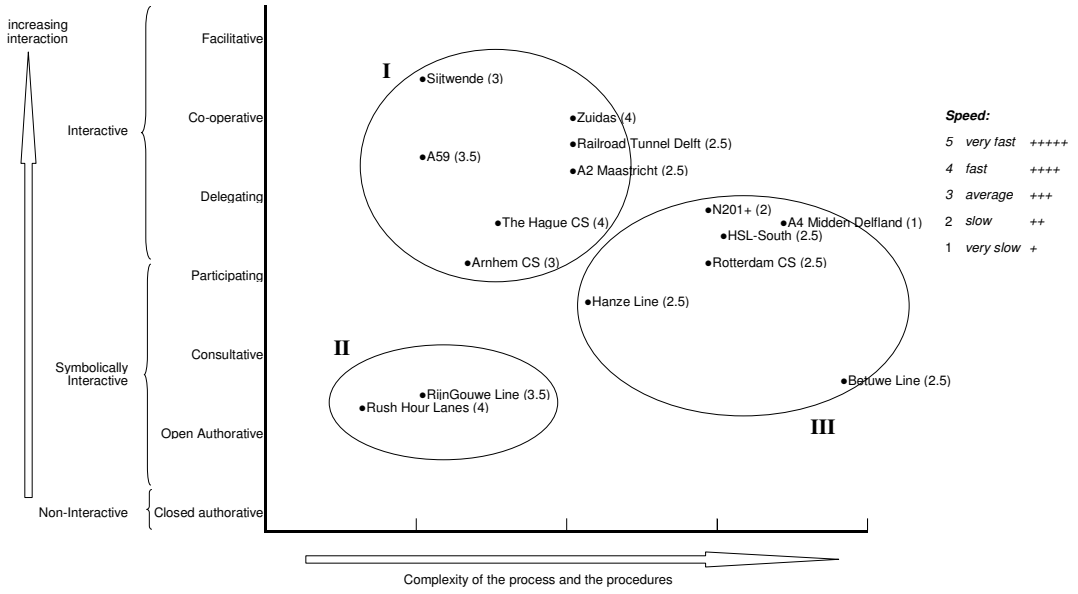


Figure 4.2 demonstrates that, in the projects that have been analysed in the empirical analysis, there is a clear link between the complexity level of the infrastructure projects and the speed of the decision-making process: low complexity levels mean in general 'faster' and more successful decision-making processes.

Figure 4.2 Evaluation of case studies: speed of decision-making process and complexity level

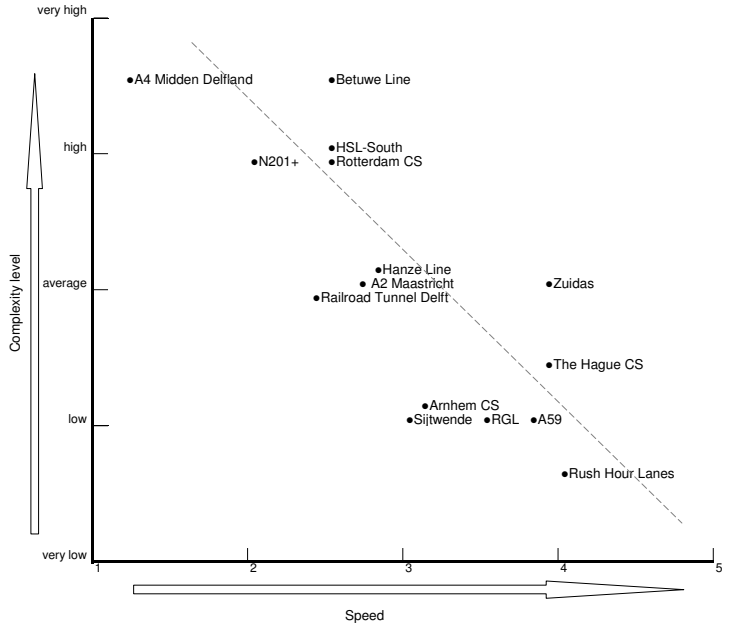
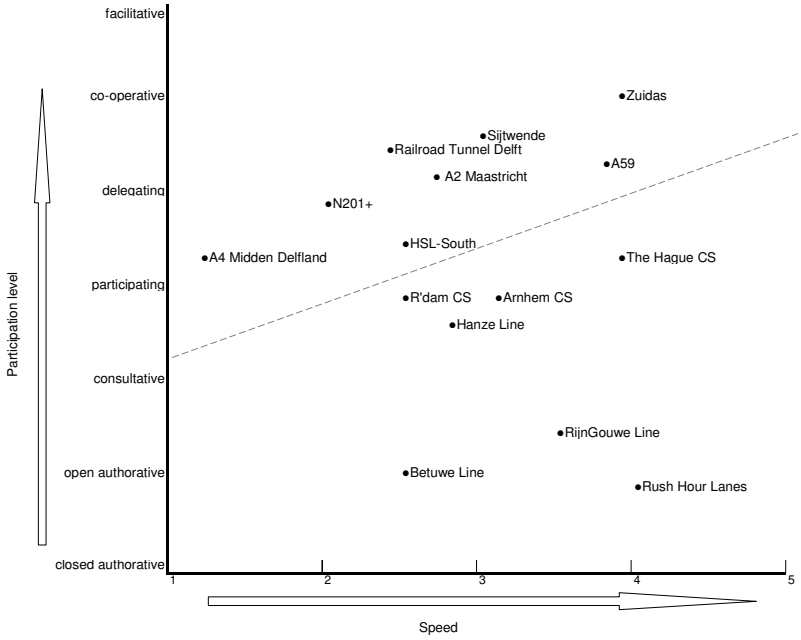


