DISCUSS: A methodology to support public participation in cost-benefit analysis

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Abstract
Despite many controversies, cost-benefit analysis (CBA) still been used in many countries as a tool in policy decision processes. More recently, public participation in these CBA processes has become an important issue for governments. However, CBA by itself does not provide a good environment for public participation. The major reasons for this are the lack of spatial disaggregation in CBA results; the lack of community understanding of the economic methodologies used to generate these results and the uncertainty included in the technical models used during the process. A methodology based on geographic information system (GIS) is presented here to facilitate greater public participation in CBA. The process generates maps that represent the individual stakeholder perceptions and identification of areas where disagreements occur. This electronic governance tool, called DISCUSS (Decision Information System for Community Understanding of Spatial Scenarios), is intended for situations where the government desires to encourage public participation in a decision process after the results from the CBA have been achieved. The main objective of the tool is to help the communities and the government in identifying the geographic areas that might require more attention during the discussion of the proposed scenarios for the policy. DISCUSS and the maps that it produces are being tested in a public participation case study with long-term impacts over a large area of south-eastern Australia.

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Introduction
Despite many controversies, CBA is still a common methodology for evaluating available policy or project options and for selecting the best decision for society. Posner (2001) demonstrated, using a search in the Westlaw in the Federal Register database, a continuous increase since 1980 in the total number of CBA reported to the Federal Register in the United States of America. Moreover, the popularity of CBA has spread in some cases from central governments to states (Hahn, 2000), proving that the controversy surrounding its validity has not affected its popularity at different government’s levels.

In this paper we explore CBA and its limitations when exposed to a public participation process. It is not our intention to encourage the use of CBA in decision-making situations. However, CBA still a common tool used by government despite its limitations in many aspects such as public participation. Consequently, we have developed an electronic governance tool called DISCUSS (Decision Information System for Community Understanding of Spatial Scenarios) and associated methodology in order to approach some of the difficulties of CBA when is exposed to public interaction.

After an analysis of the limitations of CBA in terms of public participation, we present in this paper a description of DISCUSS and its associated methodology. Then we examine our results in the case study, Lake Mokoan, where DISCUSS was used to interpret the public submissions made after the CBA results were achieved. Finally, we present our discussion about the system and the experience with DISCUSS in the case study. Alternatives for future work with the system and in the public participation area are also proposed.
Cost-benefit analysis obstacles to public participation

Introduction

In 1992 when 178 nations met in Rio de Janeiro to participate in the Conference on Environment and Development (UNCED), the necessity of public participation in all the government process was clearly identified. During this meeting the multinational plan of action *Agenda 21* was signed, giving special consideration to community involvement in governance (UN, 2003 p. 30). Since then, governments around the world have recognized the importance of public participation not only to satisfy the requirements of Agenda 21, but also to ensure the success of the policy option selected (Ball, 2002) and, therefore, to achieve a better support for the decision made in the long term.

Public participation is of especial interest in cases where implementation issues are expected. For these situations, increasing the range of consultation may emphasize problems that are otherwise not clear (Weale and Academy, 2002 p. 94). Community knowledge becomes an important asset that could reduce the risk of failure of the policy execution and even prevent the development of decisions that could be problematic.

At the same time as the need for public participation was recognised, governments have been continuously using cost-benefit analysis (CBA) as an important tool to evaluate projects and policies. This method has been tested in many situations and regions around the world. It is a current option for decision-makers and is encouraged for environmental policies in some countries (OMB, 1981, OMB, 1996). However, important difficulties have been identified when cost-benefit analysis is used in public participation processes (Paez et al., 2003). If this is the case, why are governments still using cost-benefit analysis (CBA) as the preferred methodology to evaluate alternatives?
To try to answer this question we present next an analysis of CBA methodology. In this analysis we explore the advantages of CBA in terms of facilitating decision-making and the limitations that it has when governments desire comments from the community.

**Cost-Benefit Analysis (CBA) results for decision-making**

If we assume a linear decision process, after a government proposes a new policy, the next step is to generate the different alternatives to achieve the goals. In many cases, these alternatives are projects that modify or construct public infrastructure.

Having identified the alternatives, the next action is their evaluation. For this purpose, one economic alternative is cost-benefit Analysis (CBA). Numerous books and articles have complete definitions of CBA methodology (Dorfman, 1997, Fuguitt and Wilcox, 1999). In the following lines we present a short description of CBA as a four steps process in a similar way to that suggested by Farrow and Toman (1999).

