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**Cost-effectiveness Analysis:**

**A Useful Tool for  
the Assessment and Evaluation of  
Relief Operations?**

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# Cost-effectiveness Analysis: A Useful Tool for the Assessment and Evaluation of Relief Operations?

Alistair Hallam

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## Abstract

In a context of stagnating levels of official development assistance, bilateral expenditures on emergency assistance are rising dramatically, leading to increased scrutiny by evaluation departments of the way in which such assistance is provided. As a result, cost-effectiveness analysis of relief operations is now being accorded greater attention.

*Cost-effectiveness analysis* is not the same as *cost-benefit analysis*. It does not entail valuation of human life or quantification of human suffering, and is of use in those situations where benefits cannot be reasonably measured in monetary terms. Cost-effectiveness analysis is, therefore, a potentially valuable tool for the evaluation of relief operations, where the aim is to save lives and reduce suffering.

It is essential that the relationship between costs and performance of relief activities be fully explored and understood: in a world where numerous competing demands are being made upon finite aid resources, the inefficient use of funds in one operation may reduce the availability of funds for other operations where needs are equally critical.

Formal cost-effectiveness analysis of relief operations can, however, be fraught with difficulties, both practical and methodological. Such difficulties arise from the fact that relief operations characteristically take place in complex and rapidly changing environments, and involve a large number of donors, UN agencies and NGOs undertaking a wide range of activities. As a result, the particular effects of any one intervention can be impossible to isolate. In many cases, *cost-efficiency analysis*, which investigates the process of aid delivery rather than the outcome, may be a more appropriate tool.

To facilitate evaluations of relief assistance, those involved need to revise the way they collect data, and prepare reports. There needs to be less emphasis on strictly financial reporting and more on reporting in relation to activity. This would considerably enhance the usefulness of the evaluation process.

However, while attention to efficiency and cost-effectiveness analysis is important, it should not detract from issues of impact and overall suitability of a relief operation. Evaluations should include analysis of a political and anthropological nature.

# Cost-effectiveness Analysis: A Useful Tool for the Assessment and Evaluation of Relief Operations? <sup>1</sup>

## 1. Introduction

According to the most recent DAC<sup>2</sup> Annual Report, total expenditures on emergency assistance continued their upward trend in 1994: bilateral expenditure on emergency and disaster relief (excluding food) rose to an all-time high of \$3.5 billion, while, if DAC members' emergency food aid and their contributions to multilateral institutions for emergency purposes are included, the total would be about \$6 billion, or roughly 10 per cent of their total official development assistance. This compares with a 1980 level of bilateral emergency assistance of \$353 million, or 2% of total bilateral aid.

Such dramatic increases in the level of expenditure on humanitarian aid operations are inevitably leading to increased scrutiny of the way emergency assistance is provided. In the case of public funds, such scrutiny is principally undertaken by the evaluation departments of bilateral donor organisations and national audit offices, which are now obliged to undertake more frequent and in-depth evaluations of aid operations. As a result, cost-effectiveness analysis of relief operations is now being accorded greater attention.

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<sup>2</sup> The DAC - the Development Assistance Committee - is a specialised committee of the OECD, whose members have agreed to secure an expansion of aggregate volume of resources made available to developing countries and to improve their effectiveness. To this end, members review the amount and nature of their aid contributions, and consult each other on aid policies. The members of the DAC are Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Ireland, Italy, Japan, Luxembourg, the Netherlands, New Zealand, Norway, Portugal, Spain, Switzerland, the United Kingdom, the United States and the European Commission.

The Joint Evaluation of Emergency Assistance to Rwanda, published in March 1996, provides an important example of cost-effectiveness being used as one of the criteria in the evaluation of an emergency. This unprecedented collaborative study was funded by 20 donor organisations and UN agencies, and supervised by a Steering Committee comprising 37 agencies and organisations including OECD countries, the European Union, UN agencies, international organisations and NGO umbrella organisations. Study III 'Humanitarian Aid and Effects' assessed the activities of the various agencies involved in the provision of emergency aid and protection assistance using the criteria of appropriateness, cost-effectiveness, coverage, coherence, connectedness and impact<sup>3</sup>.

Drawing heavily upon the experience of the Study III Team, this paper seeks to:

- i) briefly review perceptions of cost-effectiveness analysis among relief agency personnel, define the terms involved, and explore the use of cost-effectiveness analysis in related fields;
- ii) identify those activities and situations where cost-effectiveness analysis appears to be most viable and useful;
- iv) identify the difficulties of attempting to use cost-effectiveness as a criteria in the assessment and evaluation of humanitarian aid operations;
- v) suggest steps to be taken to facilitate the greater use of cost-effectiveness, or related forms of financial analysis.

## 2. Financial Analysis

### 2.1 Perceptions among relief agency personnel

Informal discussion with personnel from a variety of agencies involved in humanitarian aid programmes reveals a widespread unease towards the use of cost-effectiveness analysis in the assessment of performance - in some quarters the attitude is openly hostile. The

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<sup>3</sup> Appropriateness, cost-effectiveness and impact are among the criteria generally used in evaluations undertaken by donor organisations (see Berlage and Stokke, 1992, Casely and Kumar, 1987 and IFRC World Disasters Report 1995, Chapter 5). The criteria of coverage, coherence and connectedness were borrowed from a 1994 paper by Larry Minear (see Minear, 1994).

arguments generally used are that during a humanitarian crisis the level of suffering is so great and the need for assistance so evident and urgent, that financial considerations are quite simply irrelevant, if not immoral. Further discussion reveals that much of the hostility to the idea of cost-effectiveness analysis arises from a lack of understanding as to exactly what is involved, where it can be useful and where its limitations render it unsuitable. In particular, there is confusion as to the difference in meaning between cost-benefit analysis and cost-effectiveness analysis, leading to a tendency to reject the latter as unsuitable because of valid concerns about the former.

