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# Why Cost Benefit Analysis is perceived as a problematic tool for assessment of transport plans: A process perspective

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## ABSTRACT

Academic discussions on Cost Benefit Analysis (CBA) as an appraisal instrument for integrated land use and transportation plans tend to focus on its technical aspects. However, many issues of CBA also arise from process related matters, especially when assessing integrated plans. Using an inductive research design, we explored how these process related issues play out in Dutch planning practices. In two applied research techniques, focus group sessions and open in depth interviews, we focused on process related issues as perceived by CBA participants ranging from plan makers to CBA testers. This article presents the different perceptions of issues in CBA processes. Through these collected perspectives, we found that these issues are multi-layered and present a number of fundamental dilemmas. After relating our empirical data to theory, we conclude that the biggest challenge lies in decreasing the level of mistrust and communication deficits revealed between plan owners and CBA calculators and their respective frames of thinking when assessing complex integrated land use and transportation plans.

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## 1. Introduction

### 1.1. CBA as a problematic instrument

Cost Benefit Analysis (CBA) is a widely used ex-ante evaluation tool to support the decision making on infrastructure plans and others. Its aim is to provide an integral overview of the (estimated) costs and benefits of alternative plans, and to translate them as much as possible into monetary terms for comparison (Brent, 1996). Based on these qualities, the CBA has become a widely used instrument for the appraisal and evaluation of large infrastructure projects in many countries (Haezendonck, 2007; Mackie, 2010; May et al., 2008; Odgaard et al., 2005; Rotaris et al., 2010; Vickerman, 2000). In the Netherlands, the role of CBA in the decision-making process has become increasingly important. It was already obligatory for large infrastructure plans (co-)funded by the Dutch national government (in: Annema et al., 2007; De Jong and Geerlings, 2003; Eijgenraam et al., 2000). Since 2007, it also has been obligatory for the assessment of integrated spatial infrastructure plans, because of the merging of the governmental budgets for these sectors (Ministry of transport and water management and Ministry of housing spatial planning and the environment, 2009). This means that all local and regional spatial infrastructure plans requiring national funding need to go through a CBA assessment. Through this, the national government prioritizes proposed plans and decides which ones are funded. Although a positive CBA balance is not a formal requirement for approved funding, these planning regulations do give the CBA a central role in Dutch planning and decision-making processes.

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Although widely used, CBA is also contested as being inadequate for appraising transport-related plans (Annema et al., 2007; De Jong and Geerlings, 2003; ECMT, 2004; Mackie and Preston, 1998; Naess, 2006; Priemus et al., 2008; Wee, 2006). Academic literature identifies a number of aspects of CBA that underlie this critique. These include disputable calculation methods for translating soft variables like quality of nature into money, or leaving these effects out of the analysis altogether (Mackie and Preston, 1998); missing information about winners and losers (the distribution effects) and ignoring equity issues (Ackerman and Heinzerling, 2002); missing information about expected synergy and agglomeration effects (Wee, 2006); poorly constructed reference cases (Annema et al., 2007; De Jong and Geerlings, 2003; Naess, 2006; Wee, 2006); poor incorporation of uncertainties (Salling and Banister, 2009; Ševčíková et al., 2011); and too much focus on how infrastructure can help solve traffic bottlenecks (i.e. decreased travel time) and too little on how it can support a vision for spatial economic developments (ECMT, 2004; Van Wee et al., 2006). The last problem is perhaps not surprising if we consider the intrinsic difficulty of measuring such effects. According to Mackie (2010), it is very difficult to appraise the effect of investment in infrastructure on the regional economy. Moreover, Mackie states that “the interaction between transport and the wider economy, and its treatment in appraisal, is one of the most lively current topics” (Mackie, 2010, p.19).

Although these are important issues, it is questionable whether solving these technical, content-related issues alone will be enough to reverse the antagonistic attitude that many planning actors have towards the use of the instrument itself. CBAs, especially when applied to integrated land use and transportation plans, may cause several tensions and frustrations in planning practices. Different participants who operate in CBA processes do not agree on how the analysis should be understood and used, and it appears unclear what role CBA should be allowed to play in infrastructure decision-making processes. As such, we can state that along with the aforementioned technical aspects, there might be process-related issues that cause the controversy surrounding the CBA in transport planning. There is, however, only limited attention given to process-related issues in academic debate.

### 1.2. Process-related problems of the CBA

A report of the European Conference of Ministers of Transport (ECMT, 2004) addresses several process-related problems of CBA, observing that planning actors blame it for not being transparent, being used too late in the planning process, and being used as a final assessment (or ‘sword of Damocles’) without the possibility of improving the underlying plan or vision. The report stresses that although robust economic appraisal is necessary for infrastructure project development, assessments should not be seen as a blunt yes or no. “They should be used instead to draw out issues and propose ways forward. They should also provide a mechanism for drawing stakeholders into a consensus as to the fundamental problems a project is to address, the alternatives available and the solutions preferred” (ECMT, 2004, p. 8). Haezendonck (2007) also addresses the importance of involving stakeholders in CBA processes, which does not seem to be a natural element in current CBA practices. However, the incorporation of stakeholders in the CBA process could be difficult, because the CBA is based on welfare theory and compensation criteria, whereas each stakeholder has its own set of costs and benefits (Macharis in: Haezendonck, 2007).

