

# Improving the problem analysis in cost-benefit analysis for transport projects: an explorative study

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## Abstract

Key actors (consultants, scientists and policy makers) in the Netherlands transport policy cost-benefit analysis (CBA) practice consider ‘problem analysis’ to be one of the important CBA substantive problems. Their idea is that a good-quality problem analysis can help to identify proper solutions, among others. However, the Netherlands key actors state that in the Netherlands CBA practice good-quality problem analyses often lack. International literature and the Dutch CBA guide mentions some pitfalls related to problem analysis such as ‘*the analyst commits himself to a single point of view*’, ‘*he thinks too quickly in terms of possible solutions*’ and ‘*a general problem statement is shifted to a too narrow defined technical statement*’. Based on seven Dutch CBAs, this paper shows that in the Dutch CBA practice these kinds of pitfalls are indeed not avoided. Criteria for good-quality problem analysis are formulated. The core is that in CBA the problem or the perception of the problem (e.g., region ‘Y’ has poor accessibility, ‘X’ is an high barrier for public transport usage) should be analyzed with a very critical attitude.

## 1. Introduction

The Netherlands government made societal cost benefit analysis (CBA) obligatory for large transport infrastructure projects in 2000. The CBA authors are since 2000 also obliged to use the so-called ‘OEI leidraad’ (the Dutch CBA guide) (Eijgenraam *et al.*, 2000). In the period 2000 – 2013 at least 106 transport<sup>1</sup> related CBAs were published. Mouter *et al.* (2013) interviewed in depth (at least one hour using a semi-structured interview design) 86 key actors in this lively Dutch CBA practice. In their study 74 of these actors also completed a written questionnaire<sup>2</sup>. Specifically, they interviewed and surveyed consultants, scientists and policy makers on their perceptions concerning substantive problems that arise when appraising spatial-infrastructure projects using

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<sup>1</sup> We collected these 106 CBA reports for study. We aimed for completeness but it is conceivable that we missed some CBA studies because, for example, they were not made publicly available.

<sup>2</sup> It should be noted that Mouter *et al.* (2013) not only focused on key actors in the Dutch transport CBA practice but also on people who are also involved in CBAs for spatial planning projects. However, transport projects dominate the Dutch CBA market.

CBA. They found, to their surprise, that key actors consider ‘problem analysis’ in a CBA to be one of the important substantive problems in the Dutch practice.

This paper takes this unexpected result as a starting point for further analysis. This paper aims to answer the question: ‘what is a good quality problem analysis related to CBA?’

We do not have the pretension to give final answers in this paper. In this paper we just intend to explore some possible criteria for good-quality problem analysis. We think that this exploration is not only of interest for the Netherlands CBA practice but also for an international audience because international studies (see next paragraph 3) show that problems with problems analyses seems to an international phenomenon.

Case study is an important way in this paper to explore criteria for good practice. We selected seven CBAs from the 106 published (see table 1). By describing and analyzing these cases from practice we aim to learn some concrete lessons about do’s and don’ts in problem analyses related to CBA. The case study selection and the cases are described in section 4. First, in section 2 we intend to give some explanations why Netherlands key actors rate problem analysis as a problem and in section 3 we explore the international literature on problem analyses. Section 5 gives discussion on criteria for good quality problem analysis.

## **2. Explanations for ranking problem analysis as an important problem**

The authors of the CBA guide (Eijgenraam *et al.*, 2000, p. 10) mention that problem analysis can help to identify the information required to take a well-considered decision on new transport projects. *‘The problem analysis is required to take care that attention is not shifted from a general problem statement to a too narrow defined technical statement’* (p.10). On page 44 the CBA guide illustrates this general position: *‘more solutions can be included in the analyses as the goals (e.g., the Netherlands has to have airports with an ‘x’ passenger capacity) and secondary conditions (e.g., capacity ‘x’ has to have combined with environmental standard ‘y’) are formulated in a more general way. If goals and secondary conditions are narrowly defined the risk is that useful project alternatives are excluded erroneously’*. The guide advises to list the bottlenecks the project aims to solve or the opportunities the project aims to seize. Additionally, the guideline advises to analyze if other policies might be implemented which could also solve the bottlenecks or seize the opportunities (and perhaps more efficiently than the project scrutinized), and to think about the role of market parties and public parties in the solution. Furthermore, the guide advises to critical reflect on existing problem analysis and on the preconditions the client has with the project (e.g., he wants to meet certain environmental norms). Although these points in the CBA guide seem very useful, they are also a bit vague. What is ‘critical reflect’, for example? Perhaps this vagueness in the guide partly explains partly the high ranking of ‘problem analysis’ as a substantive problem in the Dutch practice. Respondents in the Mouter *et al.* (2013) research indeed mention that one of the reasons for missing high quality problem analyses in the Dutch

practice is that it is unclear for them what makes a problem analysis a ‘high quality’ problem analyses.

