

The Comprehensiveness Dilemma of Cost-Benefit Analysis

Tore Sager¹

Department of Civil and Transport Engineering, Norwegian University of Science and Technology (NTNU)

Most project impacts on environment, climate, and health are not valued in markets or in choice situations similar to market transactions. Analysts have to go beyond revealed preferences to stated preference interviews and even to deliberative processes in order to elicit preferences from which the trade-off values ('prices') of the expanded cost-benefit analysis (CBA) can be deduced. The comprehensiveness dilemma of social CBA arises with the choice between calculation of 'prices' from revealed preferences and communicative construction of 'prices' on the basis of preferences stated in deliberation. New methods for eliciting preferences, such as deliberative monetary valuation, yield preferences influenced by ethical and political values. The interpretation of the analytic results then becomes problematic. The comprehensiveness dilemma is that planners must choose between a narrow CBA making good economic sense, and a comprehensive CBA with dubious economic content. By aiming for completeness, CBA changes character from being a summation of changes in individual wellbeing to being a mix of this and the summation of monetary expressions of ethical and political viewpoints and attitudes.

Keywords: Cost-benefit analysis, Stated preferences, Comprehensive evaluation, Deliberative monetary valuation, Non-monetized effects

1. Introduction: why the aim for complete CBA is worth questioning

Several decades after it came into widespread use, social CBA is still eagerly discussed from many perspectives. For example, van Wee (2011) critiques the ethical foundation of the analysis, and Næss (2006) picks it apart on methodological grounds. Mackie and Preston (1998) sum up many of the objections in twenty-one brief points. Not surprisingly, diverse viewpoints on CBA have led to many approaches being applied throughout Europe and North America (Beria et al., 2012; de Jong, 2001; Grant-Muller et al., 2001; Lee, 2000), differing not least in their treatment of non-monetized consequences.

Planning and decision-making processes for transport infrastructure vary much between countries, affecting how CBA is being used (Damart and Roy, 2009; de Jong and Geerlings, 2003). A special branch of CBA-research investigates how the parties involved in planning view this economic evaluation method (Beukers et al., 2012). An important part of this research studies

¹ Høgskoleringen 7A, 7491 Trondheim, Norway, T:+4791897158; F:+4773597021; E: tore.sager@ntnu.no

empirically how politicians and experts use the results of CBA (Eliasson and Lundberg, 2012; Odeck, 2010; Sager and Sørensen, 2011).

The problem discussed here, however, is how CBA should be designed, given that both a narrow and a comprehensive economic evaluation have their advantages. By the early 1970s, time costs and accident costs were part of cost-benefit analyses of transport projects in several countries. Environmental impacts were the next candidates for inclusion, while studies of health effects (Rabl and Nazelle, 2012; Sælensminde, 2004) and climate change (Esteban et al., 2012; Mandell, 2011) are more recent. Much work is still going on to improve the measurement and valuation of such impacts. When decision-makers do not want to emphasize the CBA-results, it is convenient for them to point to the incompleteness of the analysis (Sager and Ravlum, 2005:47-8). This gives researchers and planners a motive for increasing the number of entries, hoping that their analytic input to the decision-making process will then be taken into account. In addition, the 'pricing' of environmental and other non-market effects creates opportunities that are appreciated by researchers.

It is a main function of analytic input to legitimize politically carried plans and the planning and decision-making processes leading up to them. Whether the model results are directly applied or not, politicians need to keep their backs clear. They must be able to show the public that the output of expert analysis was available to them when they made their decisions, so it can be credibly stated – should the need arise – that expert advice was considered as part of the policy-making. The protection offered by analytic expert advice is more politically effective the closer it is to an overall judgment. This motivates politicians to fund research promising to make CBA more comprehensive.² Hence, the interests of several actors involved in planning and decision-making feed the robust dynamics leading to the four decades long quest for expanding the CBA.

The purpose of this paper is to argue that there is a comprehensiveness dilemma of CBA. The dilemma arises when the analysis is made more complete by including environmental and other effects that are not priced in markets or similar choice situations. The analysts then rely on stated preference interviews or deliberative processes. Such techniques are relevant, for example, when estimating the willingness to pay for the following:

- Reducing carbon dioxide emissions
- Health benefits of shift from car to active transport
- Less felt insecurity of using walking and cycling track networks
- Lower perceived risk of driving on road links prone to avalanche or rockslide
- Improving biodiversity
- Preserving the habitat of particular species when choosing the alignment for a new highway
- Reducing the killing of wildlife (reindeer, elk, etc) along a railway line

² Analytic results are politically unreliable, often disagreeing with advice and demands coming from other sources that the decision-making politicians consider important, such as lobbyists, interest groups, and their own local party organization. In many cases the analytic results (for example, of CBA) will therefore not be utilized, and this can start a spiral of augmented demand for model refinement:

"(T)he politicians want to be free to set aside the analytic planning results when other sources of knowledge are more supportive of their preferred policy – as a reason for non-use, they need to point out the inadequacy of the model and its output – having criticized the results, acting as responsible parliamentarians, they have to insist that the planning model be improved and more credible results presented – the planners revise the model and present new results in accordance with political guidelines – the politicians still need to maintain their space for political manoeuvring by ignoring the analytic outcome – and the spiral continues." (Sager and Ravlum, 2005:56).

Deliberation is about the giving, weighing, acceptance or rejection of reasons concerning collective decisions prepared in a non-coercive process. The farther the choice situation is from individual market-like transactions, and the closer it is to real-life public decision-making, the more politics and ethics will mark the expressed preferences and the appraisal coefficients ('prices') derived from them. The dilemma is that the drive towards completeness makes the CBA-results difficult to interpret and undermines the analysis as a clear-cut welfare economic tool. The range of new entries aiming to make the social accounts comprehensive changes the meaning of the results. What is new in the present contribution is the explicit formulation of this dilemma.