The main area of concern about *cost-benefit analysis* is that it requires the valuation of benefits in monetary terms. It is not, therefore, considered a suitable tool with which to evaluate projects where the benefits are largely intangible, such as better health or access to education, nor those projects where the process of change in itself may be as important as the actual outcomes. Many development projects, and most relief projects, fall into precisely these categories, and hence the concern.

In some cases it is possible to use a measurable benefit as a proxy for an intangible one. For example, health and sanitation benefits have been valued in terms of the number of hours of work gained by decreasing the incidence of disease amongst the workforce. However, despite the continuing attempts by economists to develop ways to assign values to intangibles, no wholly satisfactory solution to the problem has emerged. Good health is clearly worth far more to a person than would be reflected by simply calculating how many extra hours they can work as a result of less time off due to sickness, and then multiplying this by their wage rate. As a result, the usefulness of cost-benefit analysis is limited to those projects with largely tangible benefits, and NGOs are thus right to regard the process as being highly inappropriate for the evaluation of relief programmes, where the primary aim is to save lives and reduce suffering.

Cost-effectiveness analysis, however, does not require the valuation of benefits. Indeed, it is of use precisely in those situations where benefits cannot be reasonably measured in monetary terms. Although there are practical and methodological difficulties involved in the use of cost-effectiveness analysis to evaluate relief programmes, there is no moral basis on which to reject its use, and if an end result of its application leads to aid resources being used more effectively, then it is certainly not irrelevant.

## 2.2 Cost-effectiveness analysis

Cost-effectiveness analysis avoids many of the difficulties of cost-benefit analysis, and requires no methodologically uncertain valuation of intangible benefits. There are essentially two approaches: one of which starts with a fixed target level of benefits and seeks the cheapest way of achieving these, and the other, which involves the quantification (though not the valuation) of benefits, and seeks the procedure which will give maximum benefits per unit cost.

The first of these two approaches is known as 'least-cost combination' or the 'constant effects' method, and seeks to determine the least expensive combination of tangible costs that will realise essentially the same stated level of tangible and intangible benefits. For example, can the same health benefits be provided at less cost by constructing fewer large hospitals but more clinics manned by paramedical personnel? By constructing a waterborne sewerage system or by installing low-cost household sanitation facilities that do not require sewers? Can the same number of lives be saved more cheaply by buying up all the property rights in a flood plain and moving people out, or by constructing dykes and levees?

This approach to cost-effectiveness analysis is currently carried out as part of some immunisation programmes, to determine, for example, whether it would be cheaper to attain a stated target rate of coverage for a particular vaccination through a mass campaign or by including vaccinations as part of a general visit to the local health post. A campaign might involve the purchase of vehicles and fuel, the hiring of staff, and the payment of overtime and per diems for long stays in the field, whereas the incorporation of a vaccination component as part of the health programme delivered through clinics might require the setting up of a more extensive cold chain and increased training of existing staff, but might lead to considerable savings elsewhere, as more intensive use is made of existing infrastructure. The final result might depend very much on the rate of coverage desired. A very high rate to prevent an expected epidemic may mean that a campaign is more cost-effective whereas, in other situations, it may be cheaper to achieve a given coverage without setting up a system to run parallel to existing services.

In this type of cost-effectiveness analysis, no reference is made to the value to the population of the benefit received through the project, hence no measure of absolute project worth can



be obtained. It can only be used to compare different approaches to achieving the same goal - no absolute judgements can be made.

The second approach to cost-effectiveness analysis, known as the 'constant cost' method, involves the quantifying of benefits, but without attaching a monetary price or economic value to them. For example, family planning organisations use 'couple-years-of-protection' (CYP) as a quantitative measure to appraise different projects: 13 packets of contraceptive pills are estimated to offer one CYP, as are 150 condoms, whereas an IUD is estimated to offer three and a half CYP. Given a specific budget, and information on the costs of providing the alternative family-planning services in different countries, a number of programmes can be ranked in terms of which provide the most CYP. Funds can then go to where they would have the most impact. However, once again, no reference can be made to the value of the family planning programme - one project may provide more CYP per unit cost than another, but other criteria would need to be used to determine whether the programme was worth doing at all.

Although there are criticisms of this sort of approach, the method is currently being extended by organisations like WHO and the World Bank, so that the benefits of expenditure on health interventions in different parts of the world can be compared. On the basis of historical epidemiological data, diseases are ranked in terms of their impact or burden on affected populations. By assessing how different degrees of disability affect the quality of life, this burden is expressed using single indicators, such as the Quality-Adjusted Life Year (QALY) or the Disability-Adjusted Life Year (DALY).

Predictions are made as to the effectiveness of specific health interventions in reducing the incidence of disease. The costs of intervention can then be related to the QALYs or DALYs that would be gained or lost. For example, US\$100 might pay for 20 children to be vaccinated against meningitis in a particular region of Bangladesh which, given the incidence of the disease and the effectiveness of the vaccine, would be expected to prevent 4 cases of meningitis, resulting in one death less and reduced disability in two individuals, equivalent to a gain of, say, 50 QALYs.

Once this work is completed, it should theoretically be possible to see where expenditure of a single US dollar on healthcare would have the most impact worldwide, be it on dialysis machines in the UK or on cold chains in Somalia - a seemingly attractive proposition for

those who wish to ensure that maximum impact is obtained from scarce budgetary resources.

### 2.3 Cost-efficiency

Analysts often use the concept of 'efficiency' to refer to the process of implementation of a project, in contrast to the effectiveness, which refers to its outcome or end benefits. A cost-efficient project is then one where the inputs are supplied and used in such a way as to achieve certain specific *outputs* at lowest cost, whereas a cost-effective project is one where specific *objectives* are achieved at lower cost. A project can, therefore, be cost-efficient, without necessarily being particularly effective. For example, a school could be very efficiently built, but a lack of teachers mean that the objective of increasing school attendance not be achieved.