Savelberg et al. (2008) notice that in Dutch planning practice, planners feel frustrated if a CBA does not give an understandable and recognizable output. This may happen if the plan aims for difficult-to-assess effects like increasing the liveability or the economic competitiveness of a region. Mackie (2010) confirms this struggle by pointing at a discrepancy between the views of planners and transport appraisers. Planners want to know how integrated spatial and infrastructural projects influence effects such as induced land-use changes and economic activity, questions which are difficult to answer with a CBA. According to Savelberg et al. (2008), this discrepancy is especially frustrating if the CBA is used as judgment in the decision-making process. The latter seems, however, an issue in itself, as Sager and Ravlum (2005), Martinsen et al. (2010) and Eliasson and Lundberg (2010) show that it remains unpredictable to what extent and in what way CBAs influence decision making – if at all. Other political processes seem to be more relevant.

Although the abovementioned publications shed some light on process-related issues, it remains unclear what exactly happens during the process of applying CBA in transport planning practices and what possibly causes the process-related issues. What are the fundamental issues at play that hinder the CBA process? With our research, we aim to gain more insight into these fundamental issues and – in a later phase – how they can be overcome. The central research question of this paper is therefore: *What perceptions do CBA participants have of current CBA assessment processes on integrated spatial and transportation plans in the Netherlands?* To answer this question, two research techniques are combined: focus group sessions and open in-depth interviews. Because there is very limited fundamental knowledge on the process-related issues of CBA, an inductive and grounded approach was applied. This means that the research was conducted without formulating theory-based hypotheses in advance. Our theoretical conceptions are directly derived from our data and related to theory as a final step (Bryman, 2008, pp. 9–13).

In the following section, we describe the research methodology that was used to collect empirical data. In Sections 3 and 4, the research findings of the focus group sessions and in-depth interviews are presented. After comparing the results of both research techniques, the article continues in Section 5 with a reflection on and interpretation of why these issues might develop by examining several underlying dilemmas. Before ending the article with a conclusion and discussion on future directions for research in Section 7, the findings and dilemmas are linked to the wider literature on competing rationalities in planning in Section 6.

## 2. Research methodology

To gain more insight into the CBA process and which fundamental underlying process issues are perceived by the CBA participants, a two-stage inductive research method was applied, with focus group sessions and open in-depth interviews. In both methods, participants in CBA processes for integrated infrastructure projects were asked to reflect on their experiences with the CBA instrument. Both the focus groups and the interviews followed an open technique. In doing so, we avoided the tunnel vision of limiting the empirical findings to known issues (since there is only limited academic knowledge on them) and allowed for the opportunity to explore latent issues. Moreover, this in-depth method offered the opportunity to explore how issues in the CBA process came into existence and why they were perceived as problematic. In the next sections, we will explain our research design and other methodological choices.

### 2.1. Trustworthiness and authenticity

The research design reflects the understanding that trustworthiness and authenticity are important to achieving worthwhile qualitative studies (Lincoln and Guba (1985) in: Bryman, 2008; Guba and Lincoln (1994) in: Bryman, 2008). Trustworthiness is subdivided in four criteria: credibility, transferability, dependability, and confirmability. In our research, we triangulated our findings by using two methods to answer the same research question, which is a recommended technique to meet the criterion of credibility (Bryman, 2008). These methods resulted in an overlap in the perceptions of issues in the CBA process, which will be described further at the end of Section 4. This overlap is a strong signal that the research was able to gain insight into the complexity of the CBA process and its related issues. Transferability, the second criterion, was established by giving a detailed description of the research findings within the limits of this article and publishing our research findings in Dutch planning practice journals (Beukers et al., 2011a,b). In order to meet the criterion of dependability, we were very precise with the documentation of interview recordings, transcripts, and codes used in our systematic analysis. The fourth criterion of confirmability was met by using an open and grounded approach. Authenticity was addressed in the research questions that aimed to gain insight into the perspectives of all of the different CBA participants. The issues of ontological, educative, and catalytic authenticity (Bryman, 2008) were also applied to the research design through our intention to use our findings on perceived CBA issues to address these issues in future research.

Sections 2.2–2.4 will give more insight into the two research methods used and the analysis process.

### 2.2. Focus group sessions

Focus groups are used to get information about the preferences of participants on a specific theme in a relatively short period (Slocum, 2006). Additionally, through the social interaction between the participants, values and norms can be (re)-shaped (Morgan, 1997). In 2009 and 2010, three focus group sessions were organized with 7–10 planning participants who have dealt with the CBA instrument. The group included (1) civil servants who were involved on a local, regional, and national level in making plans which had to be analyzed in a CBA, (2) professionals that were responsible for guiding the CBA process, and (3) professionals that conducted CBAs. In each session, participants discussed one specific integrated spatial and infrastructural plan which was recently subjected to a CBA. During the sessions, the participants were asked to voice their perceptions on these plans, based on their own experiences with CBAs. These discussions identified different roles in the process of the CBA assessment in transport planning. Based on that, seven roles were defined. They are those that:

1. make plans to be analyzed in a CBA: 'Plan makers';
2. advise in the CBA process on how plans should be made and how the CBA should be applied: 'CBA advisors';
3. apply the CBA: 'CBA makers';
4. test if the CBA is applied correctly according to governmental manuals on the CBA: 'CBA testers';
5. apply for national funding. This role is represented by regional politicians: 'Funding applicants';
6. lobby for or against an analyzed plan: 'Lobbyists', and;
7. reflect academically on the CBA: 'Academics'.

In the focus group sessions, four out of the seven defined roles participated: plan makers, CBA advisors, CBA makers, and academics.