It is useful for practitioners and theorists alike to know that the on-going expansion of the list of entries into the CBA is achieved at a cost. In much analytic work the cost of refinement comes in the form of increased complexity, more demanding collection and processing of data, and black-box problems.³ In the case of CBA, there is a severe extra cost: distortion of the logic making the overall evaluation exercise attractive. This is what the comprehensiveness dilemma makes clear.

Social cost-benefit analysis (CBA) can be combined with multi-criteria analysis in order to bring a comprehensive set of impacts into the evaluation (Gühnemann et al., 2012), but all hybrids of CBA and other formal evaluation methods are kept out of the present discussion. The paper concentrates on CBA and the capacity of participatory procedures for facilitating all-embracing economic assessment. CBA is here regarded as consisting only of the costs and benefits that have been given an economic value.

The focus of the paper can be specified further by turning to the administrative context. Economic project evaluation takes place both at the local level and at higher administrative levels, such as region, state and nation. CBA at the superior levels helps to set priorities among a large number of project proposals in the economic reality of scarce resources. The local analysis is often more detailed, for example, with regard to road projects; it gives attention to the exact location of the planned road in the terrain, and to the detailed computation of cost and benefit items associated with different alignments. Citizen participation usually comes out most strongly in the local evaluation procedure, and this paper is primarily about social CBA as part of a procedure in which the preferences of the involved parties are not ignored.

The following is a section outline. The reasoning leading to the comprehensiveness dilemma of CBA is easier to grasp when one is aware of different ways to use the CBA and different types of preferences that can be elicited. This basis is laid out in the next section, while the revealed/stated dichotomy is introduced thereafter, and some problems of stated preferences are highlighted. The last building block required for completing the argument concerns the procedures for preference formation. A definition of deliberative monetary valuation is also included; it is a set of techniques combining environmental valuation with the opportunity of participants to exchange viewpoints about project impacts. The last sections present the comprehensiveness dilemma of CBA, discuss the dilemma, and conclude.

2. Preference duality opens for ambiguity in the interpretation of CBA results

CBA can be used for different purposes. First, and most ambitious, is to let the analysis provide the final ranking of projects. What I mean by this is letting the analysis dictate the political decision. The analysis is then taken as providing the answer to the question of which would be the socially best project, given the values of the people determining the price tags of the cost and

³ There are two aspects of transparency: first, insight into the working of the analytic model, thus opening up the model black-box, and second, insight into the decision-makers' judgments and their weighing of the consequences. The second aspect provides an argument for using a comprehensive formal evaluation method.

benefit items. An alternative, second, use of CBA is to let the analysis supply decision-makers with sufficient information to make their own well-founded judgments about projects' social desirability. CBA has to support learning in the planning process in order to fulfil this purpose, which in turn makes it likely that a better plan will result. Nyborg (2012:8) notes that in the first use CBA gives a ranking equal to a conclusion about which project should be preferred, which seems unreasonable in a democracy: 'What is needed in a democratic process with a diversity of normative views are *factual foundations* for a conclusion – not the conclusion itself' (italics in original). In the second use, one keeps CBA as a welfare economic tool supplementing other pieces of information and preparing for the making of democratic decisions.

Preferences are used in CBA to calculate the appraisal coefficients. These coefficients have the same function as market prices in the analysis, but markets do not usually exist for environmental impacts. Appraisal coefficients (shadow prices) give the economic value per unit of each impact, so that costs and benefits measured on different scales can be added up in monetary terms. Preferences are sometimes elicited from representative samples of consumers, clients, or citizens in general, in other cases from (lay) people involved in the participatory planning process.

Different roles for respondents give different sets of preferences, and – as suggested by Sagoff (1988) and discussed by Orr (2007) – the distinction between consumer and citizen preferences may be of particular interest. We think as consumers when acting in markets and similar choice situations. In the consumer role we want higher individual utility leading to increasing personal wellbeing. We think as citizens in public decision-making settings when we acknowledge duties and obligations beyond our own desires. In the citizen role we want higher social value leading to increasing welfare (or happiness) in society. Citizen preferences are influenced by responsibility for our fellow human beings and thus reflect our ethical and political values. When co-deciding on a public good that will serve numerous people, lay participants in the planning process might want to act in a public spirit as good citizens with other-regarding attitudes. Note that the term 'citizen preferences' is used throughout this paper in the above sense of preferences influenced by ethical and political values, rather than simply denoting any preferences expressed by citizens. It has been empirically confirmed that the way people think about the value of environmental conditions in the context of willingness-to-pay questions is shaped by group discussion (Dietz et al., 2009), and that moving from an individual to a collective choice setting produces change in both values and preferences (Alvarez-Farizo and Hanley, 2006).

In economic evaluation based on self-centred consumer preferences, change in the wellbeing of a particular individual is counted only once (when some questions related to ecosystem services valuation [Fu et al., 2011] and the expression of altruism [Johansson, 1992] in individual utility functions are ignored). The change is taken into account only by the individual most directly experiencing it, and who is therefore in the best position to value the change. In a CBA that incorporates valuation of environmental impacts based on citizen preferences, the anticipation of altered wellbeing for a particular individual will influence the preferences (and choice) of every participant in the stated preference exercise who feels a moral obligation to care for this individual or feels solidarity that generates a wish to act politically to improve the situation of this individual.