It is worth noting that many analysts use the term 'cost-effective' in place of cost-efficiency, and it is generally true that if a project is not efficient, it cannot be as effective as possible: supplying the inputs of a project at lower cost, or adapting implementation procedures so that the same outputs are delivered more efficiently, can only improve the cost-effectiveness of a project. Cost-efficiency is, in other words, necessary to ensure cost-effectiveness, but is not sufficient to do so.

## 3. Experience of Using Cost-effectiveness Analysis in Evaluating Emergency Assistance to Rwanda in 1994

### 3.1 Why cost-effectiveness analysis was undertaken

Between April and December 1994, an estimated \$1.4 billion was spent by donor organisations, UN agencies, international organisations and NGOs on the provision of humanitarian assistance within Rwanda and to Rwandese refugees in neighbouring countries. A desire to assess the effectiveness of such massive expenditures was an important stated motive of the donor organisations involved in establishing the Joint Evaluation, to "draw lessons from the Rwanda experience relevant for future complex emergencies as well as for current operations in Rwanda and the region". Each Study was commissioned, and the quality of its work monitored, by a member of a Management Group

made up of the Heads of the Evaluation Departments of five bilateral donor organisations. In the case of Study III, this role was performed by the Evaluation Department of the UK ODA. During the process by which an analytical framework and broad workplan was developed by the Study III Team, the Evaluation Department of ODA strongly encouraged the inclusion of cost-effectiveness as a criteria.

### 3.2 How it was planned to undertake the analysis

Members of the Study III Team were well aware of the likely data problems and methodological difficulties of assessing the cost-effectiveness of the response. Nevertheless, it was felt that there were four particular aspects of the international response where cost-effectiveness analysis would be feasible and capable of yielding useful insights. These were:

#### *The food logistics operation*

The supply, transportation and distribution of food is not only critical to the survival of beneficiary populations but it also invariably represents the largest single component of relief operations (in the case of the Rwanda operations between April - December 1994, such activities were found to have cost over \$350 million). Moreover, there appeared to be interesting issues to examine: a WFP internal report made available at an early stage of the evaluation indicated that substantial savings in operating costs could have been obtained by investment in road repair and the procurement of additional railway engines and rolling stock for the Tanzanian Railway system, had adequate up-front funds been available.

#### *The provision of water to refugees*

As with food, the production, storage and distribution of water was a critical activity, particularly in Goma where the sudden influx of 850,000 refugees from Rwanda in mid-July created an urgent need for the establishment of pumping, storage, tankering and distribution systems. Expenditure in this sector was substantial, involving as it did the provision and transport of water by the US military, private contractors, civil defence/disaster response teams as well as NGOs such as Oxfam. There were cases of very high expenditures on particular activities within the sector. For instance the large capacity hydro sub-pump provided and operated by PWSS, a contracted US company, was flown non-stop from California to Goma by the US Air Force (involving two mid-air refuellings) on the

personal instructions of President Clinton; one NGO collected and transported water from Lake Kivu using a large bucket suspended from beneath a helicopter.

It was recognised that the ad hoc nature of the response in the water sector, the large number of organisations and agencies involved and the range of approaches to the production and distribution of water, were all likely to create considerable difficulties for the evaluation team in terms of data availability and isolating the costs associated with particular agencies and activities. However, it was expected that, at the very least, it would be possible to obtain figures on the cost per litre of water produced and distributed by the various methods used. In addition, it was hoped that information on cholera and dysentery rates at different sites might prove useful when comparing the suitability of different approaches to water production and delivery.

### *The airlift operations*

The airlift of relief resources played a vital role in the emergency programme, particularly in Goma, where there were only very limited stocks in place when the refugees arrived. The airport was used intensively in the early days, with flights arriving from all parts of the world. There were anecdotal reports that inappropriate items were sent by air, that non-urgent items displaced urgent items and that the airlift operations continued for longer than necessary with aircraft operating over routes open to overland transport. It was hoped that a comparison between the costs of delivering items by road, air, and, where available, rail would be possible, taking into account the fact that certain materials were needed urgently. It was hoped that such analysis would reveal where improvements could be made to the organisation of emergency airlifts in general.

### *The role of the bilateral military contingents*

Military contingents played a substantial role in the international response not only in the provision of security but also in terms of providing support to humanitarian agencies and in some cases undertaking direct distributions themselves. The US, Israel, Japan, and the Netherlands deployed military contingents to help with the relief operation at the refugee sites in Eastern Zaire, in response to a request by UNHCR for Governments to provide “self-contained service packages”. Others deployed troops inside Rwanda, either as part of

UNAMIR (eg the UK, Australia, Ghana and Ethiopia), or outside the UNAMIR framework (eg France, the US and a bilateral Canadian contingent).

Initial evidence suggested that the use of military contingents in the provision of humanitarian assistance was particularly expensive, their personnel on the ground being backed up by human and material resources well in excess of those available to NGOs and UN agencies, and, apparently in excess of, or inappropriate to, what was needed for the job-in-hand. The US Army, for example, flew in Reverse Osmosis Water Purification Units (ROWPUs) to pump and filter water out of Lake Kivu. These produced small quantities of very high-quality water when what was needed was large quantities of *cholera vibrio* free water.