### 2.3. Open in-depth interviews

In the second research approach, 22 professionals (of whom one also participated in a focus group session) with experience in CBA assessments of integrated spatial and infrastructure planning were interviewed in depth. They were evenly distributed across the seven roles as defined above. An open interview technique was used (Bryman, 2008). After clarifying the role of the interviewee in the CBA process, each interview consisted of only one question: What is (are) your perception(s) of the CBA process? If necessary, this single question was followed up with clarifying questions of how, why, when, and who. Each interview session lasted about one to one-and-a-half hours. The aim was to bring all (positive and negative)

perceptions about the CBA process to the surface, without structuring it too much based on assumptions or hypotheses. Since we aimed to *generate* hypotheses, the average number of three individuals per role was deemed sufficient. Furthermore, the coherence in the findings (i.e. no new perceptions emerging in new interviews) showed that theoretical saturation was achieved (Bryman, 2008, p. 462).

#### 2.4. Process of analysis

The focus group sessions and interviews were analyzed based on the principles of grounded theory. Again, this technique ensures a minimum influence of assumptions and hypotheses from the researcher (Lewins and Silver, 2007). The interviews were analyzed through a systematic process of transcribing, inductive coding, and several rounds of grouping the codes (as illustrated in Fig. 1). Due to practical constraints, the focus groups were analyzed based on detailed reports and coded more loosely per session. The coding of the interviews resulted in more than 1500 unique codes. Although perceptions are by definition unique and refer to individual experiences, opinions, and observations, we reached the stage that more interviews did not result in more or different codes of perceptions (i.e. theoretical saturation).

For each of the CBA participant roles, the codes were grouped into themes. For example, within one role, the theme of ‘CBA input: the use of norms’ was revealed, into which all codes related to perceptions on this theme were grouped, as illustrated in Fig. 1. Thereafter, the themes were approached with more focus to select only the codes on issues. Following the example in Fig. 1, we selected the codes (20 in this case) which contain perceptions on the issue ‘disagreement on CBA-input: use of norms’. Together with the other selections of codes referring to issues (perceptions on process issues related to difficult-to-quantify effects or the complexity of calculation), these codes gave insight into the issues related to the theme of ‘CBA input: use of norms’. These codes on perceptions of issues were interpreted together, as represented in Fig. 1, step 4. This procedure was done for each group of CBA participant roles, which made it possible to compare the results. This process of analysis made it possible to understand and give meaning to the 1500 codes.

As stated, the aim of the research was not to find generic truths, but to gain more insight into CBA processes and the fundamental process issues as perceived by its actors. Therefore, all of our findings reflect perceptions, which are by definition

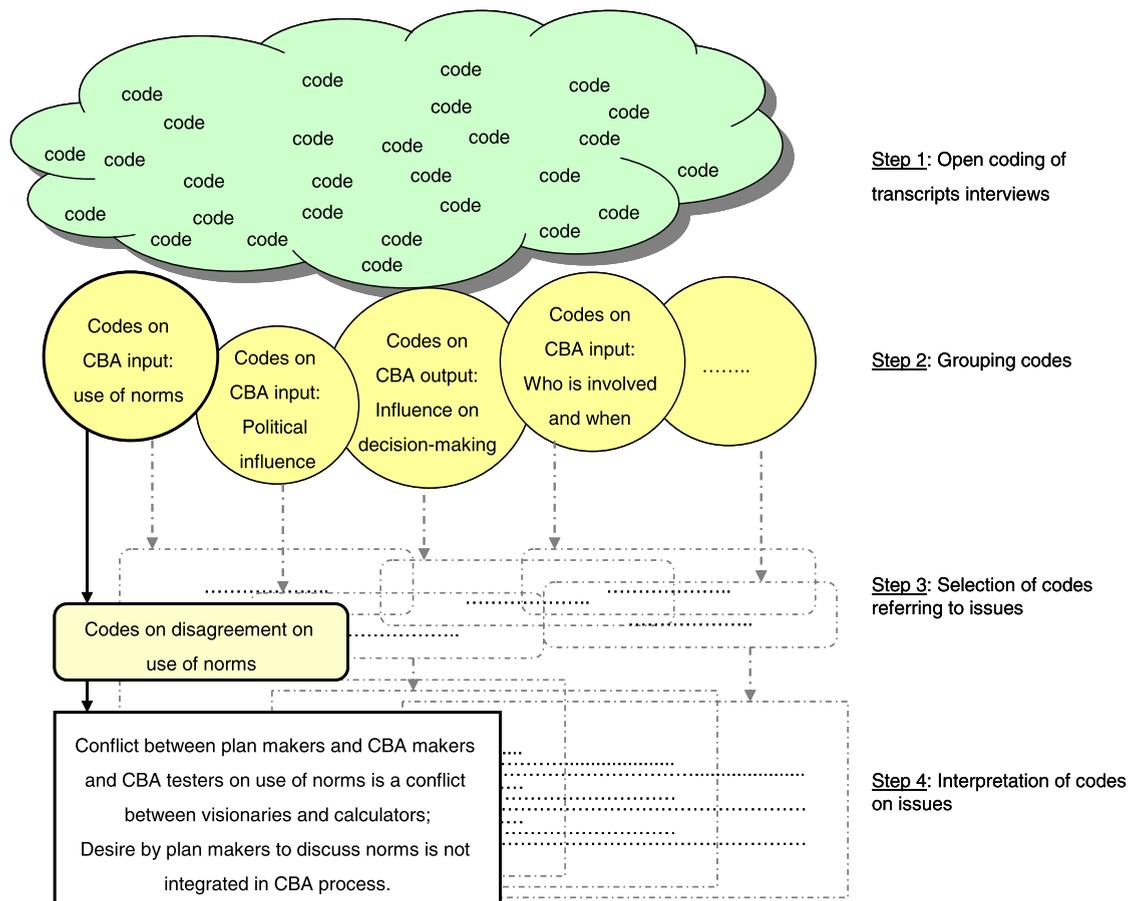


Fig. 1. From a cloud of codes to a meaningful interpretation of issues in CBA processes: Example from the analysis of interviews for the role of plan makers.

subjective. Sometimes, these perceptions contradict the formal role of the CBA in Dutch planning practice. Nonetheless, CBA participants perceive these issues in daily practice and may change their behavior and expectations accordingly. This makes these perceptions highly relevant as a study subject. The following sections will present the analysis and interpretation of the perceptions from the focus group sessions and in-depth interviews.