Citizen preferences thus raise the issue of double-counting and create doubt about how the CBA-result is to be interpreted. The sort of preferences needed for analytic purposes depends on the question we want CBA to answer. Aiming to give information about aggregate economic wellbeing, CBA requires consumer preferences, not citizen preferences. By aggregating citizen preferences, we act as if defining social welfare '*not* as a function of individual utility, but as a function of individual views of social welfare' (Nyborg, 2012:64). Consumer preferences reflecting individual utility are sufficient for the second way to use CBA, as specified at the beginning of this section.

What if environmental costs do not count for much anyway? This may be the case in a fair share of transport projects, for example, where the environment is trumped by time savings and reductions in driving costs and accident costs. This argument strengthens the idea of a narrow CBA, since the costs and benefits that usually make up most of the monetary value of the project will still be included. Moreover, if putting double or triple 'prices' on types of environmental impacts would not make any difference for the final result of the CBA, it is of less consequence that ethical and political values influence citizen preferences. The problems that are discussed in the following are then of less practical importance.

However, CBA is not only applied in cases where a few non-market changes follow as small, secondary by-products. On the contrary, in economic evaluation of policies and plans a wide range of environmental and other non-market impacts can be at the core of the analysis. Citizen preferences will then leave their distinct mark on a large part of the social cost-benefit accounts. As citizen preferences are partly formed in the planning process, they will to a certain degree depend on the design of this process. The intensity of involvement, the trust and solidarity among participants, and the agitation caused by the environmental issues will affect the statements given. Preferences and the participants' valuation of environmental impacts are thus likely to show some variation between planning processes.

3. Stated preferences can be problematic when consumer preferences are wanted

People involved in planning processes may not recognize their own wishes in the revealed preferences of market actors which are normally used in CBA. The same problem arises when stated preference results are produced independently of any particular planning process, and when such results are elicited from participants in one planning process and later transferred and used for appraisal purposes in other processes. The local anchoring of the evaluation becomes more solid if planners look beyond preferences revealed or stated elsewhere and turn to the stated preferences of lay participants when CBA is applied in open planning processes. Should conflicts emerge, the analysis could, in principle, be carried out with different price tags for different categories of participants, and the effects on the results could be shown.

There has been a long developmental path expanding the ways to impute appraisal coefficients, starting with observed market prices, then elaborately correcting some market prices, and later deducing prices from choice situations similar to markets – all corresponding to revealed consumer preferences. In the 1970s a range of stated preference techniques were worked out, for example, contingent valuation giving willingness-to-pay and willingness-to-accept estimates (Carson, 2011). In the wake of communicative action theory and the theory of deliberative democracy, the idea of inferring people's preferences from deliberation and debate came up in the 1990s (Brown et al., 1995; O'Hara, 1996) and was developed into deliberative monetary valuation around the turn of the century (Gregory and Wellman, 2001; Niemeyer and Spash, 2001; Sagoff, 1998). The move towards communicated price tags was meant to put CBA on firmer ground, and the development was partly a consequence of growing evidence of difficulties with non-deliberative stated preference techniques, to which we now turn.

Analysts can pose questions in different ways depending on their conception of the purpose of the CBA. Respondents can be brought to understand that they shall focus on their own wellbeing when comparing choice alternatives, or they can be encouraged to think as if they were decision-makers in a process of public choice. Depending on the instructions and the phrasing of questions, stated preferences may lean more or less towards those of a consumer or those of a responsible citizen.

In some interview formats, respondents are asked to state the relative importance of items, for instance, environmental effects and driving cost savings. Then the respondents might not accept

the interview format, as CBA treats everything as tradable and measurable in money (Clark et al., 2000). Respondents who disagree with this practice might nevertheless attempt to translate their deviating ethical and political views into monetary units. But their answers are apt to articulate what interviewees think is morally right or proper rather than inform about contributions from the project to their individual wellbeing. Analysts do not always find the resulting preferences useful.

Protest responses to contingent valuation of environment or justice can engender missing answers, zero or infinite registered willingness to pay, or very strange observations as judged from rational choice theory (Price, 2000:188). The planner may treat such preference data as unreasonable outliers, branding the respondents as irrational. Lexicographic preferences follow from absolute values and are associated with ethics based on duties and moral rules (Gelso and Peterson, 2005). With such preferences, one particular impact dealt with in the CBA is seen as overwhelmingly important, while other consequences are insignificant as long as the state of the goal variable associated with the crucial impact is not satisfactory. In stated preference interviews it often happens that the option of protecting the environment is chosen by a significant share of the respondents no matter which attractive attributes the alternative options are supplied with. Judging from the interviews, the environment would be protected at any cost (Spash, 2000). Defining such anomalies as bias has justified ignoring protest behaviour. But some appraisal coefficients in the CBA will be prejudiced if the planners systematically exclude or misinterpret the answers from those who express a willingness to uncompromisingly protect the environment.⁴

The underlying difficulty is that asking people to trade their principles, even hypothetically, is seen as inappropriate and even morally disreputable by some. They are reluctant to choose between an option of instrumental value and a truly moral position (Söderholm, 2001:489). Ultimately, CBA risks developing into an institutional mechanism that systematically pushes the preferences of a significant group to the background; that is, the part of the citizenry believing that rights and deeply felt values should not be traded off (Spash, 2008b).

The above critique notwithstanding, the most devastating objection to the results of contingent valuation and other stated preference interview techniques is that they are not based on a communicative process. Without preceding deliberation, stated preference exercises end up trying to elicit preferences that are not yet established in the minds of the respondents. This theme is pursued in the next section.