Assessing the cost-effectiveness of the military contingents also promised methodological challenges in ascertaining the extent to which the resources provided by military capacity were additional to, and thus interchangeable with, the resources provided by the donor organisations of the same country. UNHCR, without any doubt, would never have received comparable amounts in cash to finance those activities undertaken by the military. As a result, some agencies felt that considerations of cost-effectiveness simply did not apply to the military: according to anecdotal evidence, NGOs taking advantage of a general offer by the US Air Force of free cargo flights transported non-urgent items when road transport was also available. However, many of the additional costs incurred by the military were subsequently recorded as official aid donations, and in some cases, a proportion of the additional costs were actually met from the aid budget, thereby possibly prejudicing the level of funding available for other relief or development projects. The service offered by the military may not, therefore, be as costless as it might appear to the NGO or UN agency concerned. As a result (and because the most effective use of public funds is, in any case, of interest to the wider constituency of taxpayers) it was decided to include those military contingents which provided support to humanitarian agencies within the assessment of cost-effectiveness.

Another methodological problem anticipated was that of establishing realistic comparators for the work of the military contingents. This required the identification of activities undertaken by both military and non-military actors in the same area and under comparable conditions. Initial information indicated that this would be possible for: the airlift operation, where commercial air charters and military planes were used over the same routes; the pumping and distribution of water, undertaken by US forces, private

contractors and NGOs; and the provision of basic health services in which NGOs and a number of military contingents were involved.

It was recognised that obtaining accurate information from the military on the cost of their contingents and particular activities undertaken might be problematic but it was felt that the strong commitment to the Joint Evaluation by many donor governments, some of which had deployed contingents during the response, would result in access to cost estimates.

### 3.3 Findings

Broadly speaking, due to a combination of data and methodological problems (discussed in the following sections), the attempt to apply cost-effectiveness analysis to the four areas of activity outlined above was only successful in the case of the food logistics operation and the airlift.

In the case of the food logistics operation, the analysis undertaken revealed a cost of US \$70.8/tonne by rail from Mombasa to Kampala (total distance 1,333 kilometres giving a rate of US \$0.053/tonne/kilometre) as against US \$115/tonne by road (US \$0.086/tonne/kilometre). For Dar-es-Salaam to Ngara, via the railhead at Isaka (total distance 1,363 kilometres) the mixed rail/road rate was US \$85/tonne (US \$0.052/tonne/kilometre) compared to a road-only rate of US \$134/tonne (US \$0.098/tonne/kilometre). Given that approximately 170,000 tonnes of food were transported in 1994 alone, the impact on budgets of using the right channel are enormous. In fact, 90% of the 170,000 tonnes of commodities transported by WFP during 1994 used rail or the road/rail option (depending on the destination), while ICRC relied entirely on road transport for the 8,800 tonnes moved between Mombasa and Nairobi in 1994, and only used the road/rail option for 35% of the 55,000 tonnes they transported from Dar es Salaam to their distribution points in eastern Tanzania and Rwanda. It appeared that the smaller tonnages moved by the ICRC limited the agency's ability to make effective use of the block train operations utilised by WFP.

When examining air transport, the uncertainty over the charging basis used by military operators meant that it was not possible to establish the average cost per tonne carried by aircraft. Cost information was obtainable, however, for commercial air transport: large-capacity charters using jet aircraft, operating from Europe to the region, cost approximately

\$0.6/tonne/kilometre, while a smaller-capacity commercial turboprop aircraft, carrying a 16-tonne load between Kampala and Goma cost approximately \$1.0/tonne/kilometre. This compares with a commercial trucking rate of just over \$0.20/tonne/kilometre between the same locations. Commercial air transport within the region was, therefore, approximately four to five times more expensive than road transport (and between ten and twenty times more expensive than rail transport, where this option was available).

Military transport accounted for almost half the flights carrying humanitarian cargo to the key locations of Goma, Bukavu and Kigali and were significantly more expensive than commercial flights over equivalent routes. On the basis of the limited evidence available, it appeared that, on a total cost basis, military aircraft were 4-8 times more expensive than commercial aircraft. Thus, in those instances where military aircraft operated over the same routes as functioning road transport routes, such as between Entebbe and Goma, the use of military aircraft to carry cargoes that could have travelled by road was between 20 and 40 times more expensive.

In the case of water provision, the complexity of the operations and the rapidity with which they were established meant that cost data was simply not available for particular activities. The attempt to assess the cost-effectiveness of military contingents was also thwarted by a lack of sufficiently detailed or organised cost information on the activities undertaken by the military.

The particular difficulties encountered are presented below. They broadly fell into three types of difficulty: that of establishing a satisfactory framework for the analysis; lack of data on effectiveness; and lack of data on cost.

#### 3.4 Difficulties encountered: lack of data on costs

The critical constraint on using cost-effectiveness analysis during the evaluation was the difficulty of obtaining basic data on costs, whether at the aggregate level, or for particular activities. Although the Study III Team were given access to DHA's Financial Tracking System (FTS) - which categorised donations by donor, channel (UN agency, NGO, military contingent), country where project was undertaken and implementing agent and activity - most donors, despite repeated requests by DHA for information in a standardised form, presented financial data in the way that was most convenient to them. As a result, it was not possible

to compare expenditures on Internally Displaced Populations (IDPs) in camps with those on interventions in areas to which refugees and IDPs were returning, nor was it possible to compare expenditures on activities inside Rwanda with those on activities outside the country. The categorisation of expenditure by activity was also impossible.

The available data was further complicated by the fact that many donors gave funds to UNHCR against the general consolidated emergency appeal which were subsequently passed on to a large number of implementing partners. The FTS was incapable of recording this onward flow of funds. Information on expenditure by month was also difficult to obtain, as donors often referenced their donations to their own particular financial year, or recorded all donations as being made at the date of the emergency appeal. The information in the FTS is recorded in dollars, but was provided by the donors in terms of national currencies, many of which had been appreciating and depreciating fairly widely against each other during the year.

