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TRADE-OFF/POSITIONAL ANALYSIS
(WITH A RAWLSIAN APPROACH TO EQUITY)
AS AN ALTERNATIVE TO COST-BENEFIT ANALYSIS
(CBA) IN SOCIO-TECHNICAL DECISIONS

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ABSTRACT

This paper introduces a hybrid trade-off/positional analysis framework as an alternative to cost-benefit analysis (CBA). As a decision-support tool, the proposed framework [1] allows decision-makers not to monetize or aggregate non-monetary factors over time; [2] invites the entrance of stakeholders into the debate since there is greater transparency as to who benefits and who is harmed by a particular policy/program/project; [3] enables analysts to undertake a comparative analysis of alternatives over time; and [4] takes into account the important role of technological change in shaping the state and performance of a system. In addition, a Rawlsian approach to incorporating equity into decision-making is advocated.

BENEFIT-COST ANALYSIS AS A MEANS OF EVALUATING TRANSPORTATION POLICIES, PROGRAMS, AND PROJECTS

Arguably, there is a need for a formal methodology for choosing from among alternative transportation policies, programs, and projects. Typical government or private sector initiatives to improve the transportation system normally create social costs as well as benefits. There is a natural tendency to want a mechanism that can identify which policies or programs, on balance, make society ‘better off’ in some meaningful sense and help select the option or mix of options that will provide the largest social improvement. This is the promise of cost-benefit analysis (CBA).

As conceived in theory, CBA: [1] enumerates *all* possible consequences, both positive and negative, that might arise in response to the implementation of a candidate policy/program/project; [2] estimates the probability of each consequence occurring; [3] estimates the benefit or loss to society should each occur and expresses these in *monetary terms*; [4] computes the *expected* social benefit or loss from each possible consequence by multiplying the amount of the associated benefit or loss by its probability of occurrence; and [5] computes the net *expected* social benefit or loss associated with the policy/program/project by summing the various possible consequences (1, 2). The reference point for these calculations (commonly termed the ‘baseline’) is the state of the world in the absence of the candidate policy/program/project.

CBA usually begins with the accumulation of a set of data such as that represented by Table 1. This table presents a relatively disaggregated matrix of the various positive and negative consequences of a policy/program/project for a variety of actors. Here the consequences are separated into economic, health and safety, and environmental effects, and the parties affected are organized into policy-relevant groups of actors - firms, workers, consumers, and others (i.e., stakeholders who do not have a contractual or commercial relationship with producers or service providers) (3, 4). Initially, the consequences are represented in their natural units. For example, economic effects are expressed in monetary terms ($B_{\$}$, $C_{\$}$); health and safety effects are expressed in terms of morbidity ($B_{H/S}$, $C_{H/S}$); and environmental effects are expressed in terms of damage to ecosystems (B_{Env} , C_{Env}). The two latter types of consequences are informed by health and environmental risk assessments, respectively. In addition, the consequences are described solely in terms of the time period during which they occur. What CBA does is translate all of these consequences into ‘equivalent’ monetary units, discount them into present value, and aggregate the results into a single dollar value intended to express the net social effect of the policy/program/project.

Table 1 Matrix of Policy Consequences for Different Actors

Group	Effects		
	Economic	Health/Safety	Environmental
Producers/Providers	$C_{\$}$, $B_{\$}$	$C_{H/S}$, $B_{H/S}$	$C_{Env't}$, $B_{Env't}$
Workers	$C_{\$}$, $B_{\$}$	$C_{H/S}$, $B_{H/S}$	$C_{Env't}$, $B_{Env't}$
Consumers	$C_{\$}$, $B_{\$}$	$C_{H/S}$, $B_{H/S}$	$C_{Env't}$, $B_{Env't}$
Others	$C_{\$}$, $B_{\$}$	$C_{H/S}$, $B_{H/S}$	$C_{Env't}$, $B_{Env't}$

As a decision-making tool, CBA has several positive features. First, CBA can clarify choices among alternatives by evaluating consequences in a consistent and systematic manner.

Second, it has the potential to foster an open and fair policymaking process by making explicit the estimates of costs and benefits and the assumptions on which those estimates are based.

Third, by expressing all of the gains and losses in monetary terms, discounted to their present value, CBA permits the total impact of an initiative to be summarized using a common metric and to be represented by a single dollar amount.

However, CBA possesses several limitations. First, the one-dimensional nature of CBA gives the impression that aggregating environmental, social, and economic concerns into a single monetary value is a simple process (5). Thus, the inherent complexity underlying many environmental and development issues is likely to be hidden behind a veil of simplicity. Further, the fact that CBA stems from economic theory “*gives the impression of rigor and precision when in fact the truth is largely otherwise*” (6, p. 247).

Second, the *valuation techniques* that monetize environmental and social goods/services in a CBA suffer from a number of drawbacks. One major problem is the assumption that environmental benefits/costs can be adequately represented by a monetary value (7, 8). By making money the ‘common denominator,’ the environment, for instance, is valued (or interpreted) as a form of commodity that can be traded in real or imagined markets (9). In effect, the monetization of environmental and social goods/services “*is an attempt to extend the utilitarian and democratic principle of the free market into environmental decision-making*” (10, p. 84). While this might seem like a rational approach, a closer look at the valuation techniques reveals another problem. Only the *market roles* of an individual are captured by the valuation techniques, largely to the exclusion of other (social) roles such as community participation, citizenship, etc. (11).ⁱ Finally, valuation techniques do not provide any information about the implicit (and unavoidable) ethical decisions that an analyst makes as part of the valuation process (11-13).