4. Procedures for preference formation are required

A comprehensive CBA must, in many cases, contain impacts on environment and human health. Environmental impacts can encompass changes of climate, biodiversity, emission of pollutants, conservation of natural resources, and urban green space, for example. Most people involved in participatory planning processes are unaccustomed to trading off these kinds of impacts against impacts that have a market value; that is, to put a price tag on them. How to balance some more peace and quiet for a herd of wild reindeer against the time lost by restrictions on driving through their grazing land? How much am I willing to pay to cover the increased investment costs of curving the new road around the hill that is known to be a nesting site for an endangered

⁴ The focus here is on critique of stated preference interviews related to the consumer-citizen distinction and the unsatisfactory treatment of wardens of the natural environment, but there are also other sources of bias. Due to interview costs, the sample of respondents is often small, while still assumed to be representative for a region or an entire country. Besides, contingent valuation interviews often contain specific variable values which the respondents have to choose among, such as: Your cost of driving on a short road link is \$2, but you generate noise on the level of 60 dB. Driving on an alternative road costs you \$8 and generates 40 dB. Which road would you choose? The appraisal coefficients calculated will to some extent depend on the values selected by the analyst.

species of owl? Lay people are not prepared to make such trade-offs and express meaningful preferences without going through a process of learning, reflection and exchange of viewpoints with other people. Analytic comprehensiveness and deliberative processes in the evaluation phase of planning are therefore two sides of the same coin.

Preferences emerging from this process of interchange will differ from consumer preferences. Attitudes and opinions that participants hold in advance are likely to be modified by the interaction and deliberation with fellow citizens. Open and inclusive planning processes designed for debate, exchange of information, and consensus building can have this effect (Niemeyer and Spash, 2001). Participants must be prepared to defend their viewpoints and arguments against critique from groups with diverging interests. It is usually assumed in communicative planning and theories of deliberative democracy that ignorance, malevolence, envy, and revengefulness will be less pronounced in the resulting 'laundered' preferences than in the initial cast of mind (Goodin, 1985).

When asked for the amount of money we will contribute to a public good, the answer depends on what others are expected to pay. Uncertainty about this affects the estimated utility of environmental conservation projects as well as man-made public goods. For example, the expressed attractiveness of noise abatement compared to other aspects of a road project depends on the organization of the planning process. Psychological and economic literature on public goods experiments shows that communication between potential contributors tends to increase their willingness to pay (Meier, 2006).

The discussion and deliberation needed to provide the right kind of input to CBA – whether consumer or citizen preferences – should have some specific qualities. The communicative process must not be oppressive; no participant must be forced to take a certain standpoint. Further, participants should not be led to articulate particular preferences on the basis of lies, manipulation, or deficient understanding of the choice situation or the consequences of stating these preferences. These conditions are similar to the conditions for dialogue in communicative planning theory (Sager, 2013:5-7). The analyst may be an information monopolist with considerable opportunity to 'frame' announcements and questions to participants in the planning process. 'Framing' refers to the fact that different ways of presenting the same information often evoke different emotions. Framing effects sometimes cause large changes of preferences to follow from seemingly inconsequential variations in the wording of a choice problem (Kahneman, 2011). 'Given that framing matters and that the survey researcher has the power to frame specific questions that have never been publicly discussed, he can manipulate the outcome through providing "appropriate" subsets of potentially relevant information' (Schlapfer, 2009:1569).

It is surely the case that dialogue and deliberation in planning can be distorted by obscure technical jargon, threats, secrecy and other power games, and – consequently – preferences can also be distorted and deviate from the real interests of the person who holds them (Adler and Posner, 2000). But the solution is not to ignore preferences articulated in planning forums and place all confidence in preferences revealed by market transactions. Firstly, this is usually infeasible, as some environmental items on the list of costs and benefits are not traded in the market. Secondly, preferences revealed by market transactions can also be distorted. There is a huge industry of public relations and marketing aimed at affecting purchasing behaviour and thus preferences, frequently by other means than neutral information. Markets can even be repressive in some cases. Certain groups can be discriminated in the labour market, the housing market, or the money market.

Several deliberation techniques have been proposed, such as focus groups, citizens' juries, consensus conferences, and deliberative polls. They have in common that lay people develop preferences about complex policy issues through informed discussion. Planners should not push hard for consensus in the valuation exercise. Conflicting views on environmental values can give

useful information to decision-makers, and consensus can be repressive, particularly in communities with historically acquiesced supremacy of one group over another.

Several scholars have recently proposed to integrate small-group processes and calculation of appraisal coefficients for non-market impacts in a set of hybrid techniques denoted deliberative monetary valuation (Söderholm, 2001; Spash, 2007; 2008a; Vatn, 2009). Deliberative monetary valuation is the use of formal deliberation concerning social or environmental impacts in order to express their value in monetary terms for policy purposes, more specifically as input to CBA or multi-criteria evaluation. This approach is an interplay of analytic technique and social deliberation based upon values, interests, and policy options.⁵ Participants are exposed to a variety of perspectives and value positions held by others. An empirical comparison of deliberative monetary valuation and contingent valuation confirmed that deliberative technique can address some of the limitations of stated preference interviews, and deliberative monetary valuation was found to reduce the rate of protest responses to less than half (Szabo, 2011).

Preferences are not seen as pre-existing, stable and complete when using deliberative monetary valuation, as is the case in standard CBA. And individuals are not seen as autonomous utility maximizers. Deliberative monetary valuation gives participants the opportunity to take rights, fairness and equity (that is, social values instead of individual utility) into account in the valuation exercise. The method thus gives citizen rather than consumer preferences. The outcome is data on willingness to pay and willingness to accept as stated in a participatory process motivating individuals to think beyond their own wellbeing.