The first step is to define a baseline for the situation in which there is no change (a scenario where the policy is not applied). This provides an overview of the current situation and the implications if the policy is not implemented. For example, if we consider a transport project, where the main objective of the policy is to generate better travel time for the population, the baseline will be a scenario where no new project or action is implemented and therefore existing travel times and mobility patterns are maintained. CBA requires calculation of this baseline as a reference point to compare the real benefits of the alternatives proposed.

The next step in the CBA is to identify the different alternatives for the policy. Taking the same case, the alternatives for the transport policy could be the construction of a new massive transport system or modifications in the current infrastructure. After identifying the possible alternatives, it is necessary to describe them in a technical and economical way. The main objective at this
stage is to have a complete description of the benefits and costs for the baseline and for each of the options. To achieve this would include, in most cases, an economic, environmental and social evaluation of the costs and benefits of each alternative. These evaluations take place by the utilization of technical models and expert knowledge that predict the future effects in all the areas. The entire second step in CBA, in most practical situations, involves multidisciplinary skills.

With a complete picture of the alternatives for the policy, the third step is to identify the differences over time between the policy scenarios and the baseline scenario. This requires identification of the benefits and costs of the policy options. Returning to the transport case, the benefits will be the difference in travel times, a reduction in contamination, better mobility, etc. between the policy alternatives and the baseline scenario where nothing is done.

The fourth and final step is to assign to those benefits and costs a monetary value. Some benefits and costs may be estimated in monetary terms (e.g. the construction cost of a road or the incomes from a toll) from the beginning. However, some costs and benefits for the society may not normally be reckoned in monetary units (e.g. the changes in noise levels for residents near the road). Therefore, it is necessary to monetise them. To do this, multiple technical methodologies are used. These provide an estimation of the effect in terms of financial benefits or costs (e.g. changes in real-estate values because of the road noise). Finally, with these results, an aggregation of the effects over time is done.

In some cases, and in order to improve the reliability of CBAs, further sensitivity analyses are developed to determine how robust the results in the model are, as well as qualitative information on non-monetised benefits and costs (Farrow and Toman, 1999).

The main outcomes of a CBA for decision-making are indicators. These indicators - called the net present value (NVP) and the internal rate of return
IRR - are numbers and percentages that represent the net benefits that the community will receive if the alternative for the policy is implemented. They represent a picture of the amount (or monetary value) of the benefits of a policy alternative for the society. This amount is calculated for a fixed period of time, which in most cases is 20 years.

A hypothetical result from a cost benefit analysis of the transport policy example (which is a policy evaluation process with two options) will be for option 1 a NPV of $4.3 million and for option 2 a NPV of -$1.2 Million. This means that if option 1 is implemented, it will generate to the society $4.3 million in benefits. If option 2 is implemented the society will lose (negative value) 1.2 million. Therefore, for this case, the CBA will recommend to decision-makers to execute option 1 because its implementation generates benefits to the society when it is compared against option 2.

Although it might appear a clear methodology, in reality CBA has some difficulties when is presented to stakeholders for public comments.

**Barriers to public participation**

In order to encourage better support for their decision, governments are increasingly promoting more public participation in the decision process. Public participation could occur in multiple phases of the decision process. Communities and stakeholders could propose different alternatives during planning activities or they could help estimating the positive and negative effects of the options or scenarios proposed. In this paper we concentrate on the public participation that occurs after the results from the CBA are achieved. We have decided to focus on this period of the decision process because of the controversy surrounding CBA. We consider that most of the disagreement in a decision process is after the options (or possible scenarios) are economically evaluated. Therefore, assistant with the relation between governments and stakeholders with the CBA results could lead to a better involvement of the community in the final decision. However, as we explore at
the end of the paper, depending on the decision process and methodology used, DISCUSS could be used in other phases.

A common practice in public participation after CBA results is to open for discussion the final report produced by the technical advisors and allow public participation by submissions of comments. These comments are then summarized. Some difficulties are apparent when decision-makers are searching for public involvement with the CBA results. These justify the development of a new approach (DISCUSS).

The most important problem, in terms of public participation, is the fact that few CBA results present a spatial representation of the benefits and costs. The indicators alone produced in a CBA do not show who is going to be affected or where the positive or negative impacts may occur. This is a very important issue in CBA for governments. An important example is the USA Executive Order 12866 (OMB, 1996). This presidential document requires economists not only to present an evaluation of the amount of benefits and costs, but also spatial references to these effects. Despite the demand by decision-makers for spatial disaggregation, in current practice this is a highly complex process which requires considerable effort (Morgenstern, 1997).