Another explanation for missing high quality problem analyses in the Dutch practice the key actors mention that clients of CBAs – governmental bodies – do not see the absence of a problem analysis in project appraisals as worrisome, because the clients often perceive that they already carried out an appropriate problem analysis themselves. In the Netherlands the government has also published a guide on how to perform a so-called project exploration phase for new spatial-infrastructure projects (Rijkswaterstaat, 2011). In this guide the problem analysis is narrowed down to the question if there is a transport problem which is of interest for the Ministry of Infrastructure and the Environment to explore further. The Ministry will decide on this question. This problem analysis can be something completely different compared to a critical and far broader problem analysis as mentioned in the CBA guide. This confusion with two guides describing different ways of analyzing a problem may also explain why CBA key actors are frustrated about the quality of problem analyses. They may be confronted sometimes with a ‘problem analysis’ (region X has high unemployment which is caused by poor accessibility (‘the transport problem’), so they may be require a regional airport as a solution) of which they think this is not a proper problem analysis at all (suffers region X really from high unemployment?; if yes, is poor accessibility actually an important cause for this problem?; and so forth).

A final explanation for key actors worries might be that ‘problem analysis’ in relation to CBA might be a term which at first glance seems crystal clear but when one starts thinking deeper about it the term becomes more and more hazy. How to position problem analysis in the whole process of CBA? For example, in order to list transport bottlenecks and opportunities the CBA researcher requires to know future developments. Therefore, he or she has to build a reference scenario or different reference scenarios showing how the future of the problem (e.g., congestion, economic downfall in a region) will develop if the project/solution is not realized. Designing good quality reference scenarios is almost a half CBA. So, where to stop with the problem analysis? Moreover, if the analyst wants to evaluate if other policies might be better options in the problem analysis phase – as the Dutch guide suggests - he or she would like to carry out a full or rough CBA for the solution proposed by the client and some alternative options in order to see which option is best compared to others. Again, where to stop with the problem analysis?

### **3. Thinking about problem analysis in the scientific literature**

Simon (1979) mentions in his lecture he gave when he received the Nobel Prize in Economic Science that the evidence on rational decision making is largely negative evidence, evidence of what people do not do. In contrast: *‘Information processing theories envisage problem solving as involving very selective search through problem spaces that are often immense. Selectivity, based on rules of thumb or ‘heuristics’ tends*

*to guide the search into promising regions, so that solutions will generally be found after search of only a tiny part of the total space. Satisficing criteria terminate search when satisfactory problem solutions have been found. Thus, these theories of problem solving clearly fit within the framework of bounded rationality<sup>3</sup> that I have been expounding here*'. Bounded rationality may explain that clients of a CBA (as mentioned by the Dutch CBA key actors) are satisfied with their own problem analysis, and, therefore, do not ask for an independent one. For, a clients own analysis might satisfy perfectly their political wishes (e.g., the problem as described by them leads unmistakably to the need for the new road or tram line they just desire). Nevertheless, bounded rationality may have broader implications. Also independent scientists or consultants making a problem analysis may have tendencies to make the 'problem' too soon too narrowly defined. The reason is that by doing so it may satisfy their psychological need for telling a nice and clear-cut story.