Third, the outcome from a CBA ignores distributional effects. If a CBA indicates that a new social arrangement will maximize the welfare of the majority, the simple application of this result - without any distributional adjustments - will disenfranchise the minority who must accept the new arrangements for the greater good. In effect, CBA’s indifference to distributional effects means that maldistributions become invisible and hence disregarded.ⁱⁱ

Fourth, CBA does not adequately deal with technological innovation (14-16). For example, calculating regulatory compliance costs using existing technology is likely to overestimate costs (which are often based upon upwardly biased industry estimates) since savings that accrue from technological improvements (i.e., efficiency gains) are ignored. In effect, CBA leaves considerations of the *process* of industrial transformations outside of the analysis framework. For industrial transformations to be properly considered, a CBA would need to be recalculated each time a new innovation enters the market.

Fifth, policies designed to *internalize* negative externalities are likely to increase the costs of certain modes of transportation (e.g., by increasing production and/or usage costs) in an attempt to alter consumer behavior. Since costs are compared to benefits, a policy that is specifically designed to inflate costs may require special treatment beyond what is possible in a standard CBA.

Sixth, the translation of non-economic issues - such as the condition of the environment and human health - into a present day monetary value is a contentious issue (5, 17-21). The choice of the discount rate can have a dramatic effect on the cost/benefit estimates used to evaluate the desirability of a policy/program/project. Since many government initiatives involve an investment of resources in early periods that generate benefits in later periods, the major

effect of discounting is to reduce the magnitude of future benefits – i.e., the larger the discount rate, the greater the reduction in future benefit. Thus, the act of discounting can reduce the attractiveness of government policies, particularly in cases where benefits are not realized until many years later.

Finally, CBA does not align well with the democratic decision-making process. While CBA is democratic in the sense that it counts the ‘votes’ (or preferences) of actors and interested parties, an equally important aspect of democracy is that all kinds of arguments and alternatives are put forward and considered (5, 22). Emphasizing CBA as the primary decision-making tool adopts an economic lens to problem solving that largely excludes other equally valid tools/perspectives. Further, another important aspect of democracy is that society has the ability to collectively understand and learn from different perspectives on an issue. A problem with CBA is that the ‘expert’ analyst has very little interaction with the relevant stakeholders. While there is a limited amount of interaction through the administration of willingness to pay/accept surveys, it is questionable as to whether the decision-making process is informed (11, 22).

All of the above concerns lead to the conclusion that CBA is an inappropriate decision-making tool if progress towards sustainable development/transportation - which requires a more balanced treatment of economic, social, and environmental factors - is a desired objective. Instead of attempting to aggregate and transform environmental and social issues into a single monetary value, a better approach is to accept a certain amount of complexity and heterogeneity and adopt a more informed and disaggregated decision-making process.

Alternative, more disaggregated decision-making approaches include Multi-Criteria Approaches (MCA), Environmental Impact Assessment (EIA), Trade-off Analysis (4), and Positional Analysis (23). Of these, trade-off and positional analysis are more closely aligned with sustainable development/transportation (2).

TRADE-OFF AND POSITIONAL ANALYSIS AS ALTERNATIVES TO CBA

Trade-off and positional analysis are two techniques that require decision-makers to explore the trade-offs that are often obscured in a CBA. Instead of aggregating a wide range of heterogeneous factors into a single monetary value, trade-off analysis keeps each factor in its natural units. Thus, when constructing a trade-off matrix (represented in its generic form in Table 1), the analyst is not required to make decisions about how environmental, health/safety, and economic factors should be valued and summed across different actors or generations.ⁱⁱⁱ By keeping these factors separate in the matrix, it is possible to assess who benefits and who is made worse off as the result of an existing or new policy/program/project.^{iv} A benefit of non-aggregation is that the time period in which each effect is experienced is revealed and future (non-financial) benefits/costs are not discounted to a present value. Further, the trade-off between the costs of environmental or health improvements are made explicit.

Disaggregating the impacts of a policy/program/project in a trade-off matrix has the added advantage of informing decision-makers and stakeholders about who is reaping the benefits and who is bearing the costs. While it has been argued that the informational burden of such an approach to decision-making “*tends to reduce the efficacy of political institutions*” and leads to stakeholder conflict and delay (24, p. 16), hiding such information would surely be inappropriate in the democratic process.

The transparency achieved by non-aggregation means that decision-makers become more accountable for their decisions. When pursuing a new policy initiative or assessing an existing regulation/program, the decision-maker is required to acknowledge who is receiving the benefits/costs and how these are evolving over time. Hence, a *time series* of trade-off matrices is required to capture the changing dynamics of the system under analysis and facilitate a *comparative analysis* of alternatives over time.

It is helpful to look at a simple example to explain how decisions can be informed by a trade-off matrix. The example chosen demonstrate the equity problems that arise when a person is either not fully compensated for a loss or assumes a loss that others are able to avoid (25).