### 3. Results of the focus group sessions

As mentioned, the three focus group sessions were organized with small groups of 7–10 planning participants who had dealt with the CBA and experienced a CBA process. These participants represented the following roles in the CBA process: plan makers, CBA advisors, CBA makers, and academics. The sessions focused on perceptions of the CBA process. In each session, these were triggered by discussing a specific integrated spatial and infrastructural plan that was subjected to a CBA assessment. During the focus group sessions, five major process issues emerged, as summarized in Table 1.

#### 3.1. Perceptions of process-related CBA issues

Participants experienced that the national government uses the CBA balance (cost-benefit ratio) to decide whether or not to invest in a certain regional project (i.e. as a final assessment). This perception deviates from the official role of the CBA in Dutch planning, which is to support – not to determine – the decision making on regional infrastructural projects to be financed by the national government. In the perception of the focus groups, this role is stronger than officially intended and experienced as judgmental. This was noted by the participants as being negative, especially if they were not able or allowed to use the CBA outcome to improve the plan and to learn from the CBA. Although planning practice sometimes shows several rounds of making and assessing plans with the CBA and adjusting the plans, participants explicitly stated that this is unintended and a result of tough negotiations and struggles among bureaucrats and politicians. This was experienced as “time-consuming” or “retarding”, as stated by one participant and “tedious” by another.

Another perceived issue is that the CBA was experienced as being used in a rigid way by the so-called calculators, the professionals who conduct and test the CBA calculations. Some participants experienced that there was little or no possibility of negotiating how effects are treated in the calculation and that the calculators were too strict in what they do. According to those participants, this resulted in the feeling that elements of the plan were left out and that the CBA did not reflect, for example, the synergetic effects of the plan as a whole. Moreover, it was negatively perceived if the calculators paid more attention to the effects which are more easy to calculate and monetize; i.e. the ‘hard’ or tangible effects (Meyer and Miller, 2000) such as investment and maintenance costs and travel time benefits. According to some CBA participants, this may lead to a lack of attention on the effects which are not easy to calculate and monetize and sometimes are mentioned only as ‘pro memory’ items, the ‘soft’ or intangible effects (Meyer and Miller, 2000) such as decreases or increases in liveability or spatial quality.

A final and general perception pertained to the struggle to cooperate between involved parties in the CBA process and the sense of not understanding each other. On the one hand, there are the visionaries: civil servants, policy makers, and politicians with complex ambitions containing many hard-to-quantify spatial and social elements and political beliefs. On the other hand, there are the calculators, (mostly) researchers with financial or economic backgrounds and focused on the generation of scientifically sound information. The discrepancy between these two groups is perceived as resulting in a lack of listening to and learning from each other. It was expressed several times during the sessions that in the CBA process, too little time and effort is invested in getting to know one another in order to ease these cooperation and communication problems. Because of this, the CBA is felt as an unreliable and unpredictable black box by the plan makers.

### 4. Results of the open interviews

In the focus group sessions, it emerged that issues exist in the CBA process and that these issues might influence the effective use of the CBA to support the decision making on integrated land use and transportation plans. In the second research step, we aimed to gain more insight into the nature of these issues in the CBA process, how they might have come into existence, and why they are perceived as problematic. The interviews focused on the seven types of CBA participants, which enabled us to distinguish which issues were perceived by which type.

**Table 1**

Summary of CBA process issues expressed by CBA participants in focus groups sessions.

1	National government uses CBA as a final assessment so that opportunities for learning and optimizing plans are lost
2	CBA process is perceived as time-consuming
3	CBA is perceived as rigid or used in a rigid way
4	A perceived unbalanced attention in CBA between monetized effects and non-monetized effects
5	Perception of a lack of communication between so-called visionaries and calculators resulting in the feeling of CBA as a black box by the plan makers

The following sections will describe and compare the issues that appeared from the interview analysis, articulated by each type of participant.

#### 4.1. Perceptions on issues in the open interviews

Table 2 summarizes the issues perceived by the seven types of CBA participants.

As Table 2 shows, it appeared that the CBA advisors perceive the most issues, because they oversee the CBA process as a whole, instead of the more narrowed views of the other participants on a specific phase in the process. Several issues are shared by more types of CBA participants, whereas other issues are contradicting. The issues show overlap in relation to the following nine themes, in random order:

1. Insufficient communication among participants: experienced as contradiction between visionaries versus calculators.
2. Fear that 'hard,' easier-to-calculate effects dominate over 'soft,' difficult-to-calculate effects in decision making.
3. CBA as black box: without explanation, the tool is perceived as not understandable.
4. Parties act strategically with CBA input (composition of the plan) and output to make the plan look according to their desires.
5. The criteria for testing CBA reports are unclear and process of testing is unstructured.
6. Even though CBA may not be suited for each assessment question, CBA is being used for all of them because it is compulsory in the planning procedure.

