Cost-effectiveness analysis: an assessment of its application in evaluating humanitarian assistance

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Abbreviations

CBA  cost-benefit analysis
CEA  cost-effectiveness analysis
FTS  financial tracking system
NGO  non-governmental organisation
ODA  overseas development assistance
QALY  quality-adjusted life year
WFP  World Food Programme
UN  United Nations
Cost-effectiveness analysis (CEA) is an evaluative tool that links outcomes with their input costs. Used widely in the health and environment sectors, it has only recently been applied in evaluations of humanitarian aid. This paper examines CEA’s potential as a means of quantifying humanitarian aid performance and focuses on the practical and methodological problems that constrain its application. As efficiency is easier to measure than effectiveness, it concludes that cost-efficiency analysis is a more feasible tool for measuring the performance of certain humanitarian aid activities.

‘...when so many (NGOs) come in at one time, and insist on waving their own flags and ‘doing their own thing’, inefficiencies, duplications, or the introduction of ill-considered operational precedents result.’


While efforts to alleviate human suffering are as old as complex emergencies themselves, only in recent years has serious attention been given to evaluating humanitarian assistance. Increasing donor ‘fatigue’ and the rising cost of relief efforts have now prompted greater scrutiny of the performance of humanitarian interventions. This paper explores the possibility of using Cost-effectiveness Analysis (CEA) in the evaluation of such interventions. Despite the attraction of measuring the cost-effectiveness of humanitarian aid, the problems of fully applying CEA methods are so substantial that a judgement is needed as to whether it is indeed feasible. Hence, this paper offers such a judgement, and suggests to what extent the impacts of humanitarian assistance can be quantified using CEA.

The application of cost-effectiveness analysis

The term ‘effectiveness’ implies that a project is capable of producing its intended result. An evaluation of effectiveness, therefore, compares a project’s outcomes or impacts with its original objectives to decide whether or not they have been achieved. Effectiveness encompasses such notions as efficiency, coverage, coherence, timeliness, and appropriateness. In determining whether or not a project has been cost-effective, it is necessary to compare outcomes with the actual inputs of resources used to undertake the project. Of course, a thorough evaluation of humanitarian aid should consider all aspects of aid effectiveness, of which cost-effectiveness will be just one.

CEA should not be confused with cost-benefit analysis (CBA), although the two methodologies have similar objectives. In a CBA, the costs and benefits of a project are valued in monetary terms (monetised), discounted over time, then netted to arrive at a quantified net benefit. A positive net benefit indicates that a project is worth undertaking. Hence, CBA is a decision-making tool used for selecting projects that maximise the economic value to society.
However, CEA is usually preferred in situations where analysts are either unable or unwilling to monetise the project’s benefits. It is principally used as an *ex ante* evaluative tool for comparing mutually exclusive alternatives on the basis of their costs and a single quantified effectiveness measure. Because of the difficulties of placing a dollar value on all types of benefits (as required by CBA), it is not surprising that CEA is increasingly used in evaluating projects in such areas as health, environment, and defence. In these cases, a wide variety of effectiveness measures can be selected, for example, number of lives saved, tons of carbon monoxide reduced, or children vaccinated (Boardman 1996:395–6). During the 1970s and 1980s, CEA methodology was most commonly used in the area of health program evaluation. The rise in its popularity in developed countries stems from increasing demand on public health budgets and the need to extract maximum benefit from these health resources (Thompson and Fortress 1980:549–51).

CEA involves the calculation of a cost-effectiveness ratio, which can be manipulated in two ways. The first is the ‘least cost method’ which holds the output constant and seeks the cheapest way of achieving the benefit. For example, dividing a fixed quantity of safe water by the cost of various water delivery systems answers the question of how the cost per litre of water can be minimised. The second method is known as the ‘constant cost method’ and involves calculating the outcome effectiveness per unit of budgetary cost. This method assumes a fixed budget and seeks to maximise the outcome or impact from those given resources. For example, indicators such as Quality-Adjusted Life Years (QALYs) are frequently used in health program evaluation, with projects chosen that maximise QALYs for a given health care cost (Hallam 1996:220–3).