Suppose it was true that asbestos brake linings made the most effective type of brake that saved the lives of an estimated 2,500 drivers and pedestrians a year. Suppose it was also estimated that some 2,000 workers die each year from asbestos-related diseases as a result of manufacturing or repairing these brake linings. If we look at this scenario using CBA, one might say that the outcome is acceptable since there is a net savings of 500 lives per year. However, if the same scenario is assessed using a trade-off analysis an inequality is revealed. The problem lies with the fact that the 2,000 workers who die each year are likely to come from a certain socioeconomic class (and do not represent a group that is really taking on this risk voluntarily), whereas drivers and pedestrians come from all classes (and by-and-large represent a random group). By considering what constitutes a fair outcome, a decision-maker might decide that the increase in driver and pedestrian fatalities that might occur from using a less effective brake lining material is justified in fairness to the workers who are assuming a disproportionate amount of risk.

If we assume that there is a less effective - though more expensive - substitute for the brake linings that does not harm the workers, the trade-off in Figure 1 arises. The monetary cost of using the new material is likely to fall onto the drivers (through higher vehicle prices) who might also face a small increase in fatal or serious accident rates along with other groups such as passengers and pedestrians who are likely to face an increased risk of being killed or injured in or by a vehicle, respectively. In this scenario the decision-maker must decide whether the costs imposed on drivers, pedestrians, and others are outweighed by the benefits received by the workers.

It is important to recognize that a decision to improve the health of the workers at the expense of consumers and others may be defensible on the grounds of fairness. However, what happens if it is estimated that 3,000 or 4,000 drivers, passengers, and pedestrians are likely to be killed as a result of the change to the brake linings to make it safer for 2,000 workers? What is the appropriate trade-off between economic efficiency and equity? There is no single or 'right' answer to these questions. *The real decision is political, it is not formulaic.* The fact that there is no single answer increases the importance of transparent decision-making, which makes decision-makers more accountable for their actions.

In a situation where the potential outcomes require a compromise in economic efficiency or equity, trade-off analysis enables the decision-maker to explore more effective policy alternatives. For example, reducing speed limits and/or improving the layout of accident hotspots are ways to reduce the severity of accidents. Similarly, reducing the speed limit in all school zones and/or deploying smart cars that detect pedestrians (or objects) in the road are two potential ways that pedestrian accidents can be reduced. In this regard, trade-off analysis resists simplistic thinking and allows decision-makers to deal with those difficult questions involving [1] economic efficiency/equity trade-offs and [2] alternatives analysis. In effect, uncertainties

and distributive inequalities are accepted as part of the normal (real world) decision-making process. A critical point is that trade-off analysis holds the potential for environmental, social, and economic factors to be considered on a more equal footing and provides an environment where alternatives can be considered that do not raise Hobson's choices.

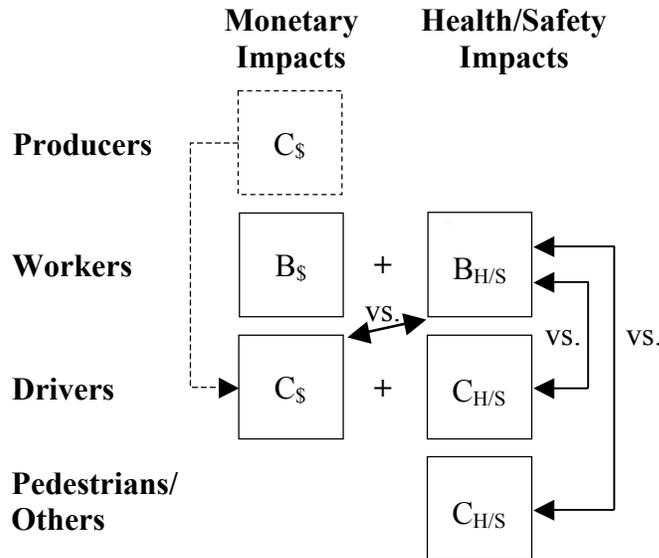


Figure 1 Asbestos brake lining regulation.

The history of trade-off analysis can be traced back to the 1970s when Ashford (4) and Söderbaum (23) independently offered trade-off analysis - what Söderbaum calls *positional analysis* (PA) - as an alternative to CBA. While there are important similarities between the two approaches, the way in which the trade-off matrix is used in each approach is different. Whereas Ashford (4) views the trade-off matrix from the perspective of the decision-maker, Söderbaum (9) considers the trade-off matrix from a number of different ideological orientations. “*The purpose of PA is one of illuminating an issue in a many-sided way with respect to:*