Rittel and Webber (1973) call planning problems 'wicked' problems. In their view no definitive formulation of a wicked problem is possible. Also, wicked problems have no stopping rule, according to them, because *'the process of solving the problem is identical with the process of understanding its nature, because there are no criteria for sufficient understanding and because there are no ends to the causal chains that link interacting open systems, the would-be planner can always try to do better* (p. 162). From the world of 'systems analysis' Checkland (1980, p. 2) seems to come to more or less the same notion of the 'problematique' of the problem analysis: *'In fact, the systems analyst, seeking to contribute to real-world decisions, always find himself facing, not a well-defined problem, but a problem area or situation; his problem turns out to be a nexus of problems, what the French refer to as a 'problematique' or what Ackoff calls "a mess"'*. Later in his paper Checkland (1980) refers to hard and soft problems. His definition of soft problems seem related to ex ante transport policy decision making (and to the notion of 'wicked' problems): no objectives are clear, some important variables are unquantifiable, and the analysis will necessarily have to include examining the value systems underlying the various possible objectives.

'Bounded rationality', 'wicked', 'a mess', 'soft problems', all these constructs boil down to the notion that in real-world decision-making (for new transport infrastructure or any other new policies) the analyst should realize that he deals with people, implying that the analyst faces an expanding network of concerns, institutions, actors and values (Checkland, 1980). The problem analyst should also realize that he also deals with his own psychological qualities. Furthermore, the four theories or terms make clear that the perfect problem analysis apparently does not exist. Maybe only some important pitfalls can be avoided as remarked by Checkland (1980): *'in his initial task of problem formulation, the analyst should avoid committing himself to a single point of view, and he*

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<sup>3</sup> Simons remarks elsewhere in his paper that bounded rationality can largely be characterized as a residual category – rationality is bounded when it falls short of omniscience.

*should avoid thinking too quickly in terms of possible solutions'*. Miser and Quade (1988, p. 48) have a somewhat different formulation in their Handbook on System Analysis but their message is the same: *'Even if the problem seems to be crystal clear, the real world is often more complex than it appears to be, whereas humans perceptions are limited, so that it is well to verify very carefully that the original perception is correct'*.

So far, it is made clear in the literature that problem analysis is a difficult art. However, an interesting question is what is actually the societal problem of a poor problem analysis? In answering this, the literature is rather implicit. Checkland (1980) states simply that because early mistakes and false starts may be expensive in time and effort, the analyst needs a delicate touch in the early stages of problem formulation. Priemus (2010) identifies, amongst others, a number of pitfalls in decision-making on mega-projects. One pitfall he mentions is absence of a proper problem analysis. He emphasizes not only a problem analysis being essential but also to reach the strongest possible consensus about it. In his view *'if there is still a difference of opinion on the analysis, it is usually the authorized political body (parliament, regional or municipal council) that decides on the problems that will form the departure point'*. Apparently, these times and effort costs (Checkland) and the fact that authorized political bodies define the problem (Priemus) are seen as being problematic, but albeit this may be true it is still not very clear 'why?' After all, there are related to the often long transport policy decision making process many moments of possible reconsideration. Thus, a start with a poor or disputed problem analysis may easily be corrected later. For example, a political defined problem statement may later in the process result in very poor benefit-to-cost ratios for the solutions chosen to solve this problem (e.g., for the regional airport in the region with the high unemployment claimed). Subsequently, from a rationalist perspective one may expect that these solutions will be off the political agenda anyhow. So, why worry about the poor start? Here, the notion of lock-in might be important. Cantarelli *et al.* (2010) think that lock-in, the escalating commitment of decision makers to an ineffective course of action, has the potential to explain the large cost overruns in large-scale transportation infrastructure projects. In their theoretical framework for lock-in one of their input variables for lock-in is *'solution as a starting point'*. They relate this specific variable together with other input variables to indicators for lock-in such as *'need for justification'*, *'escalating commitment'* and *'inflexibility; closure of alternatives'*. It is beyond the scope of this paper to go deep into these indicators which are based on different psychological and social theories (see for details, Cantarelli *et al.*, 2010). The bottom line of lock-in is that theoretical considerations and also empirical evidence show that the suggested correction of not-adopting inefficient solutions in later phases in the decision-making process after a start with a poor problem analysis is sometimes illusory. In contrast, lock-in suggests that a poor start with, amongst others, solution as a starting point, can lead to inefficient transport projects finally realized.

#### **4. The seven case studied**

In this paragraph we describe for seven CBA cases the problem analysis included (table 1). We have chosen case study as a method because it fits our purpose to just to explore how problems analyses are carried out in the Dutch CBA practice. To be clear, we have no pretension at all to give with the selected cases a representative picture of the Dutch CBAs problem analyses quality. We just aimed to learn (to put it differently: we wanted to get a feeling) how the practice deals with problem analysis in order to explore some criteria for good practice. In section 2 and 3 some general criteria could already be found but we think by also analyzing the actual practice we might be able to formulate these criteria more concrete.