**Table 2**  
Issues in CBA processes as perceived by the seven types of CBA participants.

Type of CBA participant	Perceived issues in CBA processes
Plan maker	<ul style="list-style-type: none"> <li>– Contradiction in the process between 'visionaries' and 'calculators': not understanding each other</li> <li>– CBA disregards political sensitivities: makes the assessment less useful in decision-making process</li> <li>– Ambiguities on CBA input: demands are unclear</li> <li>– Too little attention in CBA on assessing soft effects. This leads to mistrust towards the instrument and the 'calculators'</li> <li>– Influence of CBA on decision making is unclear: judgmental or not?</li> </ul>
CBA advisors	<ul style="list-style-type: none"> <li>– CBA is used too formally/rigidly by the 'calculators'</li> <li>– Stakeholders are not structurally involved</li> <li>– Testing of CBA output is organized ad hoc</li> <li>– Cooperation between regional and national parties is ambiguous</li> <li>– Civil servants influence the use of CBA in decision-making process, even though they do not always understand the instrument correctly</li> <li>– CBA is a small world in which a few professionals operate. They conduct, advice, and test each others' CBAs</li> <li>– Preparation phase of CBA is unclear</li> <li>– CBA is not always the right instrument. The monetary approach is too narrow</li> <li>– Too little dialog on CBA methodology</li> <li>– CBA is not transparent enough</li> <li>– The importance of a CBA process is underexposed</li> <li>– CBA (input and output) is strategically used in decision-making process</li> <li>– CBA is used to judge plans</li> <li>– Numbers receive too much attention in CBA</li> <li>– CBA disregards political sensitivities. This makes the assessment less useful in decision-making process</li> <li>– Information and advice in decision-making process are too narrow and too black and white. There is too little room for uncertainties</li> </ul>
CBA makers	<ul style="list-style-type: none"> <li>– Quality of CBA input is not always correct</li> <li>– Balance of cost-benefit ratio is too dominant in decision-making process</li> <li>– CBA input and output is used strategically</li> <li>– Too little time is scheduled to assess integrated plans and synergy effects. Therefore not every CBA is a thorough CBA</li> </ul>
CBA testers	<ul style="list-style-type: none"> <li>– Plan makers and funding applicants are committed by beforehand, regardless of output of the CBA assessment</li> <li>– Testing criteria are 'diffuse'</li> <li>– CBA is not the right instrument to assess every plan</li> </ul>
Funding applicants	<ul style="list-style-type: none"> <li>– CBA is wrongly used as judgment</li> <li>– Information in a CBA is too limited to support decision making</li> </ul>
Lobbyists	<ul style="list-style-type: none"> <li>– CBA is too narrow to capture all effects</li> <li>– CBA input and output is used strategically</li> <li>– Stakeholder groups are involved selectively by governmental parties</li> </ul>
Academics	<ul style="list-style-type: none"> <li>– CBA participants do not have fair debates in hard-to-assess plans, like integrated spatial infrastructural plans</li> <li>– There is too little room for uncertainties in the decision-making process</li> <li>– Deficits on presentation of CBA output. These are not understandable for non-economists</li> <li>– CBAs are conducted too late in the planning process when plans are already fixed and politicians committed. However, making CBAs earlier in the planning process seems impossible due to the detailed information needed and political sensitivities</li> </ul>

7. Too little attention paid to process matters. This leads to time pressure, due to underestimation of discussion length on assumptions and starting points.
8. CBA is used as final assessment, which is indicated as wrong, because the CBA will never give the 'whole picture'.
9. There is too little room for uncertainties and nuance in the decision-making process.

The similarities and differences in the perceptions of the CBA participants on these nine themes reveal interesting issues and give a more in-depth understanding of the perceived issues and how they may arise, which will be discussed in Section 4.2 and presented in Table 3.

#### 4.2. Differences and similarities in perceptions

Differences and similarities on the theme of insufficient communication are illustrated by the finding that while both CBA makers and testers did not express issues related to communication aspects, plan makers and advisors strongly emphasized this as being an important set of issues. Additionally, the plan makers and CBA advisors criticized the rigid attitude of CBA testers in relation to the communication issue in the CBA process. A similar contradiction appeared around the issue of too little opportunity for discussion on the use of norms and assumptions in the CBA. Again, this problem was mainly emphasized by plan makers and advisors, but not mentioned by CBA makers and testers. Although the CBA makers and testers may be unaware of a lack of communication, the analysis showed that it is perceived that these parties give little effort to stimulate active communication with other participants in the CBA process.

Similar differences emerged related to the theme of 'soft' (non-monetary or intangible) effects. Plan makers, advisors, CBA makers, funding applicants, and lobbyists worry about the matter of (a lack of) inclusion of soft effects into the CBA. They fear that 'soft', intangible effects do not receive the same amount of attention as 'hard', monetary or tangible effects in the calculation and in the decision-making process. Although CBA makers mentioned this problem and stated that hard effects should not dominate, advisors blamed them for not paying enough attention to non-monetary effects.

The notion that the CBA is a black box was mainly expressed by those participants who are not involved in the CBA process on a daily basis: plan makers, advisors, and lobbyists. Black box refers to an opaque instrument, the generation of whose output is unclear for non-daily users. CBA makers recognized that the CBA may be perceived as a black box. This was problematic for them if they had to cooperate with inexperienced plan makers who had to deliver the plan to be analyzed.

Perceptions of participants showed much agreement on the possible strategic use of CBA input and output. Strategic use refers to manipulation of the CBA input and selective use of CBA output as well as ignoring CBA output if this output does not correspond with the political preference. It is striking, however, that this issue was not mentioned by funding applicants and hardly at all by plan makers. According to all other participants, these parties tend to behave especially strategically. Apparently, these parties do not experience their own strategic behavior as problematic.