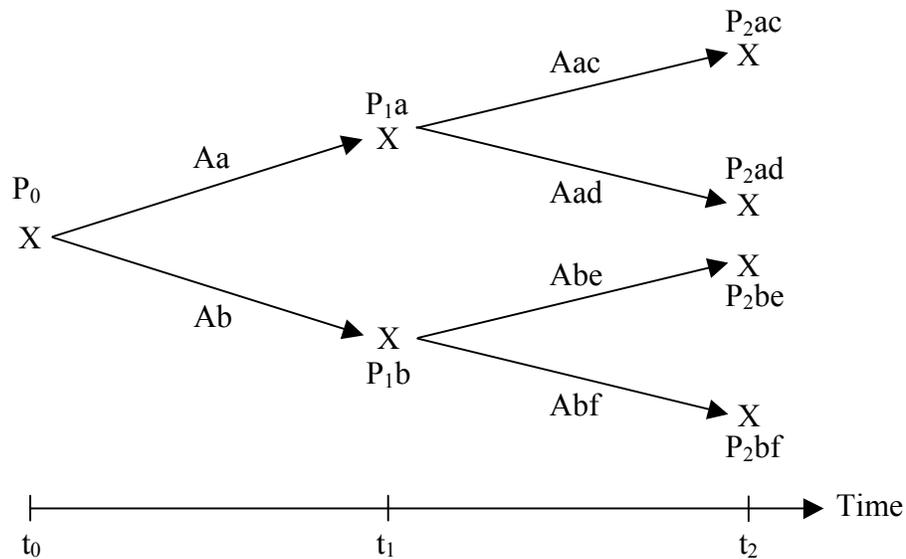
- *options or alternatives of choice;*
- *impacts;*
- *interests affected, conflicts between interests included; and*
- *possible ideological orientations that can be useful for valuation and decision-making” (9, p. 87).*

Söderbaum (9, 22, 26) argues that CBA makes the unrealistic assumption that all politicians and citizens adopt the market ideology built into the analysis framework. He suggests PA is a more democratic process that incorporates the ideological orientation of politicians and citizens. Therefore, instead of identifying the economically efficient outcome, PA is a many-sided analysis that aims to articulate the following: the options or alternatives of choice; the impacts associated with these; the interests/stakeholders that are affected and whether there are conflicts between them; and whether ideological orientations (e.g., neo-liberal market, ecological economic, technologist, deep ecology, religious, etc.) can provide a new lens for valuation and decision-making (9, p. 87). The basic idea of PA is to reach ‘conditional conclusions,’ “*that is conclusions that are conditional in relation to each ideological orientation articulated and*

considered. The idea is to facilitate learning processes and decision-making and not to dictate the ‘correct’ way of arriving at the best and optimal decision” (9*ibid*, p. 66).

The phrase ‘positional analysis’ can be confusing and requires some clarification. PA can be described as a form of *systems analysis*. The word ‘positional’ is borrowed from cybernetics where reference is made to the ‘position’ of a biological unit or system. Therefore, PA refers to an analysis of the position or state of a system at different time intervals. If we consider a system as a combination of stocks and flows, the *stocks* of a system (e.g., environmental quality, health, happiness, wealth, etc.) describe its position or state and the *flows* (e.g., emissions, reproduction rates, etc.) are the driving forces or pressures that change the position or state between time periods. Söderbaum (9, p. 103) describes the assessment of the position or state of a system as “a disaggregated analysis where monetary and non-monetary impacts are kept separate and where the distinction between flows and positions is observed.” Hence, Söderbaum’s disaggregated analysis is very similar to trade-off analysis.

PA is described in terms of pathways and movements from one state or position to another using a decision tree. Figure 2 provides a representation of a decision tree in positional terms, where ‘ $P_{t;n}$ ’ represents the position or state at different time intervals (t_i) and ‘ A_n ’ identifies a particular ‘alternative’ or pathway (guided by regulation or policies) from one position to the next. Whereas a traditional decision tree analysis assigns monetary values to each position ($P_0, P_{1a}, P_{1b}, P_{2ac}, P_{2ad}, P_{2be}$ and P_{2bf}) and a probability to each pathway ($Aa, Ab, Aac, Aad, Abe,$ and Abf), in PA the positions are mostly *non-monetary* and the pathways are associated with choices rather than probabilities. Söderbaum (9, p. 90) argues that “if we are interested in the ‘welfare’ or the ‘wealth’ of individuals and nations, it would be an excellent idea to focus (mainly) on non-monetary states or positions over time.”



Source: (9, p. 94).

Figure 2 Decision tree in positional terms.

The value of using a decision tree to track policy/program/project alternatives is that ‘path dependency’ or ‘lock-in’ become an explicit part of the analysis. If a decision is made to select alternative Aa , for instance, the future states P_{2be} and P_{2bf} are no longer feasible (Figure

2). This implies that past actions/decisions might constrain future actions/decisions, especially when natural capital is used in an irreversible way - e.g., a highway is built across arable land that could be used for crop production (9). In addition, once a development pathway or initiative has been selected, the rationality of decision-makers can be *bounded* by the knowledge, procedures, and habits that are associated with the chosen path of action. This increases the importance of considering future initiatives (in a trade-off matrix) in a ‘many-sided’ and open way.

Finally, the type of indicators used in the trade-off matrix should (ideally) capture changes in the state of the system as well as the intensity of the flows (or pressures) that change the system’s state between time periods. If achieving sustainable development/transportation is the desired objective of decision-making, then these indicators need to set parameters that can monitor and guide future development away from critical environmental thresholds and unsustainable activities.

A HYBRID TRADE-OFF/POSITIONAL ANALYSIS FRAMEWORK

While trade-off and positional analysis both use a ‘trade-off matrix’ to analyze policy alternatives, the two approaches are not identical in a procedural sense. To help clarify how a trade-off matrix can be used to assess alternative policies/programs/projects, important elements from Ashford’s (4, 27) and Söderbaum’s (9) approaches have been combined to create a hybrid framework (or series of steps) that one can follow when using a trade-off matrix. The authors believe that this hybrid framework combines the strengths of each approach to create a more effective decision-support process.