We selected the seven CBA cases from our collection of 106 without a deep a priori notion about the quality of their problem analyses. The criteria for selection we used were, first, together the cases should represent different transport policy categories: a seaport (case 1), a national rail road project (case 2), a non-infrastructure transport policy (OV-chipkaart; case 3), two roads (a provincial and national roads; cases 4 and 5), a local tram project (case 6) and a local waterways project (case 7). Second, we wanted these seven project to be carried out by different (albeit the most important) CBA authors<sup>4</sup> in the Netherlands. Naturally, we can also learn by just taking only road projects carried out by only one consultant but we think that by using our two selection criteria our view on do's and don'ts in problem analyses becomes richer. It should be noted that we only studied the problem analyses in the CBAs (or, if it had been the case, underlying problem analyses which were clearly referred and used in the CBAs studied). It could be theoretically the case that for the seven projects good-quality problem analyses exist but that the CBA did not take over this information in any way.

Table 2 Brief descriptions of problem analysis in the seven cases studied

<b>1. High speed rail Amsterdam – Groningen (city in the North of the Netherlands) (NEI, 2000)</b>	
Problem statement	The CBA just starts with stating the general ambitions of the CBA client with this project. These are, amongst others: high speed rail should contribute to an improved economic structure in the North, to a better accessibility of the North and to an improved labor market.
Problem analysis	It is not analyzed in the CBA at all if these general economic ambitions for the Northern provinces can be met with high speed rail projects. Is 'poor' accessibility really the problem?, one wonders.
Connection of solutions to	In this case, the solution (high speed rail in different variants) is really the starting point of analysis. It turned out after many debated and extra new CBAs

<sup>4</sup> CPB (an independent economic research institute, case 2) and Ecorys (formerly NEI), Decisio and SEO (consultants; case 1,3, 4,5, 6, 7) have together carried out 60% of all CBAs made in our collection. Hypercube (case 3) is an actor which only very occasionally carry out a CBA in the transport market.

problem	for high speed rail variants (...) that the project (whatever variant) is highly inefficient. In 2006 a CBA was made for other solutions, namely, alternative public transport projects for the Northern provinces in the Netherlands (Ecorys, 2006). Again, the ill-founded statement was made in this CBA that these transport projects could contribute to enhancing the economic structure in the North. However, it is unclear if 'poor' accessibility is the (or 'a') cause for the relatively weaker economy in those provinces.
<b>2. Rotterdam port extension (Maasvlakte 2) (CPB <i>et al.</i>, 2001a and b)</b>	
Problem statement	The two CBAs <sup>5</sup> made for this project do not clearly state the problem. The reports just refer to the client's assignment which is that the analysts are asked to estimate the welfare effects of a 1000 hectares land reclamation project west of the existing Rotterdam port. Estimated investment costs are roughly 2 billion Euro (in prices 2000). One wonders what societal problem or which societal problems are actually intended to be solved by this land reclamation project.
Problem analysis	A very elaborate and thorough analysis (100 pages of the 228 pages in the main document, in the first CBA published, see footnote 4) is carried out to analyze if there is indeed need for the 1000 hectares land reclamation as claimed by the CBA client. Future demand for new port lands in Rotterdam is estimated. Future land supply in the existing port is analyzed (including noise pollution consequences, see footnote 5). Demand and supply estimates in different future scenarios are confronted to each other to evaluate if land shortage is really a future problem for the port. All figures and assumptions are clearly underpinned.
Connection of solutions to problem	Only one kind of solution is analyzed thoroughly in the CBAs (a land reclamation project). Different reclamation variants are taken into account in the analysis such as building in phases, other technical designs and so forth.
<b>3. Introducing the so-called 'OV-chipkaart' (literally, public transport chip card), Hypercube and SEO, 2003)</b>	
Problem statement	The CBA just mentions the client's ambitions. The main goal of the OV-chipkaart (a contactless smart card system for all public transport in the Netherlands) is to break down barriers for people using public transport. In the old system (which the OV-chipkaart replaces) people had to use different paying and in-check systems for trains versus buses/trams/subways. With the chipkaart only one paying and in-check procedure would arise. One of the main side-goals is that all passengers using the card will provide very detailed