Figure 4.3 shows the relation between the speed of the decision-making process and the participation level for the infrastructure projects involved in the case studies analysis. This figure demonstrates, to a certain extent, a positive relation between the participation level and the speed of decision-making processes. However, projects like the RijnGouwe Line, the 'Rush Hour Lanes' and the Betuwe Line, do not fit with this suggested relation. The first two illustrate that successful decision-making processes are also possible for projects with relatively low participation levels and the Betuwe Line project is a unique case. In the next section we will argue that in the case of the 'RijnGouwe Line' and the 'Rush Hour Lanes' other factors determine the success of the projects. Section 4.4 will interpret the outcome of the case studies analysis in more detail.

Figure 4.3 Evaluation of case studies: speed of decision-making process and participation level



4.3 Successful decision-making processes: node development versus line infrastructure development

The case studies consist of both *node development projects* and *line infrastructure development projects*. All node development projects are combinations of infrastructure and real estate development projects, while the larger part of the line infrastructure projects concerns infrastructure development only. Table 4.1 shows that, at first sight, the speed of decision-making processes for line infrastructure development projects only slightly differs from node development projects.

Table 4.1 Speed of decision-making process: node development projects versus line infrastructure projects

Speed	Score	Node development	Line Infrastructure development
Very Fast	5		
	4.5		
Fast	4	Zuidas, The Hague CS	A59, Rush Hour Lanes
	3.5		RijnGouwe Line
Average	3	Sijtwende, Arnhem CS	
	2.5	Rotterdam CS, Railroad Tunnel Delft	Betuwe Line, HSL-South, Hanze Line, A2 Maastricht
Slow	2		N201+
	1.5		A4 Midden Delfland
Very Slow	1		

Nevertheless, we are inclined to think that node development projects are more successful and often less controversial than line infrastructure developments. For, we consider the three 'fast' line infrastructure projects (the A59 project, the rush hour lane project and the Rijn Gouwe line) as rather exceptional projects (in the Dutch context), because in the first two cases the financial and legal 'solutions' that are held responsible for the success of these projects have not yet been applied elsewhere. The decision-making process for the Rijn Gouwe line is relatively fast, because this project partially makes use of existing track (simplifying thus the procedures to be followed). The other line infrastructure projects, that all lack fast decision-making, seem to be more representative for recent Dutch experiences with line infrastructure development.

On the other hand, the speed of decision-making processes with respect to node development projects seems to be in most cases satisfactory. Obvious reasons why node development projects are often considered more successful than line infrastructure projects include the fact that node development projects are often initiated by municipalities, which are usually very experienced 'developers' with sufficient financial and legal instruments, while the 'responsibility' for the development of line infrastructure

projects is not always clear (national government versus provinces) and provincial and/or national authorities lack the right instruments to implement those projects. Moreover, node development projects often offer opportunities for value capturing, while (monofunctional) line infrastructure projects usually do not. Finally, line infrastructure projects are in many cases quite controversial, for one thing because for many groups of actors the balance between costs and benefits is not acceptable.