As a result of the limitations of the FTS, considerable time and effort was spent by the Team Economist in contacting bilateral donors, UN agencies and NGOs in an attempt to obtain data in a form that would allow for a more disaggregated analysis of expenditure. Additional information was obtained, though it proved of limited use, due to the fact that:

- i) many agencies do not record their expenditure by activity or beneficiary group, particularly those working on multi-sectoral relief programmes. Their accounts are primarily produced for auditing requirements, and not to allow for detailed cost-effectiveness analysis of projects;
- ii) where expenditure is classified by activity, no standard classifications are used, so the same project can be recorded in different ways by the NGO, UN agency and donor involved. In addition, the same project can be recorded using different currencies and under different financial years, as donors fund NGOs from countries different to their own. This makes it very difficult to reconcile information received from multiple sources;
- iii) the value of aid-in-kind is measured in a number of different ways;



- iv) complex sub-contracting arrangements were entered into between and amongst bilateral agencies, UN organisations and northern and southern NGO partners, involving the transfer of human and financial resources, as well as aid-in-kind. It became difficult to trace the flow of funds, let alone work out end-use of resources;
- v) there is no standard way of dealing with the issue of overheads. In looking at the performance of different NGOs, it is clearly important to include all the costs involved, whether incurred in the field or at headquarters. NGOs, when collecting from the public, generally wish to downplay the proportion of funding that goes on overheads, yet when seeking funds from official donors like to raise overheads as high as possible to increase the level of 'own' resources. This problem was compounded by the numbers of agencies involved in some sort of sub-contracting arrangement (see point iv) above).

Despite a considerable input of time and effort, very little useful information was obtained on the costs of the various military contingents. Figures for the additional costs incurred by the military during their deployment (namely those extra costs incurred solely as a result of their presence in Goma and the region - the salaries of soldiers, for example, would not be included) were obtainable for those countries that recorded such costs as part of their humanitarian contributions, but total costs of deployment were impossible to obtain. It was thus very difficult to compare the cost-effectiveness of military contingents with that of NGOs, when only partial cost information was available for the former.

Given the high profile of those military contingents active in the humanitarian response, and the representation on the Steering Committee of the Joint Evaluation of governments which sent military contingents, this poor response to requests for data on military expenditures was disappointing. The deployment of a military contingent overseas is very expensive, and where it is made on humanitarian grounds, a proportion of the costs may be met from aid budgets. It is vital, therefore, that cost-effectiveness analysis be carried out, for recourse to the military can directly affect the volume of funds available for other humanitarian activities.

As a consequence of the failure to obtain adequate cost information on the military during the evaluation, and of the importance of the issues involved, the Study III report contained an explicit recommendation that a separate study on the pros and cons of military

involvement be carried out, with the involvement of the donors concerned. This recommendation is currently being discussed amongst the DAC members.

### 3.5 Difficulties encountered: lack of data on effectiveness

It was recognised from the beginning that some activities would be far more amenable to performance measurement than others. For example, the tonnage of food delivered to a refugee camp is easier to monitor and record than a more intangible benefit such as the provision of health services. However, even for the same activities, the availability of data varied considerably depending on the area of operation, the agency involved and the particular beneficiary groups.

The Study III Team generally found that information on refugee operations outside Rwanda was more plentiful and easier to obtain than information on those operations inside Rwanda that provided assistance to IDPs and other beneficiary groups. This experience largely reflected the fact that a single agency, UNHCR, had an unambiguous mandate to protect refugees and coordinate activities in the camps outside Rwanda, whilst inside Rwanda, coordination and the division of responsibilities was much more confused. Initially, this confusion was a result of the civil war and the high levels of insecurity in much of the country. Later it was attributable to the combination of a new, inexperienced and poorly-resourced government in Kigali, and the lack of a single UN organisation strong enough to ensure standardization in data collection techniques and to impose some discipline on the large number of NGOs which arrived in the country after the end of the conflict in July 1994.

Amongst the refugee sites, Goma, with its larger scale and higher profile, had the best epidemiological information available, thanks to the presence of teams from CDC, Epicentre, WHO, and UNICEF.

Differences in data availability also depended upon the number of organisations involved. For example, most of the food aid supplied to the refugee camps was delivered by a single UN agency (WFP), whereas there were up to a dozen NGOs working in health care in some of the camps. It was thus far easier to track down sources of data on tonnes of food delivered than on vaccinations given or consultations carried out. The number of organisations involved also made it difficult, even where data was available, to isolate the

contribution of any one particular organisation and illustrated the considerable advantages of conducting multi-donor evaluations, where overall effort is considered.

Another problem was common to most relief operations: in the early stages of an emergency operation, the heavy demands upon relief personnel and organisational structures preclude adequate data collection. This was certainly the case during the crisis in the Great Lakes - UNHCR, for example, had only two international staff present in Goma on the first day of the influx of close to 850,000 refugees. When the airlift into Goma started, record keeping of the manifests was poor and it is impossible to know in retrospect what commodities and equipment were flown in on some of the first flights. This problem was exacerbated by vague or incomplete manifests which did not describe all the items aboard or used unhelpful general terms such as 'relief goods'.

### 3.6 Methodological issues: establishing a satisfactory framework for cost-effectiveness analysis

#### *Dealing with the high levels of uncertainty*

##### *Cost-efficiency or cost-effectiveness*

The Rwanda operation was extremely complex, involving, at different stages, genocide, a rapidly shifting front-line in a civil war, the movement of over two million refugees from Rwanda to four neighbouring countries, concurrent Chapter VI and Chapter VII UN peace-keeping operations and a huge internally displaced population within Rwanda. As a result, it was often difficult to accurately relate cause to effect. For instance, did the massive relief operations in Goma encourage Hutu refugees to remain in Zaire rather than return to Rwanda and thereby lead to the current impasse? Had the relief operation not been undertaken in Goma, how much greater would the mortality rate have been over and above the 50,000 who died in the first few weeks after the influx in mid-July 1994? If massive efforts had not been made to provide relief to the Hutu refugees in North Kivu, would the conflict between the indigenous Zaireans (the Hunde) and the Banyarwanda in North Kivu, which had already claimed the lives of several thousand people in 1993, have been re-ignited by the refugee influx, resulting in thousands more being killed? The lack of counterfactuals means that it is impossible to know how many lives may have been saved by the relief operation and thus impossible to generate even highly approximate estimates of the cost

per life saved. In such a context cost-effectiveness analysis of the overall operation is simply not possible.