<sup>5</sup> Two CBAs for the same project were made because in the first the consequences of noise pollution in the reference scenario were not clear yet. In the second CBA these noise consequences were clear (the model runs were finished). For the purpose of this paper this noise pollution debate is not important.

	and very fast public transport usage data for the public transport providers and the (local) authorities giving them opportunities to improve the public transport services.
Problem analysis	The potential advantages and disadvantages of the card for the users are briefly discusses. However, it is not analyzed if the old paying and in-check procedure was actually a barrier for public transport use (e.g., by carrying out a consumer survey). Thus, is this solution actually solving a problem?
Connection of solutions to problem	Only one solution is analyzed.
<b>4. New provincial road around Parkstad in the province Limburg (2 x 2 lanes, 100 km/h, only overpass junctions) (Modijefsky and Vervoort, 2010)</b>	
Problem statement	The CBA contains a clear problem statement. The new road aims to contribute to solving no less than seven different problems in the current situation (e.g., accessibility issues, problems with environmental quality and safety, economic setbacks in the region).
Problem analysis	The seven problems distinguished are analyzed elaborately. Nevertheless the analysis is sometimes rather vague and qualitative. For example, the accessibility within the region is analyzed to stay poor in the future. However, the problem analysis on this issue ends with the sentence ‘The expectation is that the amount of bottlenecks [causing the poor accessibility within the region] will decrease somewhat in the future because of a gradually lower transport demand in the future’. One wonders when reading a passage like this: what does ‘somewhat’ means?
Connection of solutions to problem	Only one main hard ware solutions (one road design) is analyzed. There is a clear connection made between the seven problems identified and these technical solution. However, one wonders if other solutions (other designs, improving existing roads and so forth) are opportune also.
<b>5. Plan study for the corridor ‘Schiphol Airport – Amsterdam – Almere’ (Decisio, 2005)</b>	
Problem statement	The problem statement is brief. ‘The main roads in the Schiphol-Amsterdam-Almere corridor are characterized by high levels of congestion’.
Problem analysis	Also the problem analysis is very brief. The CBA states that a study shows (the CBA refers to this study) that despite extra measures that will be taken in the near future congestions levels will still increase. Thus, additional measures seem required. The CBA just takes the results of this other study without any



	critical attitude. For example, is this in this study only a high growth scenario used? When was this other study made? Is it still actual?
Connection of solutions to problem	The CBA analyzes a broad spectrum of possible solutions. Road pricing measures, improvements on existing roads (.g. extra lanes) and building new roads.
<b>6. New tram connection in the city of Utrecht to an area with many university buildings (Devillers <i>et al.</i>, 2011)</b>	
Problem statement	The notion is that a good accessibility is paramount for the university area in order to develop this area into an international top knowledge center (as the municipality's ambition is). The current and future accessibility is rated as poor, by contrast.
Problem analysis	A relatively elaborate problem analysis is carried out (2 pages 25 pages total). The main problems identified are that the current buses to the university are very full during peak hours and that there are some travel time delays and unreliability during peak hours because of problems with handling so many passengers and buses in a relatively short period of time. The problem analysis is poorly underpinned. All kinds of statements are made (e.g., bus trip delays are 1 to 4 minutes in 2008; bus use will highly grow in the future) without any reference to underlying studies or without good explanations how numbers or increases have been estimated. Another critical remark is that the problem analysis does not address precisely the logistic reasons of the bus delays and unreliability during peak-hours (for more on this topic, see below this table).
Connection of solutions to problem	Only hard ware solutions are analyzed such as implementing measures to aid the improved circulation of the current bus traffic, using another bus route, and building a tram line to the Utrecht University center.
<b>7. Widening the waterway of the river Boven-IJssel in the Netherlands (Hof and Rosenberg, 2005)</b>	
Problem statement	No clear problem or ambition statement. The CBA just starts with stating that on behalf of the client measures to improve the use of the waterway of the river Boven-IJssel will be analyzed on their welfare effects. Later in the report one can find a sort of problem statement. The widening seems aimed to accommodate the growth in ships movements on the Boven-IJssel and for safety reasons.
Problem analysis	Not included.
Connection of solutions to	Five different measures are analyzed to solve bottlenecks. As there is no clear problem (or bottleneck analysis) it is not possible to evaluate if other measures