The six steps of the hybrid trade-off/positional analysis framework are as follows [note: Steps 1 and 2 should be undertaken simultaneously]:

1. Identify the problem. Describe the societal or technical problem in need of attention (e.g., unmet needs or technical/institutional failure). How is the problem perceived by different stakeholders? Describe any prior attempts to resolve/improve the problem and discuss their inadequacy/failures in terms of:^v
 - *economics and markets*
 - inadequate and/or perverse incentives, prices, markets, institutional/organizational structure and behavior, free-rider problems, and unrecognized/unmet needs and demands;
 - *legislation and the political process*
 - inadequacy of existing legislation/regulations, lack of knowledge/enforcement thereof, and inadequate stakeholder involvement;
 - *public/private sector management*
 - lack of adequate incentives or perverse incentives for, or commitment to, management of the problem; and
 - *technical system capabilities*.
2. Describe the problem in an institutional context. Identify stakeholder groups and their associated roles.
3. Represent the initial problem (P₀) using a trade-off matrix. Identify the extent to which the problem affects each stakeholder group and highlight any inequalities.

4. Make a creative effort to formulate several policy alternatives (A_n) to address the problem, paying special attention to distributional inequalities. The policy alternatives should be developed in consultation with stakeholder groups. The policy alternatives should consider improving:
 - *economics and markets*
 - _ changes in prices, markets, and industry structure
 - _ changes in demand;
 - *legislation and the political process*
 - _ changes in law and the political process (legislation, regulation, negotiation, and stakeholder participation);
 - *public/private sector management*
 - _ system changes related to organizational/institutional structure
 - _ changes in public and private sector activity; and
 - *technical system capabilities*
 - _ technological/scientific changes (options for R&D, innovation, and diffusion).
5. Use the trade-off matrix to qualitatively and quantitatively assess (in a *comparative* manner) the likely outcomes ($P_{i,n}$) from each policy alternative (A_n). Evaluate the likelihood that a policy alternative (A_n) will solve the problem under different future scenarios. Particular attention should be paid to whether distributional inequalities are adequately addressed. It is also important to consider each indicator in the aggregate to determine how the system is changing over time. Identify the impact each policy alternative (A_n) is likely to have on important systems connected to the system under analysis. Determine whether the policy alternative is sufficient to encourage a system transformation to sustainable development/transportation.
6. Inform the decision-maker(s) of different values and/or ideological orientations (e.g., ideas of development and progress) that are relevant to the situation under analysis and identify how these might create barriers to the implementation of a specific alternative. Identify strategies to address value conflicts (28), recognizing that political coalition-building is likely to play an important role in shaping the final policy.

The hybrid trade-off/positional analysis framework is generic and can be used to assess any policy/program/project. In addition, the framework is *neutral* in that it does not specify a final decision.

A RAWLSIAN APPROACH TO DECISION-MAKING

The ability of governments to develop policies/programs/projects that transition societies towards more sustainable forms of development will depend upon how they, and their societies, view the purpose of development - i.e., either to establish a fair and just society (Rawlsianism) or maximize the well-being of society in the neoclassical sense (utilitarianism). These two philosophies bound the modern decision-making continuum. This section argues that a Rawlsian approach to decision-making is more likely to result in equitable/fair outcomes that support the basic principles of sustainable development/transportation.

In 1971, John Rawls published his seminal work - *A Theory of Justice* - that renewed the notion of the social contract^{vi} by arguing that political and moral positions can be determined using impartiality (29). In essence, Rawls developed his theory to address the inadequacy of utilitarianism (the philosophy behind CBA) in dealing with equity.

Rawls (29) developed a version of the social contract in which decision-making revolved around moral principles - i.e., the principles of justice. Specifically, he created two principles of justice that he argued contracting parties would select in the Original Position - behind the *Veil of Ignorance* - to establish a just society (see below).^{vii} In addition, to make the environment an explicit consideration in the Rawlsian decision-making process, a third *environmental principle* has been added to Rawls's two principles.

First Principle: “each person is to have an equal right to the most extensive total system of equal basic liberties compatible with a similar system of liberty for all” (29, p. 302).

Second Principle: “social and economic inequalities are to be arranged so that they are both (a) to the greatest benefit of the least advantaged, consistent with the just savings principle, and (b) attached to offices and positions open to all under conditions of fair equality of opportunities” (29, p. 302).

Suggested Third Principle: social arrangements are to be organized so that they (a) protect and continually improve the environment, especially for those individuals and species most heavily affected by environmental degradation/pollution, and (b) do not result in activities that exceed the ecological carrying capacity of the environment.

The first principle determines the distribution of civil liberties. It states that each member of a society is to receive as much liberty (or personal freedom) as possible, as long as every other member of society receives the same. The second principle states that social and economic inequalities are only justified if the most disadvantaged members of society are made relatively better off under new arrangements.^{viii}

The ‘suggested’ third (*environmental*) principle was created to explicitly link the social and natural worlds in decision-making. The intent of the principle is [1] to ensure that society continually strives to protect and improve the environment and the lives of people negatively affected by pollution, and [2] to keep human activity within ecological limits.^{ix} The basic premise of the principle is twofold. First, protecting human health is believed to be of paramount importance. Second, the natural environment is essential for human life and should be protected and regenerated if it is being degraded by human activity. In reality, the first part of the third principle [3(a)] is likely to be the most useful, since defining *and* agreeing upon the ecological carrying capacity of the environment [3(b)] is still a major work in progress. In addition, 3(a) aligns well with the idea of progress and does not attempt to define an end state or goal.