Small-group deliberation faces problems of inclusiveness, representation, competence, and manipulation, so deliberative monetary valuation is no panacea. The deliberative approach can nevertheless answer some of the criticism against contingent valuation: The outcome is not limited by narrow definitions of rationality which result in exclusion of interlocutors' judgments on the suspicion that they are acting strategically, protesting, or just violating the accepted tenets of economic valuation. And even more important, deliberative monetary valuation can solve the problem of neglected preference formation which is haunting preference elicitation by non-deliberative stated preference interviews. Presumably, learning and consciousness-raising throughout the preference formation process tends to increase the stability of preferences.

5. The comprehensiveness dilemma of CBA

Without a deliberative process a comprehensive CBA will not be meaningful, as the analysis is then bound to rest on preferences that are unfounded, unstable and temporary. These characteristics are due to respondents not being given the opportunity to reflect on alternative actions and think through project consequences in company with others before stating their preferences. When a deliberation process accompanies the economic evaluation, elicited preferences can be meaningful, but they will not reflect personal wellbeing or individual utility in the economic sense. The reason is that the communication process of deliberative monetary valuation necessarily brings ethics and politics to bear on the preferences articulated by the participants. People involved in the planning process are unlikely to be wholly self-centred in small-group deliberation with fellow citizens often living in the same area.

Once superiors have decided which role CBA should play in the decision-making process, planners are not logically free to choose whether to use consumer or citizen preferences in the

⁵ Deliberative monetary valuation is already divided into different strands of practice with more or less structured and analytic deliberation. Lo and Spash (2011) offer some critique of deliberative monetary valuation and identify the main lines of development. The strand that Lo and Spash dub 'preference economisation' brings in ethical and political values to a lesser extent than the approach they call 'preference moralisation'. This last strand gives more credence to issues of legitimacy, civic engagement and social learning, and emphasizes interactive aspects.

analysis. A CBA suitable for providing a politically credible ranking of the project alternatives has to be comprehensive, which entails inclusion of impacts that participants in the planning process are initially unable to trade off or put a monetary value on. Comprehensiveness therefore implies a communicative process which can be part of deliberative monetary valuation. Inevitably, the result is a set of appraisal coefficients deduced from *citizen* preferences. Ethical and political considerations are embedded in these preferences, and this leads to a weakening of the welfare economic interpretation of the CBA-results.

Some appraisal coefficients can be calculated from market transactions revealing the preferences of consumers. However, many environmental variables require that analysts go beyond revealed preferences to achieve a comprehensive CBA. I argue that non-deliberative contingent valuation will not suffice either. Deliberation processes are required to avoid the drawbacks of stated preference interviews and arrange for shaping of preferences concerning environmental options that are unfamiliar to participants in the planning process.⁶ From this turn towards communicative planning a dilemma emerges: If analysts stick to calculation, the CBA cannot be comprehensive. If they glean preference information from communication processes in order to expand the CBA, they simultaneously alter the character of the analysis and undermine CBA as a welfare economic tool. This is the comprehensiveness dilemma of CBA, and the insertion of a broad set of environmental entries in the economic evaluation makes the dilemma unavoidable.

There are obvious advantages of deliberative methods for eliciting citizen preferences: The preferences expressed by participants throughout the planning process are more likely to be taken into consideration; they become part of the input handed over to the decision-makers. Moreover, the preferences will be formed, revised and updated in a process of learning and mutual interaction. And the analytic results of CBA become more closely linked to the wishes that participants have as citizens rather than as market actors.

There are disadvantages too, however: The analysts risk to be aggregating ethical and political views rather than individual economic utility. This is because CBA would not remain a purely economic instrument, and it will therefore yield less trustworthy information on changes in the economic welfare of society. CBA would instead invade the sphere in which the democratically elected politicians should exercise their judgment. Finally, it is difficult to compare projects when appraisal coefficients ('prices') are process specific, meaning that they depend on the design of the deliberation process preceding the implementation of plans. The quality of deliberation can be expected to vary between projects.

In order to retain the sound economic logic of CBA, entries into the account must be limited to costs and benefits that are closely enough associated with market-type choices, so that only *consumer* preferences are needed. If, instead, one insists on including in the CBA impacts on society and the environment that cannot be assessed on the basis of market-like choices, *citizen* preferences are necessarily elicited and applied in the analysis. But CBA then changes character from being a summation of changes in individual wellbeing to being partly a summation of monetary expressions of ethical and political viewpoints and attitudes, similar to an aggregate of hypothetical charitable contributions.

⁶ For several important consequences of transport infrastructure there is a choice between calculation and communication when eliciting preferences. This points to an analytic-democratic tension that has also been discussed by others in an evaluation framework (Lo, 2011), and not only in evaluation guided by CBA. A similar discussion about the role of social interactive processes and the best combination of deliberation and analytic technique takes place among scholars using multi-attribute utility theory or other multi-criteria evaluation methods (Burgess et al., 2007; Gregory et al., 2005; McDaniels et al., 2003; Proctor and Drechsler, 2006).

6. Discussion of the dilemma

The treatment of methods for estimating appraisal coefficients is somewhat simplified in previous sections, in order not to divert attention from the main train of thought leading up to the comprehensiveness dilemma. We now return to the ways shadow prices can be deduced, and discuss whether the comprehensiveness dilemma of CBA is likely to hold even if a wider range of approaches is considered. The second part of the discussion is about the choice between a narrow CBA where only consumer preferences are needed, and a more comprehensive CBA where the analyst tries to minimize the influence of ethical and political considerations embedded in citizen preferences.