In the context of such major uncertainties, cost-effectiveness analysis can only be meaningfully carried out for specific, highly defined, components of a relief programme, and even then, the rapidly changing situation, and the wide range of needs that must be met simultaneously in order to protect vulnerable populations, means that great care is needed to distinguish between outcome indicators (malnutrition, mortality and morbidity rates, etc.) and process indicators (tonnes of food delivered, litres of water produced, drugs dispensed, patients seen, etc.). Malnutrition, for example, is not caused solely by a lack of food, but also by poor hygiene, inadequate water supplies and lack of health care. Malnutrition, as an indicator of effectiveness, might not, therefore, be suitable to use in assessing the performance of a food logistics system - an efficiency indicator might be more appropriate.

The importance of using the correct indicator was demonstrated by Study III Team's analysis of WFP's logistics operation during the Rwanda crisis. The Transport Economist showed that this operation was generally very efficient, while other members of the Team found that, in the early stages of the operation, high levels of malnutrition were recorded amongst certain vulnerable groups in the camps in Goma. WFP had used the transport corridors with the lowest costs (via the port of Dar-es-Salaam, rather than Mombasa) and had relied principally on the cheapest mode of transport (the railways), but their responsibility lay in delivering the food only up to storage points (the Extended Delivery Point - EDP) next to the camps. From there, it was a responsibility of the NGO partners of UNHCR to deliver it to the refugees themselves. The quantities of food delivered to the EDPs were generally sufficient but, unable to deliver to individual households because of the numbers involved, NGOs had delivered food directly to self-elected refugee representatives. These were often members of the former regime such as commune leaders or mayors, who diverted rations away from the camps to fund non-humanitarian activities. This was found to be the principal cause of the high rates of malnutrition. Despite a very cost-efficient logistics operation, the ultimate objective of preventing malnutrition in the camps was not fully achieved.

*The cost-effectiveness of preparedness measures*

Relief expenditures in Rwanda and the region tended to be very reactive to events, reflecting, to a certain extent, the high levels of uncertainty surrounding unfolding events. However, there seems little doubt that considerable savings could have been made, and effectiveness enhanced, had the signals of the impending crisis been read and analysed correctly, and the appropriate investments made. WFP, for example, could have made substantial savings in operating costs, had they had sufficient up-front funds with which to invest in road repair and the procurement of additional railway engines and rolling stock for the Tanzanian Railways.

ICRC pre-positioned supplies in preparation for cross-border operations inside Rwanda, and these stocks enabled the first distributions of food and non-food items to commence within hours of the start of the influxes in these locations. This gave WFP time to open land routes, and organise the first deliveries, thereby avoiding the need for bulk food to be airlifted in, and resulting in considerable savings.

MSF-Holland and OXFAM had also built up supplies and equipment in Goma. OXFAM used approximately £400,000 of its privately-raised funds to purchase and pre-position water equipment, which enabled the agency to rapidly establish water production, storage and distribution systems in Mugunga and Katala camps. For a number of years prior to the influx of 1994, MSF-Holland had been building up the capacity of a local Zairean NGO that was involved in supplying drugs to the local health structures and, in addition, had deliberately built up a large stock of drugs in anticipation of instability in the region. This stock was used in the initial phase of the response by MSF as well as by other organisations, and was available immediately.

The two agencies which undertook these very positive preparedness measures shared some common characteristics: both already had a presence on the ground, and both had access to their own funds. Although UNHCR had a contingency plan for Goma, this was not wholly adequate for the unfolding situation on the ground, and nor was it fully operationalised by the time of the influx. Although there was a complex sequence of events which led to this state of affairs, the Study III Team concluded that more effective contingency planning and greater investment in preparedness measures (for example the presence of additional technical personnel in the weeks prior to the influx, the establishment of increased off-loading capacity at the airport, etc.) would probably have improved the effectiveness of the

response. It would, in addition, almost certainly have significantly reduced the costs of the ensuing operation.

A common fear with up-front investments is that if no crisis occurs, or if it unfolds in an unexpected manner, donors may consider them to have been a waste of funds. Yet, in many developed countries, risk analysis and investment in preparedness measures is standard. Donors might well find that investing in an integrated monitoring and early warning capacity, and the provision of more up-front funding to the principal agencies would cut costs considerably in the longer run.

*The type of activity for which cost-effectiveness analysis is most appropriate*

In a recent study commissioned by the UK ODA on linking costs and benefits in NGO development projects (Riddell 1996), the author concludes that, when making judgements about what projects to put up for funding, certain (development) projects lend themselves more readily to impact analysis (including cost-effectiveness) than others. Where projects are concerned with the whole process of social change, and are innovative and risky, impact assessment may be less suitable than a more qualitative appraisal of the NGO implementing the project. However, where the projects involve meeting the core needs of people which would otherwise not be met, by means of tried and tested methods, then impact assessment, including cost-effectiveness, would be given a far greater emphasis in the decision-making process.

This last category of project, although describing hypothetical development projects, accurately sums up the characteristics of many relief interventions. Certainly, in the early stages of a relief operation there is generally little or no emphasis on social development issues. The main aim is to deliver food and non-food items as quickly as possible, along with emergency provision of water and health services. Indeed, food aid alone constitutes approximately 40% of the resources consumed in an emergency operation. It seems, then, that relief projects may be particularly amenable to cost-effectiveness/cost-efficiency analysis, using process indicators, such as: number of vaccinations given; patient-days in a hospital bed; tonnes of food delivered; litres of water produced and delivered, etc.