problem	could also be opportune. Interestingly, the CBA still analyses non-widening measures (but so-called ‘utilization alternatives’) and concludes ‘The project alternatives with the largest net benefits are the ones in which the river is dredged to a depth of 2.5 or 2.8 meters and where no other specific measures are taken (“benuttingsalternatieven): utilization alternatives”’. (p.vii)
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The seven cases show some interesting general observations. First, the practice shows that despite warnings in the Dutch CBA guide it still seems difficult to avoid the problem that a general problem statement is ‘*shifted to a too narrow defined technical statement*’ (see section 1, CBA guide). For example, in the case of the Rotterdam port extension (case 1) and widening the river Boven-IJssel (case 7) it is unclear which general societal problems lie behind ‘technical problems’ such as a possible future Rotterdam port terrain deficiencies or a ‘too’ small Boven-IJssel. Second, Checklands (1980) notion that ‘*the analyst should avoid committing himself to a single point of view and he should avoid thinking too quickly in terms of possible solutions*’ may be viewed as stating the obvious, nevertheless, we see ‘single point of views’ and ‘thinking too quickly in possible solutions’ in the Dutch problem analysis practice. Here, a striking example for thinking too quickly in solutions seems to be the OV-chipkaart case (case 3). At first glance, the smart card seems a logical solution but taking a closer look at the main problem which this card should solve (breaking down public transport in-check barriers) you wonder if this problem is really a problem. Third, the phenomenon of ‘solution as starting point’ (section 2, lock-in) can also be observed in the Netherlands practice with the high speed rail project to the North of the Netherlands as the most clear example. A fourth observation is related to Miser and Quade their remark that ‘*it is well to verify very carefully that the original perception [of the problem] is correct*’. We find that this careful verification is weak in some cases. For example, in the cases of the two road projects (case 4 and 5) sometimes not clearly underpinned statements about future volume growth are used (case 4) or results of other studies (perhaps outdated) are used rather uncritically (case 5). The tram case (case 6) is also interesting in this respect because the problem analysis is on one hand elaborate but when reading it you miss careful verification. All kinds of future problems in a world without the tram are just stated without any clear underpinning. Finally, a not so good quality problem analysis (see especially cases 1,2, 3, 6 and 7) leads especially to a feeling of unease about the question if no better alternatives (e.g., more efficient solutions) are available compared to the solution analyzed. Perhaps the port extension results in welfare gains but with a good problem analysis maybe totally different policies in the port could be identified which lead to (far) more gains. In the case of the Utrecht tram, a more underpinned and deeper problem analysis related to the logistics of students getting on and off a bus could have resulted in identifying far cheaper solutions to decrease delays and unreliability compared to the hard-ware solutions analyzed. For example, Rienstra (2011) in his second opinion

of this CBA addresses some very cheap and simple possibilities to improve the in-check procedures for students which decrease also bus trip time delays and unreliability.

## 5. Discussion on criteria

Based on sections 3 and 4 of this paper we think that for a good-quality problem analysis three criteria seem paramount:

- The original problem or the original perception of the problem<sup>6</sup> should be analyzed with skepticism. This skeptic attitude is in our view required to gain the ‘critical reflection’ wished for. The problem should not be analyzed from one single point of view but from a broad societal perspective. Additionally, the problem should not be narrowed down to a technical problem. If port terrain deficiencies in the future are addressed as a problem, the analyst should think: ‘perhaps this is true, but what is actually the societal problem of these possible deficiencies?’ If a region claims to have economic problems, critical questions could be: ‘what are actually these problems?’, ‘what is their magnitude?’ ‘what causes these problems?’, ‘poor accessibility?’, ‘something completely different?’ Thus, the problem analyst should not be too easily satisfied with a, at a first glance, good and plausible story. A plausible story might seem that the public transport in-check and paying procedure is complicated; this is a problem as it forms a barrier for PT usage; the solution is a smart card. Here, skeptical questions could be: do users really find the in-check procedure complicated? Who says so? Is there any independent research underpinning this statement? Is a smart card indeed the sole solution?
- The analyst should underpin his analysis with independent and quantitative data. Naturally, he may use data from other sources or studies, but, in those cases a critical attitude seems also required in our view. In the Dutch cases we could easily criticize the sometimes poor underpinning of all kinds of problem statements. A special critical attitude is required, in our view, towards using older studies. Are these results still up-to-date? After all, as mentioned before, decision-making processes can take a very long period in transport and spatial planning. An obvious argument against this criterion is that it is costly. Of course, good analysis is more expensive compared to superficial analysis. The counter arguments are that superficial analyses may lead to on-going debates and meetings about the actual problem (which also costs money). Moreover, it seems