The justification behind CBA for generating a number (the NPV indicator for decision-making) that represents the entire region of influence with one numerical result is the fact that CBA uses Kaldor-Hicks theory, which assumes that all the entities in the analysis should be considered equal when distributing benefits and costs (Farrow, 1998). This means that CBA assumes that all the entities (affected people, regions or ecosystems) in the analysis are equal and, therefore, losses that occur to some in the analysis are compensated with gains in others.

If it assumed that stakeholders are located in different regions, the Kaldor-Hicks theory does not facilitate public participation. Concern among stakeholders that a specific option affected their interested region might generate opposition.
Another problem related to public participation in CBA is the reliability of the technical models (environmental and social) used to predict the different effect of the policy alternatives. Cortner (2000) argues that there is no truly objective science. While many may argue with this, subjectivity is clearly a factor when complex environmental and social interactions are involved. Farrow (1998) indicates the difficulty in estimating benefits from improvements in environmental quality because value of benefits must be inferred from indirect evidence. This is crucial because, among other factors, the credibility of the CBA depends on the rigor of these estimations (Nigro, 1984).

In consequence, when the stakeholders have to comment about the results of CBA, the primary instrument for opposing an alternative that they believe might impact their area of interest is the questioning of the technical modelling made to generate the predictions and economic estimations of effects used to calculate the benefits of each scenario.

If we consider that scientific veracity might not be guaranteed, and at the same time we have a scenario where humans residents are present, consensus could only be obtained by public participation that links the communities with the environment or infrastructure changes in question (Ball, 2002). To achieve this and to allow stakeholders another option apart from questioning the technical procedures, the proposed methodology and related tools allow each stakeholder to express a personal opinion about the spatial effects of the different options. DISCUSS, which does not produce a technical result, uses a graphical interface in such way that perceptions of spatial effects can be expressed.

In conclusion, in many cases of public participation in CBA, the stakeholders have to interact with technical models that they might not understand and with economic methodologies that produce results which are difficult to comprehend. These difficulties tend to focus discussion on the methods and procedures used during the CBA and not on the alternatives proposed, creating a difficult environment for consensus building and, consequently,
undermining the principle that participation process should avoid unnecessary confrontation (Weale and Academy, 2002 p. 40).

3 DISCUSS: Decision Information System for Community Understanding of Spatial Scenarios

Lenk (in Loader and Hague, 1999 p. 87) found that the main characteristic of a system capable of supporting participation in decision processes is normally a combination of several technologies that are joined together in different forms. DISCUSS is no exception. It is a geographic information system (GIS) based methodology linked to database management science and human-computer interaction technology. The main objective is to promote better public participation in the CBA process by providing a simple approach to modelling spatial disaggregation. We believe the application of this software, after the CBA results have been achieved, aids the interaction between communities and governments; and at the same time helps decision-makers to identify the areas where disagreement between stakeholders exists. This facilitates the decision process enabling more people (with different backgrounds) to understand the economic analysis and, therefore, participate actively in the discussion of alternatives.

DISCUSS has been based on a GIS because this technology allows integration of different datasets according to geographic positions. For example, if we have a map of polygons¹ that represents the political boundaries of a region and we also have another map that contains all the schools available for the same regions, with GIS it is possible to generate a new complete map with the density of school per local government area. In the same way that this school density map was produced by using two different datasets, DISCUSS can integrate different effects for an option, using the spatial location.

¹ For this paper polygon is defined as a closed plane figure bounded by straight lines (Merriam-Webster-Dictionary 2004 in http://www.m-w.com/ 25/05/2004 )
Suppose we have an option A for a policy that according to the CBA results has a total benefit of $90 and total costs of $43 in monetary value. For this option the net benefit for the society is positive $47 ($90 – $43). Figure 1a is the map representation of the benefits for option A in a policy decision. This is called a raster map because the bi-dimensional space has been modelled using a grid. In this case the number in each cell represents possible benefit that will be generated if option A is implemented (this is according to the stakeholders in DISCUSS). Figure 1b is another raster map; however it represents the spatial disaggregation of costs for option A.

Figure 1a is a spatial disaggregation of benefits for option A. This means that the total benefit for option A ($90) is equal to adding all the values in the cells. In the same form, adding all the cells in Figure 1b is equal to the total calculated costs for option A. The values in Figure 1b are negative to represent a cost or negative revenue for the society.