The significance of the three principles is that - collectively - they support decision-making that can move society towards sustainable development/transportation. First and foremost, *social equity* is placed at the center of decision-making (the first principle). Second, the notion of *economic growth* is supported, so long as the benefits from this growth are distributed fairly among society (the second principle). Finally, ‘movement’ towards a better *environment* is made a critical component of any new policy/program/project (the third

principle). Hence, the three principles provide a framework through which ‘movement’ towards sustainable development/transportation becomes a real possibility.

The ability to achieve a Rawlsian outcome in the transportation decision-making process (or in that of any service or product area) is likely to depend upon the perceived role of government in public participation and the posture adopted by stakeholders (30) (see Table 2).

Table 2 Likelihood of Achieving a Rawlsian Outcome with a Rawlsian/Non-Rawlsian Government and Strong/Weak Stakeholder Postures

GOVERNMENT	STAKEHOLDER POSTURE			
	UTILITARIAN (Maximizing individual/social benefit)		COMMUNITARIAN (Promoting the ‘greater social good’)	
	Stakeholder Influence	Rawlsian Outcome	Stakeholder Influence	Rawlsian Outcome
Rawlsian Government (Government acts as trustee for stakeholders)	<i>Strong</i>	Outcome uncertain	<i>Strong</i>	Extremely likely
	<i>Weak</i>	Possible	<i>Weak</i>	Highly likely
Non-Rawlsian Government (Government acts as facilitator for utilitarian/majoritarian consensus)	<i>Strong</i>	Extremely unlikely	<i>Strong</i>	Likely
	<i>Weak</i>	Unlikely	<i>Weak</i>	Possible

Table 2 uses the terms ‘Rawlsian outcome,’ ‘Rawlsian/Non-Rawlsian government,’ and ‘strong/weak stakeholder postures,’ which require some clarification.

A *Rawlsian outcome* is one in which a new policy/program/project offers greater advantage to individuals or groups who are relatively worse off to begin with and is consistent with the three principles of justice.^x

A *Rawlsian government* refers to a government (or quasi-governmental entity such as a Metropolitan Planning Organization) that is willing and has the capacity to either impose or endorse Rawlsian outcomes.^{xi} If the stakeholders hold a predominantly utilitarian posture, it is likely that Rawlsian outcomes will need to be *imposed* upon the stakeholders, which a Rawlsian government may be willing to do. While such a situation appears autocratic, one needs to recognize that utilitarian solutions can result in unjust outcomes that can infringe upon an individual’s liberty and rights. Here, the *fundamental assumption* is that Rawlsian outcomes are more likely to be just and fair for all members of society. Hence, if the stakeholders hold a predominantly communitarian posture - which promotes the (perceived) greater societal good - the government is likely to simply *endorse* the solutions agreed upon by stakeholders.

It follows that a *non-Rawlsian government* is either unwilling or does not have the capacity to impose Rawlsian outcomes on the stakeholders. Instead, it adopts the position as mediator of stakeholder interests. Under this arrangement, the responsibility for achieving a just and fair society is left to the stakeholders. A *non-Rawlsian government* does not mean that a Rawlsian outcome cannot be achieved; it simply means that government does not act as a trustee for stakeholder interests and it would take a strong communitarian group of stakeholders to press for a Rawlsian outcome.

Under both the utilitarian and communitarian postures, *stakeholder influence* is idealized as either being *strong* or *weak*. While the influence and ability of stakeholder groups depend

upon their size and composition (31), we are not concerned with such details in this hypothetical exploration. For simplicity, we can assume *strong stakeholder influence* means that the stakeholders have the ability to influence government action, and *weak stakeholder influence* means that this is less likely.

While the ideas presented in Table 2 are hypothetical, they present some valuable insights that can help guide decision-making towards just and fair outcomes. In effect, the table highlights two important observations: [1] *a Rawlsian-sympathetic government may not be sufficient to achieve a Rawlsian outcome if the stakeholders adopt a utilitarian posture and the government accedes to their wishes*; and [2] *a non-Rawlsian government can arrive at a Rawlsian outcome, but only if stakeholders adopt a communitarian posture^{xii} and the government accedes to their wishes*.

In a typical policy setting, if one were to adopt a Rawlsian approach to decision making - i.e., any new policy/program/project should *preferentially advantage the least advantaged* - analysts would likely ask by how much should the least advantaged be made better off? Since the Rawlsian approach only talks about *progress*, there is no right answer to how much to preferentially advantage the least advantaged as long as significant maldistributions remain. In contrast, if we were to adopt a utilitarian approach it would be possible to identify the optimum level of safety or income transfer, for example. Therefore, while the Rawlsian approach should be seen as a movement (a process) and not a final state, it is nonetheless possible to operationalize Rawls's theory of justice by 'bounding' the acceptable moves and rejecting the clearly utilitarian moves that are not Rawlsian. This can be achieved by identifying the utilitarian (i.e., market) *and* Rawlsian solutions to a problem. Both outcomes mark opposite ends of a decision continuum within which the final decision is likely to fall. The authors argue that solutions which lean towards Rawlsian outcomes (i.e., outcomes that are consistent with the three principles of justice) are more likely to move a society towards sustainable development/transportation than purely utilitarian outcomes through the reduction of inequality and improvement of the environment.