Unfortunately, the scope of this paper does not allow for an activity-by-activity review of which indicators might be most suitable for which activities.

### *The importance of including all the costs*

When evaluating relief programmes, it is important to consider not only the costs borne by the donors, but also by the beneficiary groups themselves, as well as the communities hosting affected groups. In Tanzania and Zaire, the lack of provision of cooking fuel to refugees, along with the supply of slow-cooking beans and whole grain maize instead of flour, led to intense deforestation around the camps. This cost, which is a direct result of inappropriate assistance and inadequate account being taken of the needs of the refugee population, is being borne almost solely by the host communities in Tanzania and Zaire. Analysis of alternative foodstuffs, or projects designed to supply fuel to the camps, must take the environmental costs into account. The successful continuation of much of the relief effort depends to a great extent upon the goodwill of the host communities, goodwill which can be jeopardised by ignoring the impact on them of both the crisis itself and the associated relief programme.

### *Speed versus cost*

In a relief operation, needs are sometimes so urgent that if food, drugs or water pumping and purifying equipment do not arrive immediately, the result will be massive loss of life. In such cases, if the resources required are not present in the area, they will have to be flown in. Cost-effectiveness analysis must take this need for speed into account when comparing the costs of material delivered by plane with the cost of delivering it by road. It is important, however, to assess exactly when road transport is feasible, for airlifts are extremely expensive, and ought not to be continued once other routes are open. It is interesting to note that the first WFP overland convoy to Goma arrived from Kampala within five days of the start of the influx, while the airlift between Entebbe and Goma continued for another ten weeks. Although, due to inadequately completed manifests, it was not possible to fully evaluate the use of air transport in this operation, the Study III Team did conclude that the airlift continued for several weeks longer than was required, and that potential savings of several million dollars could have been made had there been more extensive use of land routes.

### *Isolating the humanitarian support activities in multi-functional military contingent*

The different and often overlapping roles performed by the military contingents presented a particular problem. Whilst several of the bilaterally provided military contingents had exclusively humanitarian objectives, several of those deployed within UNAMIR undertook mixed security and humanitarian support/delivery roles. Whilst (theoretically) their principal role was that of peace-keeping and the provision of security, and thus the costs of their deployment would ultimately be refunded by the UN Department of Peace-Keeping Operations, several UNAMIR contingents put considerable efforts into humanitarian and rehabilitation activities. Of the 600 British military personnel deployed in Rwanda during the period August-November 1994, for instance, the majority were specialist personnel drawn from medical, mechanical repair and logistics units. The mixed objectives of such contingents and the fact that their costs would ultimately be borne by UN member states, rather than solely by the troop contributing country, substantially increased the difficulties of applying cost-effectiveness analysis to these contingents.

Where the military are present solely to assist in the delivery of relief services, it seems reasonable to estimate that they would be considerably more expensive than an NGO carrying out comparable activities. However, if they are primarily involved in peace-keeping activities, then the marginal costs of their humanitarian activities would undoubtedly be very low. Some governments present the work of their military as a national humanitarian response for the domestic audience, while seeking reimbursement from UN peace-keeping budgets for their costs in the field. Where unfavourable cost comparisons emerge between the military and alternative sources of service provision such as NGOs or private contractors, these may be rebutted on the grounds that the soldiers were undertaking a security role that could not be undertaken by such organisations.

### 3.7 Political and institutional factors limiting the usefulness of cost-effectiveness analysis

Political factors can substantially constrain the ability of relief agencies to achieve the most cost-effective solutions and can therefore limit the usefulness of cost-effectiveness analysis. For example, since August 1994, the spontaneously settled camp at Kibumba, 27 kilometres north of Goma Town, has received its water supplies through an extremely expensive tankering operation. A hydrological survey of the area around the camp revealed that it



would probably be cheaper either to invest several million dollars in constructing a pipeline to the camp from a perennial water source several kilometres away or, alternatively, to move the refugees closer to Lake Kivu. However, for political reasons, the Zairean authorities did not want to signal to the local population that the refugees were going to be staying for an indefinite period and were therefore unwilling, regardless of the cost being borne by the international community, to either bring them closer to the lake, move them further into Zaire, or encourage the building of 'permanent' water systems.

Despite these political constraints, cost-effectiveness analysis of the alternatives to tankering in Kibumba would make clear the enormous cost of maintaining refugees in such an inappropriate location and, thereby, possibly stimulate the search for a better solution.

Very similar constraints to moving to more cost-effective water supply systems were also encountered in Ngara District in Tanzania. The borehole supply systems there were inadequate to meet the demands of the refugee population in part, it appears, because the camps were so close together that the boreholes were drawing-down the same aquifer. The main options for achieving a more sustainable water supply were either to develop systems requiring substantial investment, drawing water from perennial sources at some distance from the main camps, or to reduce the size of the camps and spread them over a larger area and develop new borehole sources. Again, the Tanzanian authorities were against spreading the camps over a larger area and investing in more 'permanent' settlements as this would signal to the local population that the refugees would be remaining for an indefinite period and, to the refugees, that Tanzania was prepared to accept them for an indefinite period. Such signals were particularly sensitive in the Tanzania case because national elections were scheduled to be held during 1995 and the continued presence of the refugees looked likely to become an important issue in the election campaign.