Using DISCUSS and its GIS tools, it is possible to generate a new raster map (Figure 1c) where the two maps representing benefits and costs are combined. This map is a representation of the net benefit that option A will have for the society. The sum of all the cells in this result is equal to the net
benefit for the society ($47). Although the final net result is positive for the society, some areas have a net positive value while in other the net result is negative.

Thus, presenting these spatial disaggregations to the stakeholders, along with the CBA results, could potentially minimize the doubts about the spatial effects and provides a voice to the community.

When designing DISCUSS our initial thought was to create a tool capable of disaggregating, in a technical form, all the results from a CBA. This means to develop scientific methodologies to identify the areas receiving the benefits and costs for each policy alternative or option. However, after analysing the decision process, in which facts are seldom known completely and merged with opinions or scenarios, we preferred a tool that allows the input of stakeholders’ opinions of spatial costs and benefits in a way that identified areas of greater disagreement between stakeholders. Ideally, the system should provide for spatial disaggregation on the basis of scientific or social models (where available) and the softer disaggregation of expert and stakeholder opinions.

The focus of DISCUSS is, therefore, a system that allows users to spatially interact with the CBA results presented, generating in this process a sense of ownership of the policy and its alternatives. DISCUSS is been created using Visual Basic for Applications (VBA) and operates under ArcMap, which is GIS software produced by ESRI.

DISCUSS can be defined as a DSS if the definition of (Pereira and Quintana, 2002) is adopted. They describe DSS as a context and platform for helping all those involved in decision-making to access the policy information needed for a useful debate to take place. An example of DSS with a similar approach is GOUVERNe, created for groundwater governance issues (Quintana et al., 2002). Consequently, we regard DISCUSS as a DSS, which incorporates
elements for revaluation within the planning process and, in some modules, operates as an expert system\(^2\).

DISCUSS can be used in different ways in accordance to the decision process. It can be applied as direct tool for interacting with the stakeholder in a workshop environment or can be used as a tool for the decision makers to organize, visualize and analyse the input from the community.

We have identified three stages of application: input CBA results, disaggregation of effects and assembling of opinions and generation of new analysis for decision making.

**Stage 1: Input CBA into DISCUSS**

The main purpose of a CBA is to distinguish different options for a policy. In consequence, the first step using DISCUSS is entering the results from the CBA for each option.

In addition to the CBA results, technical information about the spatial representation of effects could be added in step one of the methodology. This means, for example, that if an environmental model was used during the CBA to calculate a certain effect and this model can produce a map representation of the areas impacted (in a positive and negative form), this layer can be added to the analysis.

**Stage 2: Disaggregation of effects**

Having all the scenarios and their effects (costs and benefits) in DISCUSS, the next stage is to spatially disaggregate the effects. This means, to assign to each cost and benefit an area in the space where it is considered that impact will occur. This process is done individually for each stakeholder – or

\(^2\) A definition of experts systems could be found in Jun, C. 2000,'Design of an intelligent Geographic Information System for Multi-criteria Site Analysis,' *URISA Journal*, vol. Vol. 12, no. No.3, pp. 5 - 17.
user of our system—and can be done in a workshop environment or by an interpreter of written submissions from the stakeholders.

The concept underlining is to get the perception of the stakeholder about the scenario and its spatial impacts. In consequence, in stage two every scenario and effect is manipulated individually for each stakeholder. To do this, DISCUSS opens individual files for each stakeholder. The process could be done for all the stakeholders at the same time if several computers are connected by a network.

During stage 2, DISCUSS provide three methods to disaggregate each of the benefits and costs in the following order: Technical disaggregation, disaggregation to geographic entities and Fuzzy disaggregation.

In the technical disaggregation method the stakeholder accepts, modifies or rejects the technical disaggregation made during the CBA methodology. If the stakeholder accepts the technical representation, this is automatically assigned for that particular effect and the stakeholder can move to the next effect in the scenario. If he or she desires to modify the technical results, the system converts this technical result from the model into a polygon map. This map created constitutes a start point for using the “Fuzzy Disaggregation method” that we will explain later in this paper.

If the stakeholder does not accept this technical representation at all, DISCUSS allows the stakeholder to move to the next method “Disaggregation to geographic entities”.

The assumption for using the second method (Disaggregation to geographic entities) is the fact that stakeholders consider that some geographic entities, such as Local Government Areas, Census Collection District or electoral boundaries, could represent better the regions that will be affected. In this case, for each benefit and cost users are allow to assign the benefit to one or many polygons.
To use this method, users select one or many polygons in a map and assign them a monetary value - which represents the effect that the selected polygon is receiving.