Appraisal coefficients (shadow prices, weights) can be estimated by a number of methods (Huppel et al., 2012). Preferences can be stated or revealed, in both cases directly or more or less indirectly. Moreover, many hybrid methods exist, that combine deliberative techniques with more calculative approaches (Alvarez-Farizo and Hanley, 2006; Niemeier and Spash, 2001). The relative importance of decision criteria (project consequences) has sometimes been inferred from previous investment choices made by elected politicians (Nijkamp et al., 1990:49-50) or from avoidance costs (Nijland and van Wee, 2008), which are approaches using revealed preferences. This is also the case for the distance-to-target weighting method (Seppälä and Hämäläinen, 2001). Its underlying idea is that the quotient between the reference levels of impact potential and the target level indicates how important a certain impact category is considered to be among the decision-making politicians.

The last method to be mentioned here is choice modelling, which is applied, for example, by Othman et al. (2004). Choice modelling is a family of alternative stated preference formats: choice experiments, contingent ranking, contingent rating and paired comparisons:

“Respondents are presented with various alternative descriptions of a good, differentiated by their attributes and levels, and are asked to rank the various alternatives, to rate them or to choose their most preferred. By including price/cost as one of the attributes of the good, willingness to pay can be indirectly recovered from people’s rankings, ratings or choices” (Hanley et al., 2001:436).

Choice experiments can be seen as a generalization of discrete choice contingent valuation, and the experiments are more flexible in estimating the values of multiple changes in individual attributes that make up a resource. There is little reason to believe that choice experiments perform better than contingent valuation when it comes to important objections to the stated preference approach, such as ‘hypothetical bias’ and sensitivity of estimates to study design. Hanley et al. (2001:451) speculate, however, that choice experiments might reduce the vulnerability to respondents’ ethical protesting.

For a few environmental variables, consumer preferences can be elicited by using parallel markets, for example, estimation of implicit prices for noise from the housing market. However, it is important to note that for the majority of environmental variables lacking parallel markets none of the mentioned methods for recovering appraisal coefficients yield shadow prices that are unaffected by ethical and political values. Both the distance-to-target method and the use of earlier investment decisions obviously bring in political values and do not yield shadow prices based on individual changes in wellbeing. And the choice modelling approach does not eliminate the motives of respondents to state citizen preferences. Thus, the rich flourishing of price-deducing methods has not been found to invalidate the reasoning leading up to the comprehensiveness dilemma.

Consider now the choice between a narrow and a comprehensive CBA. The pragmatic need felt by many decision-makers for economic value estimates and CBA-rankings cannot be ignored. Politicians may find that a comprehensive CBA facilitates the making of the final decision, possibly because it gives more credibility to their own judgment. Planners can then be asked to include a number of non-market impacts valued on the basis of citizen preferences, even if the

theoretical foundation is shaky. In this case, not to impair the logic of the analysis more than they have to, planners can try to design the deliberation process in a way that encourages the interlocutors to behave as consumers to the greatest possible extent. For example, Gregory (2000) reminds each participant in deliberative monetary valuation that value dimensions are of different importance to different people, and that he wants to know what is important to that particular respondent. He uses the analogy of a car purchase to illustrate the idea of rating objectives by their importance, thus leading the respondent to think as a consumer.

It is a problem that the more the planner succeeds in designing the deliberation process so as to yield consumer preferences, the more is lost from the perspective of deliberative democracy. The consumer perspective requires self-centred valuation based on changes in the valuator's own wellbeing. Dialogue and deliberation, on the other hand, bring in other people's desires, needs, anxieties and antipathies, and remind respondents that they are living in a community encouraging members to show mutual regard.

A methodologically less demanding strategy is to keep CBA narrow and without need for anything but consumer preferences. The analysis can then include only impacts that people are familiar with, and that can be valued in market-type choice situations. Participants in the planning process would not be required to give preference-input to the CBA. This does not necessarily mean that their influence on planning and policy choice is weakened, however. Lay participants can still have agenda-setting power, identifying promising project alternatives to be evaluated by CBA and suggesting impacts that need to be considered – whether in or outside the CBA. Besides, they can take part in the discussion of how CBA-results are to inform the decision-making process, and which supplementary input is required for the evaluation.

Planners may not serve community interests best by focusing on inserting participants' preferences into the CBA. Such preferences are used for making CBA complete, and the more complete the CBA, the stronger will be the pressure to give the economic results a prominent place in the decision procedure. Plans for cities invariably show that urban communities pursue other, and equally important, goals besides economic net benefits.

7. Conclusion

It is not obvious that planners should ask for a CBA that covers as many interesting project impacts as possible. There is a comprehensiveness dilemma of CBA instilling modesty when considering inclusion of impacts on climate, biodiversity and other aspects of the environment. The aim to make CBA all-inclusive reflects a wish among decision-makers to accentuate the economic side of collective action. However, 'economism' is not a strategy furthering the legitimacy of planning in communities of value multiplicity where a considerable population segment is regarding environmental protection as a primary goal.

The reason for keeping CBA narrow is not primarily to avoid hurting economists' feelings by corrupting a useful tool for economic analysis. The idea is to ensure that planners' input to decision-making processes is comprehensible, lending itself to clear interpretation, and that it enables politicians to form well-founded judgments about projects' social desirability.

This paper analyses the relationship between analytic technique and communicative planning process. It contributes to planning theory by showing that the potential of formal, analytic techniques processing information for planning and decision-making varies with the participatory characteristics of the planning process; viz that the possibilities of making social CBA comprehensive depend on deliberation.

The argumentation for the comprehensiveness dilemma is based on theory. It is not demonstrated, for example, how much the results of particular CBAs would change if the value of all items strictly reflected consumer preferences. In fact, I am not at all convinced that it is

possible to collect the data suited for such practical demonstration. Moreover, there is no solution to the dilemma, and therefore no way out is suggested. The analysis (CBA) is either incomplete, or it lacks a clear interpretation because of cost and benefit estimates reflecting ethical and political values.