CONCLUSION

The decision to use CBA or a hybrid trade-off/positional analysis is likely to depend upon a society's values and beliefs. While CBA provides a structured framework for decision-making, it does so by considering only *one* perspective/ideology - i.e., neo-classical economics. In contrast, trade-off/positional analysis is able to consider a wide range of perspectives/ideologies, although this flexibility comes at the expense of being able to provide a single solution to a problem. Hence, trade-off/positional analysis is a *decision-support* (rather than decision-making) tool. Further, while trade-off/positional analysis disaggregates costs and benefits, at some point the decision-maker must *implicitly* co-measure factors in order to make a decision. What the trade-off matrix does is make the value system behind this co-measurability explicit. For example, if a decision-maker values human health above the costs of adopting a pollution abatement technology, then this preference is captured by the trade-off matrix and becomes visible. Indeed, a decision-maker might want to make this fact known for political reasons. While the knowledge that a trade-off matrix can reveal an individual's or society's value system might make some elected officials uncomfortable, one can argue that such an outcome is an essential component of a healthy democratic society.

In conclusion, the hybrid trade-off/positional analysis framework provides a decision-support tool that is more neutral, fair, and sophisticated than CBA and should guide decision-making toward sustainability when combined with a Rawlsian approach to equity.

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ⁱ Valuation techniques capture the preferences of the individuals affected, which are then translated into a monetary value and summed across different impacts, social groups/stakeholders, and time periods. The amount of economic goods - i.e., purchasing power - a person has in the marketplace influences his/her willingness to pay for a good/service or to accept a certain level of risk with employment. This observation is known as the ‘wealth effect.’ While the distribution of wealth collectively determines the market value of environmental, social, and economic goods, the position a market actor holds on a distribution of wealth determines what basket of goods (and bads) he/she receives. If a valuation technique fails to consider the distribution of wealth in a society, its outcome is likely to lead to misleading conclusions about the benefits/costs of a policy/program/project.

ⁱⁱ One theory put forward by neo-classical welfare economists as a way to avoid distributive problems is the Pareto optimality criterion. A Pareto efficient solution is one in which no one is made worse off, but at least one person gains under new arrangements (32). However, given the complexity of real world development, it is difficult to identify a policy/program/project that does not make someone worse off. A less restrictive theory that can be used to arrive at a ‘potential’ Pareto outcome is the Kaldor-Hicks efficiency criterion (33, 34). A Kaldor-Hicks outcome is one where the total economic value of social resources is increased to a level at which those who gain can compensate those who lose and still be better off. However, there is no requirement that any transfer of wealth should actually take place. This potential outcome is a significant problem, especially when those most likely to receive the benefits are already the more advantaged members of society. If we are interested in developing a more democratic and fair decision-making process that specifically addresses inequality, then a Rawlsian approach seems more appropriate (see the section entitled ‘A Rawlsian Approach to Decision-making’).

ⁱⁱⁱ It is important to recognize that a CBA framework can be used within the trade-off matrix to translate the ‘economic’ costs or benefits of a policy or program into a net present value (NPV) or future value (FV) for comparison purposes. The ‘non-economic’ costs and benefits remain in their natural units and are not ‘valued’ in an economic sense.

^{iv} When identifying stakeholder groups, it is important to consider whether there are any conflicts within each stakeholder group that might impact the analysis or success of a policy alternative. In the situation where value conflicts among members of the *same* stakeholder group are pronounced, it might be more effective to focus the distributional analysis on ‘interests’ rather than traditional stakeholder groups (e.g., producers, workers, consumers, low-income groups, etc.). Thus, members of different (traditional) stakeholder groups might find that their interests align, allowing them to form an ‘interest group’ whose members cannot be grouped into a uniform category.

^v These four categories should be considered as *lenses* for assessing the problem. Each lens focuses on a particular system - i.e., economics and markets, legislation and the political process, public/private sector management, and the technical system - and assesses whether [1] the system is broken and [2] if so, what needs to be changed to fix the problem. It is important to *deliberately* consider these lenses when formulating the problem to ensure that policy

alternatives (developed in Step 4) are not constrained by *path dependency* or *bounded rationality*. Adopting an approach to decision-making that seeks to uncover issues - rather than ignoring an issue/lens that does not fall under one's area of responsibility - is essential if society is to make progress towards sustainable development/transportation. In this regard, *sins of omission* are just as important as *sins of commission* that occur when a policy alternative is influenced/captured by special interests. Also, a *lens* should not be confused with *value conflicts* or *ideological orientations* (discussed in Step 6).

^{vi} The basic premise of the social contract is that an individual - in accepting that the pursuit of self-interest is ultimately self-defeating - relinquishes certain freedoms/rights to a system of collectively-enforced social arrangements in exchange for peace and security. Hence, he/she agrees to follow the 'general will' of society and be held accountable if his/her 'individual will' motivates behavior that breaks the social contract - i.e., the law of the land (35). Whatever freedoms an individual loses in the transition from the State of Nature to the Civil State are more than compensated for by belonging to a civil society that ensures liberties and property rights. Hence, the social contract tries to balance individual freedom with being a member of a civil society that limits freedoms for the greater good.