If the previous method is not accepted for some effects, the third and final alternative for stakeholders to spatially distribute effects is by a method that incorporates fuzzy logic. Our desire with this method is to allow users to make a fuzzy input to the system and get a crisp mapping as a result.

In this method stakeholders have more flexibility to disaggregate effects than in “disaggregation to geographic entities” because they are not restricted to polygons already created. With this method stakeholders create their own areas of influence.

To apply this method to a specific impact, the user has to draw over a map (which represents the area of influence of the scenario proposed) polygons which correspond to the different levels of impact. The user has to draw at least two set of polygons. One set should represent those areas which are considered to have the highest level of impact. The other set should represent areas which are definitely considered to have no impact.

With this input from the stakeholder, the third method assign level of impact to those areas where the user was not certain about the level of impact using the generation of fuzzy numbers.

**Stage 3: Assembling concepts**

Following the disaggregation of the different effects (benefits and costs) for all the different scenarios proposed for the policy or project, the third stage in DISCUSS is to join all these inputs from the stakeholder.

To assemble this map with different impacts, DISCUSS calculates different options for agreement and disagreement between stakeholders. For example DISCUSS can calculate the standard deviation or the maximum differences
between cells from the inputs from stakeholders. This makes it possible to see
the areas where greater differences between stakeholders occur.

DISCUSS can also present a map for each stakeholder for an individual
scenario, producing a spatial representation of the indicators for decision-
making. Individual results from stakeholders can be combined to produce a
consolidated map.

With these aggregations, DISCUSS presents to the decision makers and the
stakeholders an overview of the different perceptions about the project
options.

**CASE STUDY: Lake Mokoan**
In the state of Victoria - Australia, the water industry is in a mature phase
where resources are largely developed and committed to existing users
(SKM, 2000). Therefore, when the Victorian government decided to analyse a
policy for achieving significant water saving in the northern part of the system,
the need arose for detailed analyses of different alternatives. Each possible
option would impact positively on some regions and negatively on others. This
made it an ideal case study for us because any alternative to save water in
the system involved different perceptions of effects from a wide variety of
stakeholders.

The government decided to contract a consultant company to analyse the
different alternative for saving water in the State of Victoria. The firm Sinclair
Knight Merz (SKM) was contracted and conducted preliminary studies for
evaluating alternative water saving policies. In these preliminary studies, main
options for saving water were determined. Changes to Lake Mokoan
produced the largest net water saving (SKM, 2002). Among others, returning
Lake Mokoan back to a swamp and reducing its capacity were identified as
key options to achieve water saving in the system.
With these results, the Victorian government decided to contract a more detailed study to analyse the possibilities for Lake Mokoan. The final results of this study included a detailed analysis of the possibilities for Lake Mokoan and a cost-benefit analysis for all the possible alternatives for the lake. Using common practice, the government published the final results of the study and established a certain period for public submissions of comments about the results of the study. These results were then processed to produce a table containing four columns: the description of the issue, the comment from the consultant firm, the number of submission mentioning this issue and a reference to the final report where the issue was address.

In this paper we present the initial results using DISCUSS with the Lake Mokoan options. We used the capacity of DISCUSS in this initial phase to transform the table (or summary) of submissions into maps that represents the different perception of spatial impacts. Currently we are developing the second phase that will interact directly with the Lake Mokoan stakeholders and develop the methodology in a workshop environment. In this second phase we are planning to develop an electronic meeting room with similar characteristics to the one existing in the University of Arizona (Loader and Hague, 1999 p. 92).

From this process of disaggregating the submissions from stakeholders we found:

- An important number of submissions did not have a clear spatial component. The government received 55 submissions and we identify 23 submissions without spatial (map) references to their comments. The community where expressing their agreement or disagreement to the option without mentioning a specific area which was considered affected. These submissions were not possible to treat with DISCUSS but it is expected that the second phase of the case study will cover them.

- Another difficulty was that some submissions did have a spatial component, but they were not related to a specific scenario studied in
the CBA. For these cases individual results were generated, but aggregation between stakeholders was not possible.

- On the other hand, 26 submissions permitted a clear interpretation of the scenario considered and the area affected. With these community submissions it was possible to generate a map with the areas where more disagreement between stakeholders exists. Among this, four areas shown not only disagreement between stakeholders, but between the perception of the technical advisors and the community.