Nevertheless, using CEA to assess Cost-effectiveness is in itself an ambitious objective. Outcomes and impacts are often hard to define, and for this reason many analysts opt for the more modest goal of evaluating intermediate outputs which are generally easier to measure. For example, instead of using ‘lives saved’ (an outcome measure) an evaluator may use the ‘number of patients treated’ (an output measure) in the analysis. While few would object to such analysis, caution is needed in interpreting the results. A comparison of outputs with inputs is no longer a measure of effectiveness, but a measure of efficiency. So a comparison of the number of patients treated with the cost of treatment will give some indication of how efficiently treatment was provided but tells nothing about how many patients in fact survived!

Cost-effectiveness: the neglected aspect of humanitarian aid evaluation

The last decade has seen increasing pressure on the aid dollar. While overseas development assistance (ODA) has stagnated in real terms, expenditure on relief operations has risen steadily throughout that time, accounting for around US $4 billion or 7 per cent of total ODA in 1991 (Borton 1993:189). The changing character of aid flow brings with it concern that emergency relief is now coming at the expense of development aid. In a few African cases, development aid has all but ceased and humanitarian aid is the
only form of assistance being provided (Duffield 1994:40). A further issue is the growing competition between complex emergencies for precious aid resources. Actual outlays have not kept pace with the numbers of people rendered acutely vulnerable by complex emergencies, despite rising humanitarian aid expenditures (Duffield 1994:40).

Despite the large sums of money involved in relief operations, evaluations of humanitarian aid have, until the 1990s, been relatively scarce. This contrasts with evaluations of development aid, for which there is an extensive literature. While donor and implementing agencies were well aware of the enormous cost of relief operations, often little was known about what the money was spent on and whether value for money had been achieved (Hallam 1996:222).

Philosophically, there has been a reluctance to evaluate humanitarian emergency aid on the grounds that every effort is warranted and every cost worthwhile in preventing human suffering. The application of financial criteria to humanitarian aid evaluation, was viewed at best, as inappropriate, and at worst, as completely unethical. At a pragmatic level, there has also been a recognition by authors such as Hallam (1996:233), that economic evaluations of humanitarian assistance are fraught with methodological and data difficulties. Others, such as Vosburgh et al (1986:309–10), acknowledge that emergencies pose special challenges for evaluators and require a ‘loosening up’ of evaluation criteria.

Nevertheless, in recent years comprehensive evaluations have been undertaken of humanitarian responses to emergencies such as those in Rwanda, Somalia and Liberia. These evaluations have attempted to fulfil two functions. Firstly, as an instrument of control, by assessing the extent to which the goals of humanitarian assistance were achieved, and secondly, as a method of identifying lessons learned, that can be applied in future operations. A review of these evaluations by Apthorpe (1997:84–5) concludes that despite the crisis conditions under which humanitarian emergency aid is implemented, this form of assistance appears to have achieved a more effective record than development aid. This is all the more remarkable given the latter is implemented with the benefit of time and stability.

While overall effectiveness was a criterion applied in the above evaluations, the measurement of cost-effectiveness of humanitarian aid was only attempted in the Rwanda evaluation. The Rwanda evaluation team was able to assess cost-effectiveness for some logistic functions, but was severely hampered by data limitations in assessing the water and health sectors. For example, the evaluation team made comparisons of land and air transport costs over comparable routes. The results showed that amongst the various methods of transport available, the road/rail combination proved to be most cost-effective means of food delivery at US $85 per tonne. This compared with US $134 per tonne for the rail-only option, with commercial and military air lift being significantly more expensive again. The study also revealed that significant cost savings could have been realised had there been initial investment in upgrading road corridors, and purchasing locomotives and rolling stock for the Tanzanian railways (Joint Evaluation of Emergency Assistance to Rwanda 1996:103–4).
No attempt was made at quantifying the cost-effectiveness of humanitarian aid in the two evaluations of the Somalia emergency. The study *Hope Restored?: Humanitarian Aid in Somalia 1990–1994*, is generally positive in its evaluation of the contributions made by the various agencies involved. It concluded that despite the negative image of the Somalia operation, more than 100,000 lives were saved. However, it also stressed that co-ordination and collaboration are necessary ‘both for improved and cost-effective coverage of at-risk populations and for ensuring acceptable and sustainable working conditions for relief organisations’ (Refugee Policy Group 1994:122).