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<sup>6</sup> Interestingly, one should as a problem analyst also be aware that problems as perceived by decision-makers can change in time. In the Mouter et al. (2013) research some civil servants interviewed mention that they had to work on the same transport solution for years but depending on the political color of the actual decision-makers the problem which this solution should solve could easily change.

rather risky to base a multi-million (or multi-billion) investment on poorly, albeit cheaply, underpinned analyses.

- The analyst should take care that the solutions are clearly linked to the problem. We acknowledge that in this paper we do not aim to improve the solution analysis (e.g., the CBA) but, here, we mean that after performing a problem analysis based on the two criteria just presented the analyst will obviously gain ideas about proper solutions. By subsequently performing a thorough check if these rough ideas actually solve the problem we think that the analyst will learn even more about the actual problem. In the case of the tram to the Utrecht university center, the real problem could turn out to be that policy-makers worry that their ambitions to make this location a really attractive place for business in order to boost the Utrecht economy will not be realized. A theory could be that improving public transport reliability will realize this higher location attractiveness. However, the critical question could be: ‘is this actually true?’ ‘is there any literature or research underpinning this policy idea (perhaps the theory is only true for university or other public buildings but not for businesses)?

It seems that a good quality (with critical reflection and based on the other criteria just mentioned) problem analysis can only be carried out by an independent party. The literature implies, after all, that it is hardly possible for authorized political bodies to carry out good quality problem analysis themselves (related to notions such as ‘bounded rationality’, ‘wicked’ problems and so forth). Nevertheless, it is theoretically not impossible for a political body to carry out a good problem analysis. It is only perhaps easier for an independent party to do this.

Strikingly, the seven Netherlands cases show that independent parties are not automatically a guarantee for good quality problem analysis. Thus, it seems important that these parties are supported by clear guidelines on how to perform good quality problem analysis and with a procedure that takes care that these guidelines are complied with. For example, in the Netherlands a lively review culture exists on CBAs carried out. It could be wise in these reviews to specifically address the quality of the problem analysis in the CBA. This ‘rule’ may give incentives to CBA authors to really spend time and effort on making an independent and critical problem analysis. Additionally, this rule in the review culture may lead to learning within a CBA practice on how to perform a good quality problem analysis. Another idea could be to include in the guidelines that the independent party carrying out the problem analysis is obligatory to organize a meeting with people who oppose the project, the problem analysis or the policy theory used to link solution(s) to the problem perceived and so forth. Whatever they oppose, it seems good to collect these countervailing information and viewpoints to make the problem analysis richer. Naturally, in an independent problem analysis it is also important to critically reflect on the countervailing viewpoints. After all, open minds can also come to

the conclusion that a political body has carried out a very good problem analysis and the countervailing information is biased by interests.

Ideally, one could state that it would be best that this independent problem analysis should be carried out very early in the decision-making process. By doing so, 'lock in' problems could be prevented. However, although this criterion seems wise, this ideal is also perhaps naïve, and too much part of the paradigm of rational decision making. And to repeat Simon (1979), there is large evidence that this rational model is what people in decision-making actually not do. So, a second-best model (somewhere in the decision-making process an independent problem analysis is carried out related to CBA) might have limited influence, we, nevertheless, still think it is worthwhile to have this independent check on the problem somewhere in the process anyhow. The check may especially result in the thinking of more and totally different 'solutions' compared to those of the authorized political bodies. Again, it is perhaps too naïve to assume that these alternative solutions will be very influential. However, already much societal gains may be reached if even rarely one of these alternatives (including doing nothing or postponing policies) is implemented compared to the 'locked in' solution.

## Literature

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