According to CBA makers, strategic behavior can be reduced by independently testing CBAs. The CBA makers and testers themselves pointed out that testing of CBAs is done too infrequently, and often in an unstructured, unorganized manner. The timing of the involvement of the testing committee is especially problematic in current practice, because they are mostly involved only at the end of the CBA process when the assessment is already finalized. Also stated by CBA testers as problematic was that the testing criteria are more and more diffuse. Their explanation for this diffusion is that the first CBA manuals with testing criteria were written solely for infrastructure plans and not for integrated spatial infrastructural or other complex plans. This broadening of the scope of plans resulted in an increase in the amount of extra manuals and reports on how to conduct a CBA, specified for the more complex plans. The CBA testers stated that this broadening of manuals and criteria make it more difficult to test CBAs in a consistent way.

**Table 3**

Perceived issues in the CBA process experienced by different CBA participants.

Issues in CBA process	Perceived by
1. Deficient communication among participants: experienced as a conflict between visionaries versus calculators	Plan makers; advisors; funding applicants; lobbyists; academics
2. Fear that hard effects dominate over soft effects in decision making	Plan makers; advisors; CBA makers; funding applicants; lobbyists; academics
3. CBA as a black box: without explanation, the tool is perceived as not understandable	Plan makers; advisors; CBA makers; lobbyists
4. Parties act strategically towards CBA input (composition of the plan) and output to make the plan score according to their desires	Plan makers; advisors; CBA makers; CBA testers; lobbyists; academics
5. The criteria of testing CBA reports are unclear and the testing process is unstructured	Advisors; CBA makers; CBA testers
6. Even though CBA may not be suited for each assessment question, CBA is being used because it is compulsory in the planning procedure	Plan makers; advisors; CBA testers; funding applicants; lobbyists; academics
7. There is too little attention for process matters. This leads to time pressure, because of the underestimation of time needed for discussions on assumptions and starting points	Advisors; CBA makers; CBA testers; lobbyists
8. CBA is used as a final assessment, which is indicated as wrong because the CBA will never give the 'complete picture'	Plan makers; advisors; CBA makers; funding applicants; lobbyists, academics
9. There is too little room for uncertainties and nuance in the decision making process	Plan makers; advisors; CBA makers; academics

For all roles except the lobbyists, who did not mention this topic, it emerged that it is very difficult (if not impossible) to appraise complex or integrated plans by using CBA. Area development, regional, and land use plans are also mentioned as very difficult to be assessed by a CBA. Participants mentioned that the CBA is not always the optimal instrument to appraise every type of plan and does not always fit the needs of the planning process. Whereas on the one hand the CBA gives too much information, on the other it shows a deficit of information related to what was mentioned as political sensitivities. Still, the CBA is compulsory for integrated plans, according to Dutch government regulations.

The notion that the CBA is not always the right instrument for analysis of complex plans has a side-effect in that, according to CBA makers and testers, plan makers and funding applicants tend to downplay the CBA and its output. They underestimate the time needed to reach agreement on the exact layout of the plan to be analyzed and other inputs. This downplaying and underestimation of the CBA process appeared to result in allocating too little time and means to this process. In contrast to this apparent downplaying, plan makers did stress the importance of a CBA, because they saw a negative CBA balance as a potential risk factor in the decision-making process for blocking the plan's realization and aimed for a positive balance.

Although CBA testers and academics did not mention an opinion on this theme, the other participants agreed that the CBA should not be used to judge plans. They mentioned that the CBA is too restricted and does not give a comprehensive picture of an analyzed plan. Because of the CBAs restrictions, participants stated that it is not possible to weigh pros and cons based solely on the CBA. At the same time, however, it remained unclear for all participants how and to what extent exactly the CBA influences decision making and how it is used in the actual decision-making process.

Finally, plan makers, advisors, CBA makers, and academics found it problematic that contemporary decision-making processes for infrastructure projects demand unrealistically clear and unambiguous information. Participants stated that decision makers simply want to get advice stating if a plan should be conducted or not, preferably with analytical reports to support that decision. The government seems to be under pressure to deliver the right answers in accordance with the political preference of the decision maker. Because of these attitudes, participants perceived that there is too little room for nuance and uncertainties in the decision-making process. This nuance should be taken into account, because a CBA – as well as other kinds of analyses – can never give exact answers and should not suggest that it can.

## 5. Interpreting the research findings

The focus group sessions and open interviews were used to answer the research question. The research techniques shed light on issues in the CBA process as perceived by several types of CBA participants. Although the difference in information richness yielded by the two techniques is evident, they both pointed in the same directions. Below, we will confront and triangulate the findings of both techniques in Section 5.1. Furthermore, the interpretation of the issues as perceived by the different types of participants revealed some dilemmas, which will be discussed in Section 5.2.

### 5.1. Triangulation of focus groups and interviews

The overlap between findings is evident when the same words are used to formulate the mentioned issue. 'The use of CBA as a final assessment' was, for example, mentioned as a fundamental issue during both the focus group sessions and in the interviews. In the interviews, however, it became clear that other issues are closely related, which sheds some light on why this is considered to be so problematic. For example, the issue that 'a compulsory CBA is not always the right assessment tool for every plan and research question' may increase the problematic experience that CBA is used as final assessment. The interviews also signaled that the use of CBA as a final assessment may cause strategic behavior by the plan owners. If the CBA is experienced as the last hoop in the process to get the necessary financial resources for the realization of the plan, the plan owners will do their best to jump through it (instead of learning from the entire experience and improving their plans and strategies). This could include presenting the plan as beautifully as possible, maybe even unrealistically, to gain that desired positive CBA balance.