Similarly, the donor evaluation, *Humanitarian Aid to Somalia*, assessed the efforts of implementing agencies and concluded that all activities were effective in meeting its aims of alleviating human suffering and restoring human dignity. A qualitative assessment of the cost-effectiveness concluded that the same results could not have been achieved for ‘less effort and investment’ given the extraordinarily dangerous circumstances in which the operation was conducted. It states clearly that a lower financial cost would have come at the expense of expatriate lives (Netherlands Development Cooperation 1994:166, 300).

**Problems of applying CEA to the evaluation of humanitarian assistance**

The above studies highlight some of the difficulties in assessing cost-effectiveness, and why CEA has not been routinely used as an analytical tool in the evaluation of relief operations. Although CEA has the promise of adding to the rigour of these evaluations, there are serious methodological and practical issues that need to be resolved.

**An ex ante or ex post evaluative tool?**

The few evaluations of humanitarian aid were undertaken as *ex post* assessments of performance and with the purpose of identifying lessons to be learned from the experience. However, in other sectors, CEA is primarily used as an *ex ante* tool for evaluating competing project alternatives. This raises the issue of how useful CEA would be in *ex post* evaluations of humanitarian aid. In the Rwanda evaluation, the results obtained using CEA revealed valuable insights as to, for example, the cheapest modes of transport for food delivery, the appropriate timing of resource allocations, and the advantages of incurring initial capital expenditure in order to reduce later operating costs. As this was an *ex post* evaluation, the benefit of ‘doing things differently’ cannot be realised; the only benefit will be if the lessons learned from Rwanda are applied to future humanitarian relief efforts.

This raises a further problem as to whether the lessons learned are context specific. As Hallam (1996:231–2) states, the circumstances in which food, water, and health services are provided are unique to the particular emergency. For example, the cost of producing a litre of water in one region may bear no relationship to the cost of producing water in another refugee setting. Nevertheless, Hallam concludes that despite being context specific, CEA data could serve as a useful guide for implementing and assessing
operations elsewhere, particularly in providing a breakdown of the cost components of particular activities. CEA could also be useful in prolonged emergency situations where there is the opportunity to change operations to achieve a greater effect.

CEA will add greatest value when used as an *ex ante* evaluative tool, because the possibility of making operational changes still remains. This requires incorporating CEA in the planning of humanitarian operations with the goal of identifying the least-cost methods of delivery. Of course the least-cost options may not be feasible for political, geographical, and security reasons. Nevertheless, incorporating cost-effectiveness into logistics planning will be a factor in improving outcomes.

**Problems of attribution**

In sectors such as health, there is typically a sole agency responsible for implementing a project, and an assessment of cost-effectiveness can, therefore, be linked to the performance of that agency. However, humanitarian emergency aid, is characterised by operations involving diverse activities and inputs, implemented by a large number of agencies, and often over a long period of time. For example, there were more than 200 Non-government organisations (NGOs) working in Goma at the height of the Rwanda emergency in 1994 (Joint Evaluation of Emergency Assistance to Rwanda 1996:152). With multiple agencies contributing towards the same objectives, it becomes difficult to attribute outcomes to the performance of a single agency. This limits the usefulness of agency-specific CEAs since effectiveness data cannot be isolated. In order to gauge the effectiveness of feeding programs in a refugee camp, it is necessary to know the number of people being fed by all agencies, and the total refugee population. This calls for an emergency-wide CEA. In practice, however, it is often easier to view disaster relief as discrete projects and conduct individual evaluations of each component (Fallenius 1996:238). Hence, in large-scale emergencies, it is more feasible to use CEA in evaluating outputs by individual agencies, than the more ambitious goal of assessing disaster-wide effectiveness.