4.4 Success factors to accelerate infrastructure development

As we have mentioned before we must be aware of the fact - when interpreting the results of the case studies - that the speed of the decision-making processes in all projects depends to a large extent on project-specific details. This implies that only very global conclusions can be drawn from the empirical analysis. Moreover, based on the empirical study, it is not possible to draw conclusions about the exact relation between the supposed explanatory variables and the speed of decision-making processes for large infrastructure projects in general. The previous sections of this chapter have nevertheless showed that some general rules may apply to successful infrastructure development.

First, the following conclusions can be derived from the case studies analysis:

1. With respect to the infrastructure projects that have been analysed substantial differences occur regarding the speed of decision-making processes and, in coherence with this, the success of the projects.

2. In most infrastructure projects involved complications arise with respect to financial issues; mobility issues and transport forecasts (is there really a need for the project?) are almost never an issue.
3. Some case studies show that a broader project scope and a higher participation level can result in renewed progress and can provide a solution to an impasse, usually caused by conflicting interest.
4. The speed of (financial) decision-making processes for large infrastructure projects does not seem to be affected by the economic situation. Budgeting of large infrastructure projects usually concerns long-term processes and does not seem to be dependent of any cyclical problems in economic terms.
5. The projects demonstrate that the speed of decision-making processes depend, to a certain extent, both on the complexity level and the participation level. However, when we want to improve decision-making processes, it probably makes more sense to work on the participation level than to change the complexity level. Most of the procedures that 'are held responsible' for the complexity level are essential for decision-making and cannot be removed or replaced easily.
6. The analysis shows that, in general, node development projects appear to be more successful than line infrastructure projects. We have related this to differences in government level, value capturing opportunities and the differences in controversies with respect to infrastructure projects.

Second, the case studies analysis provides evidence of the factors that determine the success of large infrastructure projects. Table 4.2 distinguishes both the success factors and the bottlenecks in decision-making.

Table 4.2 Factors determining the success of large infrastructure projects: success factors versus bottlenecks

Success factors for infrastructure decision-making	**Bottlenecks for infrastructure decision-making**
• Relatively low procedural complexity; • Leading role in project planning for municipalities (making optimal use of their financial and legal instruments); • (Early) involvement of market parties; innovative contracting models, based on risk-taking by private partners; • Leading role in project planning for market consortium; • Optimal project scope: positive balance of costs and benefits for different groups of actors and interest groups involved (after completion of the project); • Combination of infrastructure and real estate development makes sure that projects not only cost money, but will also generate income; • Innovative (temporary) legislation may contribute in certain cases to success of decision-making.	• Decision-making processes and budgeting problems on the national level; • Provinces' lack of decision (low degree of decisiveness on the regional level); • Inadequate co-operation between municipalities (in case of regional projects); • Problems with co-operation and / or contracting between public and private actors involved in the project; • Too centralised approach neglecting support from public, decentralised authorities and market parties; • No or insufficient involvement of market parties (in case of 'traditional' line infrastructure projects); • Wrong project scope (problems with tuning of decision-making; missing opportunities for value-capturing); • Too high ambitions causing too high costs; • No finishing of public debate on necessity and added value of the project.

Finally, we are able to mention a number of recommendations *how to accelerate decision-making processes* for large infrastructure projects:

1. Optimal definition of project scope, making sure that all groups of actors involved (including interest groups) may see the project benefits, that opportunities for value-capturing will be used and that decision-making processes of different subprojects are well-tuned.

2. Decide on the right government level, taking account of the legal and financial instruments that different government authorities have disposal of. In the Dutch context the national government has decided to introduce in the very near future a new 'Spatial Planning Act'. The new Spatial Planning Act will increase the decision-making powers with respect to large spatial projects of both the national government and the provinces and thus reduce the power of municipalities to frustrate and delay decision-making- and implementation processes.
3. Rethinking of optimal market structuring for infrastructure projects; shift of project responsibility from public to market party. Market parties often seem very eager to increase their involvement in infrastructure development (including financial involvement), but government authorities often appear to be rather sceptical;
4. Early start of public private partnership design; innovative contracting models offer new opportunities to increase for instance the involvement of institutional investors;
5. Reconsideration of national government's role (from 'financial contributor' to risk-taking participant in project planning and implementation);
6. Introduction of innovative methods for Cost Benefit Analysis, particularly with respect to combined infrastructure and real estate development projects (for one thing, to improve the opportunities for value-capturing). Thorough (societal) Cost Benefit Analysis can prevent government agencies from making unfounded decisions and can also be helpful in arguing the necessity of a project.

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