^{vii} Central to Rawls's (29) *Theory of Justice* is the 'Original Position,' a hypothetical situation in which an individual's knowledge is constrained by a 'Veil of Ignorance.' Behind the Veil of Ignorance, "*no one knows his place in society, his class position or social status; nor does he know his fortune in the distribution of natural assets and abilities, his intelligence and strength, and the like. Nor, again, does anyone know his conception of the good, the particulars of his rational plan of life, or even the special features of his psychology such as his aversion to risk or liability to optimism or pessimism. ... [T]he parties do not know the particular circumstances of their own society, ... its economic or political situation, or the level of civilization and culture it has been able to achieve*" (29, p. 137). Rawls argues that decisions made for society should be made as if the participants do not know in advance what their lot in life will be. By denying contracting parties the knowledge of their own characteristics or circumstances, they are forced to adopt the moral point of view and are unable to develop principles or policies that favor themselves. Rawls also states that contracting parties are assumed to be "*rational and mutually disinterested*" (29, p. 13): 'rational' in the sense that the contracting party makes the most effective decision to reach a given ends, and 'mutually disinterested' in the sense that each person does not take "*an interest in one another's interests*" (29, p. 13). Thus, the 'rational' choice is to develop principles and strategies for a just society that are developed from initial conditions that are inherently fair. Justice, therefore, proceeds out of fairness, giving rise to Rawls's formulation of "*justice as fairness*" (29, p. 17).

^{viii} Rawls's two principles of justice have a specific order in which they are to be considered. The first principle must be considered prior to the second principle since "*liberty can only be restricted for the sake of liberty, not for other social and economic advantages*" (36, p. 490). It is possible to envision a situation where liberty is constrained to protect liberty - i.e., "*restrictions to individual freedoms are justified when the unfettered exercise of these freedoms conflicts with other freedoms*" (37, p. 156). For example, the speed at which vehicles are allowed to drive is constrained to protect broader public freedoms such as individual safety. The lexicographic order to the principles implies that society would rank the determination of civil liberties above that of economic advantage.

^{ix} A significant work that focuses on the links between environmental *quality* and human *equality* and those between sustainability and environmental justice more generally is Agyeman et al.'s (38) *Just Sustainabilities: Development in an Unequal World*. This publication, which consists of a selection of papers, focuses specifically on the linkages between the political and policy processes surrounding environmental justice and sustainability. *Just Sustainabilities* highlights "*an important and emerging realization that a sustainable society must also be a just society, locally, nationally and internationally, both within and between generations and species*" (38, p. 3).

^x The difference between the likelihoods of achieving a Rawlsian outcome is the extent to which it is believed that it will be possible to *increasingly advantage the least advantaged*. It is important to realize that this framework does not attempt to achieve a single state of utopia; Rawls does not define such a state. This fact highlights an important difference between Rawlsian thinking and utilitarianism - utilitarian outcomes *can* be defined by an end state (i.e., efficiency). In contrast, Rawlsian outcomes should be seen as a *movement* towards equality, not equality per se. If a society were to continually advantage the least advantaged, it is conceivable that it would eventually achieve

equality. But this is not necessarily the case. If a society continually allowed concentrations of wealth in an effort to make the economic pie bigger, it might never reach total egalitarianism (i.e., social equity).

^{xi} A core function of a Metropolitan Planning Organization (MPO) - as stated by the U.S. DOT - is to “[e]stablish and manage a fair and impartial setting for effective regional decisionmaking in the metropolitan area” (39, p. 4). This requirement aligns with the ‘cooperative’ element of the 3-C planning process. The need to remain ‘impartial’ is a constraining factor that limits the MPO’s ability to advocate for disadvantaged groups. However, the MPO is required “to extend public participation to include people who have been traditionally underserved by the transportation system and services in the region” (39, p. 2). The rationale is that “[n]eglecting public involvement can result in proposed solutions that do not address the community’s needs, unnecessary delays, litigation, and can erode public trust” (39, p. 2). Hence, the MPO does have a trusteeship role to ensure that the ‘voice’ of all stakeholders is heard - especially those who are underrepresented or underserved - although it is to remain impartial and cannot advocate for certain affected groups. Thus, an interesting question is whether this trusteeship role can be enhanced in a Rawlsian sense to strengthen the MPO’s ability to represent underserved groups. Unless MPOs are able to give *preferential* consideration to underserved groups, it is unlikely that they would be able to adopt a Rawlsian approach to decision-making.

^{xii} It should be understood that communitarian stakeholders will not develop a Rawlsian outcome based upon Rawls’s (29) *Theory of Justice*; rather, they are likely to approximate a Rawlsian outcome by pursuing the greater social good (or common purpose or goal). Thus, communitarians are ‘likely’ to arrive at a Rawlsian outcome from the perspective of shared moral values that stem from the traditions of a community. While it is not possible to know whether, and to what extent, communitarian stakeholders will develop Rawlsian outcomes - since the perception of a ‘fair outcome’ is likely to differ between communities - one would imagine that their strong emphasis on the ‘community’ is likely to prevent or minimize the marginalization of disadvantaged groups. For an insightful discussion of the differences between views of liberals (i.e., Rawlsians) and communitarians, see (40).

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