**Timeliness and uncertainty**

Another factor that adds caution to the use of CEA in evaluating the response to complex emergencies, is the imperative for timely implementation. Often the need for food, drugs, and water is so urgent that massive loss of life will eventuate unless the required resources are airlifted into the affected area (Hallam 1996:227). In this case, quantified CEA results would fail to reflect the necessity for speed, instead showing road transport to be the more cost-effective form of transportation. Understanding the context of operational decisions is therefore vital in producing a balanced assessment of performance. This highlights the need for quantitative data to be read in conjunction with qualitative assessments of humanitarian aid effectiveness.
A related issue is the effect of uncertainty on information flows during complex emergencies. Benini (1997:336) sees uncertainty as being a function of both the war-ridden environment in which humanitarian aid is conducted and the complexity of agencies’ information systems. He believes there is typically a trade-off between effectiveness and uncertainty, in that agencies become less certain about key information (such as the number of beneficiaries) the more effective they become in their interventions. Uncertainty diminishes the accuracy of CEA results. So an effectiveness indicator such as the total numbers reached, cannot be used without a reasonable estimate of the total number of beneficiaries. This strengthens the case for assessing the efficiency of particular activities, rather than attempting to quantify the effectiveness overall.

**Political factors limiting the usefulness of CEA**

Another issue that calls for qualitative assessments of effectiveness to accompany quantified CEA data, is the political context in which humanitarian emergency is conducted. In some cases political factors limit the choices of aid agencies such that the most cost-effective mode of delivery is unavailable. Hallam (1996:231), for example, cites the case of supplying water to the refugee camp in Goma. A hydrological survey revealed that it would have been significantly cheaper to have invested in a pipeline to the camp compared with the enormous cost of continually tankering in water. However, the Zairean government would not allow the pipeline to be built for fear it would signal permanency to the refugees. This case reinforces the need for quantitative evaluations to be understood within the political context of the situation.

**Institutional resistance and data limitations**

Institutional resistance creates problems for the acceptance of CEA as a valid evaluative tool of humanitarian aid. In attempting to use CEA in the Rwanda evaluation, Hallam (1996:220) encountered considerable resistance amongst aid agencies. This was partly caused by a misunderstanding of the purposes of CEA, reflecting agencies’ concern that CEA would require the valuation of human lives in money terms (as occurs in CBA). Hence, there is likely to be a reluctance in divulging cost data because of disagreement on how it will be used and a fear that such analysis will lead to performance comparisons between agencies.

In addition to the reluctance of agencies to divulge cost data, there is the problem of the usefulness of the data itself. Hallam (1996:228–9) encountered problems with data availability while attempting to undertake CEA of the Rwanda operation. He found that agencies were unable to collect adequate data during the early stages of the Rwanda relief operation, as staff numbers were inadequate and the workload overwhelming. Data on effectiveness was also lacking for certain functions, particularly those related to health care such as the numbers of vaccinations and medical consultations. Data also became less complete as more agencies became involved in particular activities. Hence, data on food deliveries was easier to collect because the World Food Program (WFP) was the major supplier, whereas in the area of health care there were multiple NGO providers which added to the difficulty of data collection.
Hallam also found data on costs even more difficult to obtain and analyse. Although the Financial Tracking System (FTS) used by the UN, was the major data base for recording expenditures, the information was of limited use for CEA purposes. The absence of standard accounting practices meant that many agencies did not record expenditures by activity or beneficiary group ¾ a pre-requisite for CEA calculations ¾ and expenditure was often recorded in different currencies and in different financial years. The usefulness of CEA in evaluation hinges on the accuracy and completeness of data provided by implementing agencies. This will require greater cooperation between agencies and a willingness to standardise accounting practices in future complex emergencies.

Problems of measuring cost

In addition to the problems of data collection and dissemination, there are methodological issues associated with measuring costs that pose problems for the analysis. All costs, including those borne by the donors, beneficiaries, and host country, need to be estimated. One of the problems is how to value in-kind donations of food and other materials. Hallam (1996:229) found that different methods were used for valuing in-kind donations in the Rwanda emergency. This again calls for standardisation in the accounting treatment of these items.