- “Changes in land value” is an example of an effect where disagreement between the technical advisors and stakeholders exists. This effect is included on the CBA of the option 1 “removing lake Mokoan of the System”. Figure 2 shows a map of the perception of the stakeholders. In the same way, Figure 3 is the interpretation of the technical advisors’ estimation.

Figure 2
Perception of the stakeholders for the impact in land values if option 1 is implemented
Areas with land value negative impact
Areas without land value negative impact

Figure 3
Perception of the technical advisors of the impact in land values if option 1 is implemented

Figure 4
Areas of agreement and disagreement between the stakeholders and the technical advisors in terms of impact in the land values if option 1 is implemented
Figure 4 represents the areas of agreement and disagreement between the stakeholders and the technical advisors. This map was created with DISCUSS and it is an example of the output of the system. It is expected that this type of results helps decision-makers to focus their interest and effort of negotiation in the areas where more discrepancy exists.

**Discussion**

An important number of the attention in the Lake Mokoan submissions was not focused on any particular option, making it difficult to identify areas where more discordance exists. In the second phase of the case study we will work directly with the stakeholders. This will allow us to develop a more appropriate participation process, concentrate the discussion on the scenarios and help the Victorian Government and the community involve identify the “hot spots” where more attention or discussion is required.

As a result of our initial work with the Lake Mokoan case study we also found that it is important to input the information from the stakeholders into DISCUSS with the correct spatial characteristics. For this, it is especially significant to support stakeholders in including spatial references to their comments, so most of the analysis features included in DISCUSS can be used.

However, the solution is not to encourage and admit only spatial inputs. The restriction of public submissions to only a map form could constitute a disadvantage to those stakeholders who are not comfortable representing their opinions with spatial references. This could be seen as a limitation to an open and democratic public participation process. Consequently, we propose that the input from the community – or stakeholders - be enhanced by allowing spatial (map) submissions, as well as traditional written comments about the proposed policy.
We have adopted the concept, proposed by (Quintana et al., 2002) that a DSS should help decision processes by promoting a better environment for discussion. We also agree with (Weale and Academy, 2002 p. 40) in terms of considering that an effective consultation and participation process will avoid unnecessary confrontation. We believe that governments should not try to find a perfect technical solution for every stakeholder. This is unrealistic. We propose a methodology for public participation in which the main outcome is the identification of the issues that divide the opinions of stakeholders.

DISCUSS is a tool that can represent these differences in a map form enhancing the participation process. In this context, our initial results with Lake Mokoan exposed to the decision-makers the factors and areas that are causing rejection from the community to the project. The next step in the process will be to concentrate the discussion on this areas and effects.

We see the potential of DISCUSS in allowing a clustering of stakeholders depending on their positions. This could complement even more the discussion process by allowing a better identification of groups with similar perceptions. Some testing of clustering techniques will be included in the second phase of the case study.

O’Looney (2002 p. 21) also argues that electronic governance is importance because governments still gain tremendous economies from using computers to automate such tasks as processing bills, ordering goods and services, etc. We consider that electronic governance can not only optimize monetary resources for the government, but also help to generate better decisions by implementing more accessible participation process. This public knowledge included in the system could potentially complement and improve the technical quality of decisions (Weale and Academy, 2002 p. 41).

Although the format of community participation is also frequently specified in the government’s administrative procedures laws (Weale and Academy, 2002 p. 139), electronic governance tools can be adapted in such way that these laws are respected and at the same time a better public participation is
achieved. Our case study, Lake Mokoan, where tool was implemented without affecting any standard procedures, proved how this could be achieved.

Due to its flexibility representing opinions, we consider that DISCUSS is not restricted to CBA and can be used in other related financial-economic evaluation methods such as cost-effectiveness. Moreover, DISCUSS has the potential in support public participation in other policy evaluation methodologies different from traditional CBA such as the multicriteria decision support methodology proposed by Vreeker et al. (2001).

Additionally, DISCUSS could be an online tool. Kinston et al (2000) showed that Internet can be an important tool for public participation. Moreover, O’Looney (2002 p. 30) considered that the potential of the internet to support new electronic commerce and business strategies might also push for similar changes in the public sector. Therefore, another development of DISCUSS could involve its conversion into an internet based application. This would allow a broader participation from the stakeholders and at the same time may lead to a reduction in costs associated with the decision process.

Developing DISCUSS for other policy evaluation methodologies and over the internet are proposed as areas for future work.

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