Another clear overlap was the issue of 'imbalance in the attention given to the calculation of 'soft' effects in comparison to the 'hard' effects'. Both techniques again showed how this issue related to other issues. This issue arises when the CBA gives surprising (low) output, which plan owners do not recognize in their plan. Then they start looking for soft effects like increasing livability, which may be very important to them, and if they were calculated correctly and received enough attention. Often, such effects are then found to be put in the 'pro memory' box, which adds to the frustration. In the occasion of an unexpected and incomprehensible output, plan owners may then even question the entire instrument and start wondering what it actually calculates (without getting clear cut answers). In other words, they then experience the CBA as a black box which is used too rigidly. So, the experience of an imbalance in the attention given to soft and hard effects in CBA relates to the experience of CBA as a black box and the notion that the instrument is used rigidly.

The two abovementioned issues show the existence of two distinct groups in the CBA process: the plan owners on the one hand and the calculators on the other. This distinction relates to the issue of insufficient communication and cooperation between these two groups. Related to that, the interviews showed that the calculators find that too little time is dedicated by the plan owners to conduct a CBA, and therefore too little attention is given to the process. In the focus groups sessions, however, the CBA process was typified by the plan owners as being too time consuming. This may be related to their

experience of the CBA as an obligation and final assessment, for which plan owners are not inclined to dedicate much time and effort. Nonetheless, neglecting the process elements of the CBA seems to give a contrary result, because of the necessity to discuss CBA input and assumptions used early in the process. If this is not done sufficiently, participants start to question the used input later on, which may cause severe delays. All these issues indicate insufficient communication and cooperation between the participants from opposing directions.

In general, the issues that came forward in both the interviews and the focus groups were strongly overlapping, supplementary, and interconnecting. Only two issues mentioned in the interviews were less reflected in the focus group sessions. Namely, (1) the suboptimal functioning of the testing of CBA reports, which was characterized as being unstructured and done too late and (2) the insufficient room for uncertainties in planning and decision making. According to some interviewees, the focus is too much on creating certainties about the assessed plans, so that the decision can be based on 'scientific proof' like in CBA, even though this proof may not be as accurate as expected by its users.

Besides showing the complexity of the process-related issues, the findings of both research techniques brought forth four dilemmas. When we are looking for possible solution strategies, we should be especially aware of the tradeoffs on these dilemmas. The four dilemmas are described and discussed below.

## 5.2. Dilemmas that emerged

A first dilemma relates to the disagreements on how soft effects should be treated in the CBA and in the CBA process. Some participants stated that as long as soft effects are not monetized, they will not receive the same attention as hard effects, which can be monetized. Others, however, expressed the opinion that monetizing soft effects should not be done at all, since this will create false certainty. These opposing opinions on the difficulties of dealing with soft effects in the CBA are expressed randomly among the different roles of participants, so these opinions cannot be assigned to one group opposing another. It is striking that these apparent fundamental differences related to the issue of soft effects, and indirectly to the appropriate possible solution (putting effort into monetizing soft effects or not), seem to paralyze the discussion on this theme.

A second dilemma relates to the first. On the one hand, plan makers and funding applicants expressed their worries about soft effects receiving too little attention vis-à-vis hard effects in the decision-making process. On the other hand, the interview analysis showed that there is hardly room for uncertainties in the decision-making process and exact numbers are favored. These two observations seem difficult to unite, because soft effects can be particularly uncertain and difficult to capture in concrete figures. It seems that from these observations, participants criticize the procedures in which they play a part and which they even help preserve.

The third dilemma is formed at the one hand by the aim of the CBA testers to keep the CBA scientifically pure, as expressed in their more or less rigid behavior. On the other hand, participants acknowledged that the CBA is not always the right instrument to fully analyze all types of plans, especially complex spatial infrastructural plans. Is it fair to keep the CBA pure, if it is not suited for analyzing these plans? And is it fair for the Dutch government to require a CBA for complex spatial infrastructural plans even though the instrument is not suited to fully assess these plans? The interviews showed that participants find several ways to deal with this dilemma or inconsistency. However, these ways were pointed out by other participants as issues. In practice, for example, governmental regulations seemed to be not as strict as they appear, and other, lighter versions of a CBA or CBA-like assessments are conducted. So, not every analysis which claims to be a CBA is a 'real' CBA. Furthermore, participants may act strategically by just fulfilling the formal requirements and trying to adjust the CBA input in such a way that it will score well in CBA terms. Alternatively, they may downplay the CBA output by emphasizing its deficits and rejecting all of its results. Taken together, these reactions have the effect of diminishing the intended role of the CBA to support the decision-making and planning process.

A fourth and final dilemma came from the academics' perceptions. They stated that the CBA is applied too late in the planning process, when plans are already designed and political positions entrenched. Because of this, it is no longer possible to use the CBA to improve plans or learn from its outcomes. Participants, except CBA testers, in the focus groups and the interviews firmly expressed that they disapprove of this. Although the tardiness of the CBAs application is problematic, it also seems hard to do it much earlier. The academics perceived that attempts to apply the CBA earlier in the planning process failed because politicians did not want to reveal their positions then. Furthermore, the CBA requires so much detail that plans already have to be thought through comprehensively before a CBA can be made.