Another issue related to food delivery is how to treat theft and ‘lost convoys’ ¾ a problem endemic to complex emergencies. The high levels of food theft encountered in Somalia, for example, would diminish cost-effectiveness had a CEA been undertaken. In this case, agencies incurred considerable costs on security to protect food convoys. However, this would adversely affect CEA results by indicating poor performance, when in fact banditry was beyond the control of the implementing agencies. Therefore, the costs associated with food theft and the costs incurred in preventing it need to be treated separately, if CEA is to contribute to the meaningful evaluation of agency performance.

Even more difficult to value are the costs borne by the host country. These include the externalities associated with the failure to provide appropriate humanitarian aid. During the Rwanda emergency, for example, the failure to provide cooking fuel to the refugees led to extensive deforestation around the camps in Zaire and Tanzania (Hallam 1996:227). Another problem is the inflationary effects of humanitarian assistance itself. The enormous sum of money channelled into host countries in a short period of time inevitably drives up prices for housing, food, and other basic commodities. Inflation, obviously, has an adverse effect on local populations, yet is difficult to relate to the costs that need to be included in a CEA. Further thinking is required on this issue if CEA is to be incorporated into evaluation practices.

Cost-efficiency analysis: an alternative tool for evaluation

The above section has provided an overview of the practical problems in conducting a CEA of humanitarian assistance. Given the particular characteristics and circumstances of humanitarian aid, it may be more realistically achievable to investigate the process of humanitarian aid delivery (cost-efficiency analysis) rather than the outcomes achieved.
from these activities (cost-effectiveness analysis). Although cost-efficiency analysis is a more limited form of CEA, small improvements in efficiency can lead to large resource savings. For example, the Rwanda evaluation team identified four areas where either CEA or cost-efficiency analysis yielded useful insights — food logistics operations, water supplies to the refugee camp in Goma, the airlift, the cost of military contingents (Hallam 1996:222–4).

Cost-efficiency analysis has the added advantage of enabling the analyst to use narrower output indicators for particular activities, like food delivery, rather than broader, and more difficult to define, effectiveness indicators. It is easier to link outputs, such as tonnes of food delivered, litres of water produced, numbers of patients treated, with their cost, than outcomes, such as rates of malnutrition. Malnutrition, for example, can be caused by contaminated water, poor hygiene, and inadequate health care, and not simply a lack of food (Burkholder and Toole 1995:1014). In this case, it is not feasible to isolate the costs of interventions that have multiple purposes and link them with particular outcomes.

Even in the health care sector, commentators such as Hildred and Watkins (1996:772–3) express concern at the competence of non-economists in using CEA. They state that uncertainties in using outcome measures and the failure to correctly calculate costs have led to ill-founded conclusions, such that CEA should not be the dominant basis for deciding the allocation of health resources. This is not to say that effectiveness should no longer be a criterion for evaluation. On the contrary, evaluators should continue to make qualitative assessments of the effectiveness of humanitarian interventions. It is only when attempts are made at quantifying effectiveness by linking outcomes with cost, that many of the difficulties arise.

Conclusions

This paper has sought to reach a judgement on the usefulness of applying CEA in evaluations of humanitarian aid. As the only study that has attempted CEA, the Rwanda evaluation revealed useful insights as to how aid interventions can be implemented efficiently. It also showed the many institutional, methodological, and data hurdles that need to be overcome if CEA is to be applied as an evaluative tool. Some of these issues can potentially be resolved by, for example, improving agency co-ordination and standardising cost accounting practices. However, other problems such as those related to attribution, uncertainty, and the need for timeliness, continue to prevent the application of CEA to many of the functions of humanitarian aid.

As suggested, the way forward appears to be in taking the more modest approach of using Cost-efficiency analysis. Cost-efficiency analysis offers the potential, particularly in the ex ante stage of intervention, of identifying resource savings. Nevertheless, quantitative evaluations of humanitarian aid will never be sufficient alone. While adding to the rigour of evaluations, the specific geographical, political, and operational context in which interventions are conducted necessitates qualitative judgements of aid effectiveness. Hence, CEA and cost-efficiency analysis should only be viewed as a support to qualitative opinion and not as the ultimate measure of success or otherwise.
References