Given that the trend towards comprehensive CBAs continues, the challenge to academia and practice alike is to design experiments for eliciting *consumer* preferences for an expanding set of environmental, health, and safety impacts. Furthermore, it is a challenge to quantify the consequences for monetary valuation of changing from estimation based on citizen preferences to estimation based on consumer preferences. A different but equally important challenge is to convince politicians that they can do without CBAs that include ever more environmental value estimates that lack clear interpretation.

Acknowledgements

Thanks for reading and commenting on the manuscript are due to James Odeck at the Norwegian Public Roads Administration and NTNU, Gro Holst Volden at the Concept research program at NTNU, and Morten Welde at the Norwegian Public Roads Administration.

References

- Adler, M.D. and E.A. Posner (2000). Implementing cost-benefit analysis when preferences are distorted, *Journal of Legal Studies*, 29(2), 1105-47.
- Alvarez-Farizo, B. and N. Hanley (2006). Improving the process of valuing non-market benefits: combining citizens' juries with choice modelling, *Land Economics*, 82(3), 465-78.
- Beria, P., M. Giove and M. Miele (2012). A comparative analysis of assessment approaches. Six cases from Europe, *International Journal of Transport Economics*, 39(2), 185-217.
- Beukers, E., L. Bertolini and M. Te Brömmelstroet (2012). Why cost benefit analysis is perceived as a problematic tool for assessment of transport plans: a process perspective, *Transportation Research Part A*, 46(1), 68-78.
- Brown, T.C., G.L. Peterson and B.E. Tonn (1995). The values jury to aid natural-resources decisions, *Land Economics*, 71(2), 250-60.
- Burgess, J., A. Stirling, J. Clark, G. Davies, M. Eames, K. Staley and S. Williamson (2007). Deliberative mapping: a novel analytic-deliberative methodology to support contested science-policy decisions, *Public Understanding of Science*, 16(3), 299-322.
- Carson, R.T. (2011). *Contingent Valuation. A Comprehensive Bibliography and History*. Cheltenham: Edward Elgar.
- Clark, J., J. Burgess and C.M. Harrison (2000). "I struggled with this money business": respondents' perspectives on contingent valuation, *Ecological Economics*, 33(1), 45-62.
- Damart, S. and B. Roy (2009). The uses of cost-benefit analysis in public transportation decision-making in France, *Transport Policy*, 16(4), 200-12.
- De Jong, M. (2001). The impact of institutional structures on transport infrastructure performance. A cross-national comparison on various indicators, *European Journal of Transport and Infrastructure Research*, 1(2), 169-96.
- De Jong, M. and H. Geerlings (2003). Exposing weaknesses in interactive planning: the remarkable return of comprehensive policy analysis in The Netherlands, *Impact Assessment and Project Appraisal*, 21(4), 281-91.

Dietz, T., P.C. Stern and A. Dan (2009). How deliberation affects stated willingness to pay for mitigation of carbon dioxide emissions: and experiment, *Land Economics*, 85(2), 329-47.

Eliasson, J. and M. Lundberg (2012). Do cost-benefit analyses influence transport investment decisions? Experiences from the Swedish transport investment plan 2010-21, *Transport Reviews*, 32(1), 29-48.

Esteban, M., Q. Zhang and G. Longarte-Galnares (2012). Cost-benefit analysis of a green electricity system in Japan considering the indirect economic impacts of tropical cyclones, *Energy Policy*, 43, 49-57.

Fu, B.-J., C.-H. Su, Y.-P. Wei, I.R. Willett, Y.-H. Lü and G.-H. Liu (2011). Double counting in ecosystem services valuation: causes and countermeasures, *Ecological Research*, 26(1), 1-14.

Gelso, B.R. and J.M. Peterson (2005). The influence of ethical attitudes on the demand for environmental recreation: incorporating lexicographic preferences, *Ecological Economics*, 53(1), 35-45.

Goodin, R. (1985). Laundering preferences. in J. Elster and A. Hylland (Eds): *Foundations of Social Choice Theory*. New York. Cambridge University Press.

Grant-Muller, S.M., P. Mackie, J. Nellthorp and A. Pearman (2001). Economic appraisal of European transport projects: the state-of-the-art revisited, *Transport Reviews*, 21(2), 237-61.

Gregory, R.S. (2000). Valuing environmental policy options: a case study comparison of multiattribute and contingent valuation survey methods, *Land Economics*, 76(2), 151-73.

Gregory, R.S., B. Fischhoff and T. McDaniels (2005). Acceptable inputs: using decision analysis to guide public policy deliberations, *Decision Analysis*, 2(1), 4-16.

Gregory, R.S. and K. Wellman (2001). Bringing stakeholder values into environmental policy choices: a community-based estuary case study, *Ecological Economics*, 39(1), 37-52.

Gühnemann, A., J.J. Laird and A.D. Pearman (2012). Combining cost-benefit and multi-criteria analysis to prioritise a national road infrastructure programme, *Transport Policy*, 23(1), 15-24.

Hanley, N., S. Mourato and R.E. Wright (2001). Choice modelling approaches: a superior alternative for environmental valuation?, *Journal of Economic Surveys*, 15(3), 435-62.

Huppel, G., L. van Oers, U. Pretato and D.W. Pennington (2012). Weighting environmental effects: analytic survey with operational evaluation methods and a meta-method, *International Journal of Life Cycle Assessment*, 17(7), 876-91.

Johansson, P.O. (1992). Altruism in cost-benefit analysis, *Environmental and Resource Economics*, 2(6), 605-13.

Kahneman, D. (2011). *Thinking, Fast and Slow*. New York: Penguin.