## 6. Closing the inductive research cycle: planning versus economics

As a final step, in this section the inductive research findings are related to theory to enable us to identify relevant patterns. Although it is not possible to identify a simple hierarchy among the several mentioned fundamental issues and dilemmas, the theme of communication deficits and the apparent gap between planners (visionaries) and economists (calculators) forms a core problem in the CBA process. Many perceptions indicate large differences between the worlds of planners-and-planning and economists-and-economics. These differences can cause difficulties when these two worlds have to cooperate and (therefore) communicate. As a potential bridge between the two worlds, the CBA is proposed as an economic instrument built on economic logic, with economic terms and methods. A plan, however, is based on planners' terms and logic, and the

two do not match one another. It is also worth noting that plans come into existence in a process in which planners operate largely separately from economists (and others), since in an early planning phase (economic) appraisal techniques are minimally used – if at all. This results in a situation in which an optimal plan in terms of planners' logic still has to jump through the economic hoop of the CBA. In this sense, it is not surprising that assessing a planners' plan through an economic method of appraisal causes friction. We can turn to some academic concepts that help us to understand this concept of two worlds better (and potentially lead us to solution strategies).

A problematic confrontation of different systems seems to happen when making a CBA of integrated spatial and infrastructural plans. This confrontation is explained by Owens et al. (2004) as a clash between the technical rational approach and the communicative rational approach. In short (and at the risk of oversimplification), the technical rational approach represents the positivist belief that rational knowledge exists and can be provided by technical instruments (such as the CBA) operated by experts. The communicative rational approach, on the contrary, is fundamentally a reaction to this positivist thinking. Its basic premise is that knowledge is a construction whereby the role of the planning expert is to create a space or place for different actors to communicate and to let inter-subjective knowledge come into existence (see for example Huxley and Yiftachel, 2000). Within this dichotomy, the CBA and its prescribed use seems to be an exponent of the technical rational approach, whereas the transport planning domain, especially when including wider regional economic visions, seems to increasingly tend towards communicative rational approaches (Durning, 1999; Te Brömmelstroet and Bertolini, 2011; Willson, 2001).

Also, Handy (2008) recognizes that transport planning as a discipline has changed and that this affects the effectiveness of the appraisal methods being used. The goals in transport planning are no longer dictated through predicting and providing. Nowadays, goals for transport planning are far more complex in nature and less shared among different actors. Hence, appraisal methods which are aimed to support the old goals (such as easing congestion) do not automatically fit the demands of the changing planning paradigm (such as enhancing accessibility and sustainability). Te Brömmelstroet (2010), Hatzopoulou and Miller (2009), and Amekudzi et al. (2009) explored the lack of the use of integrated models in planning practice, even though there is a growing need for up-to-date models which reflect different priorities like sustainability.

As the findings of this study indicate, the distinction between planners and economists in the CBA process does not only result in misunderstanding and a lack of communication, but also leads to a situation of mistrust. Apparently, the planners presume that economists do not understand planners' values, like the increasing of liveability, as they do, so they fear these values do not get the same attention as those effects that the economists do understand; the participants call this the contrast between 'soft' and 'hard' effects. Also, the experience of CBA as a black box is an expression of mistrust. Plan owners are anxious if the CBA assesses their plan appropriately and this anxiety is increased if they do not exactly understand the calculation methods being used. Furthermore, this mistrust seems to induce planners into operating tactically and strategically, which seems to happen more often in transport planning (Naess, 2011; Wachs, 1989). Moreover, plan owners appear to feel resistance towards the CBA and therefore postpone it and devote little time and attention to the assessment and its necessary processes. On the other hand, the calculators exhibit suspicious behavior, too, if they act rigidly towards the assessed plan. Even more, the obligation of CBA in Dutch planning may be interpreted as a mistrustful setting, as if plans are not assessed properly without an obligatory CBA. The consequence of all this seems to be that a crucial opportunity for learning, and thus making better plans, that CBA can in principle offer, is getting lost.

## 7. Conclusion: mistrust and defective communication

This article started with mapping the problematic relation between the growing importance of the CBA instrument and its controversy in Dutch planning practices. It emphasized that CBA literature tends to focus on content-related issues instead of the CBA process and possible related issues. The aim of the research presented in this article was to narrow this knowledge gap on CBA processes and to gain insight into perceptions on process-related issues by CBA participants in Dutch planning practice. Through our inductive research approach, several issues and dilemmas in the CBA process were pointed out, explained, and reflected upon with the help of planning literature.

That the CBA and its process are perceived as problematic and characterized as frustrating when applied to assess complex infrastructure plans must not come as a surprise. It appears to be a logical result of clashing values and approaches. This dichotomy helps to explain and understand many of the issues explored: deficient communication among 'plan owners' and 'calculators'; the fear that 'hard' effects dominate over 'soft' effects in decision making; the characterization of CBA as a black box; the occurrence of strategic behavior in relation to CBA input and output; the experience of time pressure in the CBA process because of the underestimation of the length of discussions on assumptions and starting points; the use of the CBA as final assessment, too late in the planning process; and having too little room for uncertainties and nuance in the decision-making process. Moreover, the dichotomy between plan owners and calculators explains the two problems connecting most of the fundamental issues that were expressed: the mistrust between plan owners and calculators towards each other and the plan or instrument which they represent and, furthermore, how this leads to a communication deficit and inferior cooperation.

The research findings show that awareness of process-related issues and dilemmas is crucial if we want to improve the use of CBAs to assess integrated land use and transportation plans. The main challenge from a process perspective is then to narrow the exposed gap between planners and economists and their related frames of thinking and assessment. Moreover,

the level of trust should be increased so that effective communication and cooperation between participants in the process could be improved. The in-depth understanding of the CBA process issues discussed in this paper forms a stepping stone for future research, which should be directed at identifying theoretical solutions for the problems as described and finding out how these theoretical solutions may work in practice.

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