Lee, D.B.Jr. (2000). Methods for evaluation of transportation projects in the USA, *Transport Policy*, 7(1), 41-50.

Lo, A.Y. (2011). Analysis and democracy: the antecedents of the deliberative approach of ecosystems valuation, *Environment and Planning C: Government and Policy*, 29(6), 958-74.

Lo, A.Y. and C.L. Spash (2011). Articulation of plural values in deliberative monetary valuation: beyond preference economisation and moralisation, Munich Personal RePEc Archive, MPRA paper 30002, <http://mpra.ub.uni-muenchen.de/30002/1/MPRA_paper_30002.pdf> Accessed 03.08.2012.

Mackie, P. and J. Preston (1998). Twenty-one sources of error and bias in transport project appraisal, *Transport Policy*, 5(1), 1-7.

Mandell, S. (2011). Carbon emission values in cost benefit analyses, *Transport Policy*, 18(6), 888-92.

McDaniels, T.L., R.S. Gregory, J. Arvai and R. Chuenpagde (2003). Decision structuring to alleviate embedding in environmental valuation, *Ecological Economics*, 46(1), 33-46.

Meier, S. (2006). *The Economics of Non-selfish Behaviour. Decisions to Contribute Money to Public Goods*. Cheltenham: Edward Elgar.

Næss, P. (2006). Cost-benefit analyses of transportation investments: neither critical nor realistic, *Journal of Critical Realism*, 5(1), 32-60.

Niemeyer, S. and C.L. Spash (2001). Environmental valuation analysis, public deliberation, and their pragmatic syntheses: a critical appraisal, *Environment and Planning C: Government and Policy*, 19(4), 567-85.

Nijkamp, P., P. Rietveld and H. Voogd (1990). *Multicriteria Evaluation in Physical Planning*. Amsterdam: North-Holland.

Nijland, H. and B. van Wee (2008). Noise valuation in ex-ante evaluations of major road and railroad projects, *European Journal of Transport and Infrastructure Research*, 8(3), 216-26.

Nyborg, K. (2012). *The Ethics and Politics of Environmental Cost-benefit Analysis*. London: Routledge.

Odeck, J. (2010). What determines decision-makers' preferences for road investments? Evidence from the Norwegian road sector, *Transport Reviews*, 30(4), 473-94.

O'Hara, S.U. (1996). Discursive ethics in ecosystems valuation and environmental policy, *Ecological Economics*, 16(2), 95-107.

Orr, S.W. (2007). Values, preferences, and the citizen-consumer distinction in cost-benefit analysis, *Politics, Philosophy and Economics*, 6(1), 107-30.

Othman, J., J. Bennett and R. Blamey (2004). Environmental values and resource management options: a choice modelling experience in Malaysia, *Environment and Development Economics*, 9(6), 803-24.

Price, C. (2000). Valuation of unpriced products: contingent valuation, cost-benefit analysis and participatory democracy, *Land Use Policy*, 17(3), 187-96.

Proctor, W. and M. Drechsler (2006). Deliberative multicriteria evaluation, *Environment and Planning C: Government and Policy*, 24(2), 169-90.

Rabl, A. and A. de Nazelle (2012). Benefits of shift from car to active transport, *Transport Policy*, 19(1), 121-31.

Sager, T. (2013). *Reviving Critical Planning Theory*. London: Routledge.

Sager, T. and I.-A. Ravlum (2005). The political relevance of planners' analysis: the case of a parliamentary standing committee, *Planning Theory*, 4(1), 33-65.

Sager, T. and C.H. Sørensen (2011). Planning and political steering with new public management, *European Planning Studies*, 19(2), 217-41.

Sagoff, M. (1988). *The Economy of the Earth*. Cambridge: Cambridge University Press.

Sagoff, M. (1998). Aggregation and deliberation in valuing environmental public goods: a look beyond contingent pricing, *Ecological Economics*, 24(2-3), 213-30.

Sælensminde, K. (2004). Cost-benefit analyses of walking and cycling track networks taking into account insecurity, health effects and external costs of motorized traffic, *Transportation Research A: Policy and Practice*, 38(8), 593-606.

Schlapfer, F. (2009). Contingent valuation: confusions, problems, and solutions, *Ecological Economics*, 68(6), 1569-71.

Seppälä, J. and R.P. Hämmäläinen (2001). On the meaning of the distance-to-target weighting method and normalisation in life cycle impact assessment, *International Journal of Life Cycle Assessment*, 6(4), 211-18.

Söderholm, P. (2001). The deliberative approach in environmental valuation, *Journal of Economic Issues*, 35(2), 487-95.

Spash, C.L. (2000). Multiple value expression in contingent valuation: economics and ethics, *Environmental Science and Technology*, 34(8), 1433-38.

Spash, C.L. (2007). Deliberative monetary valuation (DMV): issues in combining economic and political processes to value environmental change, *Ecological Economics*, 63(4), 690-99.

Spash, C.L. (2008a). Deliberative monetary valuation and the evidence for a new value theory, *Land Economics*, 84(3), 469-88.

Spash, C.L. (2008b). Contingent valuation design and data treatment: if you can't shoot the messenger, change the message, *Environment and Planning C: Government and Policy*, 26(1), 34-53.

Szabo, Z. (2011). Reducing protest responses by deliberative monetary valuation: improving the validity of biodiversity valuation, *Ecological Economics*, 72(1), 37-44.

Van Wee, B. (2011). *Transport and Ethics. Ethics and the Evaluation of Transport Policies and Projects*. Cheltenham: Edward Elgar.

Vatn, A. (2009). An institutional analysis of methods for environmental appraisal, *Ecological Economics*, 68(8-9), 2207-15.