Institutional factors can also limit the usefulness of cost-effectiveness indicators. For example, in Goma, immediately after the influx of 850,000 refugees in July 1994, UNHCR was forced to pay some NGOs considerably more than they would normally do for expatriate staff costs, vehicles and house rents, etc. as they were not in a position to negotiate. In addition, some NGOs included in their budgets requests for payments of overheads of up to 25% on capital goods. Only as the crisis stabilised were UNHCR able to renegotiate agreements, and place a ceiling on the amount they would reimburse NGOs for certain activities. Indicators on 'reasonable' unit costs alone would not have been sufficient to

reduce such claims on the UNHCR budget. Consensus on their use would also have been required, along with pre-arranged stand-by procedures specifying ceilings for expatriate and overhead costs.

As shown by this example, not only are there technological and procedural reasons, but also institutional reasons why interventions do not work as cost-effectively as they should do. Tackling these institutional problems can be as important in cost-effectiveness terms as attempts to develop, for instance, new technology for water pumps or new ways to treat cholera infection.

### 3.8 The context-specific nature of most cost-effectiveness information

Although many relief operations involve undertaking essentially the same activities, such as the provision of food aid, the setting up of airlift capacity and the emergency provision of water and health services, each relief operation is unique to the circumstances in which it takes place. Cost-effectiveness and cost-efficiency analysis of one particular relief activity or operation will, therefore, tend to produce information that is highly context-specific.

Experience of evaluating one of the key interventions in Goma, namely the provision of water to Kibumba camp, demonstrates this point. At the early stages of the relief operation, water was pumped out of Lake Kivu by a private contractor into water tankers operated by a range of NGOs, UN agencies and donor teams, which then delivered the water to tanks/reservoirs built and run by OXFAM-UK, which also constructed and operated the reticulation systems within the camp. The cost of producing and delivering a litre of water in Kibumba would not necessarily bear any relation to the cost of a litre of water in any other refugee setting or, indeed, even in neighbouring camps in Goma which had quickly moved to systems drawing on nearby surface water sources.

Even the more common example of water provision by borehole and hand-pump cannot be adequately described without detailed information on the particular circumstances involved: the depth to be drilled for boreholes; the nature of the layers of rock between the surface and the aquifer; the quality of the water being produced; the distance recipients needed to walk to be able to collect the water, the time needed to queue, etc.

This often highly context-specific nature of information on cost-effectiveness does not mean the approach is not useful. Relief operations may continue in the same area for several years and the insights of cost-effectiveness analysis can be used to adapt on-going operations or to draw up contingency plans for future operations, even if only for those in the same region. They can also be of use to evaluators and managers - having a breakdown of the component costs of a water tankering operation in Ethiopia, for instance, can serve as a useful guide when implementing and assessing such an operation elsewhere, provided information is also available on the environment and context in which the operation took place.

During the transition to peace in Mozambique, one UN agency received proposals from a range of NGOs to build schools in the same areas that differed in cost by a factor of eight, despite only minor differences in the design and the quality of the materials to be used. Simply knowing that one NGO was capable of building schools at the lower cost allowed this agency to filter out proposals that were too expensive, and led to an interesting and useful debate amongst NGOs and Ministry of Education officials on the issue of the most appropriate design for classrooms, and where it was better to sacrifice some quality in order to provide more schools and thus educational opportunities for a larger population.

It is also useful to know the cost per beneficiary of a relief operation, not as a guide to how much it would cost to provide similar services elsewhere, but to highlight the enormous costs of not taking preventive action. The cost of conflict-resolution efforts or even peace-keeping activities could then be placed in some sort of context.

#### 4. Conclusions: How Useful is Cost-Effectiveness Analysis in the Assessment and Evaluation of Relief Operations?

In assessing the usefulness of cost-effectiveness analysis in the evaluation of relief operations, a number of points can be made based upon the experience of the Joint Evaluation of Emergency Assistance to Rwanda.

In a world where numerous competing demands are being made upon finite aid resources, it is essential that the relationship between costs and performance of relief activities be fully explored and understood. Cost-effectiveness analysis can reveal inefficient imbalances in resourcing, whether these involve too low a level of 'up-front' funds for preparedness and contingency planning measures, or too little spent on investments that might yield considerable savings over time. The inefficient use of funds in one operation or one part of an operation may reduce the availability of funds for other operations or even for other parts of the same operation. The extraordinarily high rate of expenditure in Goma may have had the effect of reducing the funds available for responding to refugee needs in Bukavu, to the acute needs of IDPs inside Rwanda or to rehabilitation efforts in Rwanda after July 1994. Similarly, the extraordinary level of expenditure in Goma in the July-September period may have reduced the availability of funds for relief operations in Afghanistan or Liberia or even the availability of funds for development activities elsewhere. It is in the interests of all agencies and not just donor organisations alone, that scarce resources are used cost-effectively.

Formal cost-effectiveness analysis of relief operations, as this paper has shown, can, however, be fraught with difficulties, of both a practical and methodological nature.

Methodological difficulties arise from the fact that relief operations characteristically take place in extremely complex and dynamic environments, and involve a large number of donors, UN agencies and NGOs undertaking a wide range of activities. As a result, the particular effects of any one intervention can be impossible to isolate and this significantly limits the situations in which cost-effectiveness analysis can properly be utilised. Cost-effectiveness is not a universally applicable, straightforward form of analysis.

However, such limitations on the use of cost-effectiveness should not preclude all financial analysis of relief operations. *Cost-efficiency analysis*, which investigates the process of aid delivery rather than the outcome of such activities, is a much more appropriate tool in those situations where the methodological difficulties facing cost-effectiveness analysis are too great. Cost-efficiency analysis represents a limited form of cost-effectiveness analysis, in the sense that efficiency is only a necessary and not a sufficient condition for effectiveness. It does, however, have a potentially invaluable role to play given the enormous expenditures on emergency operations and the fact that even small improvements in efficiency can lead to large resource savings.

Obtaining suitable data was the main practical difficulty encountered in trying to carry out cost-effectiveness analysis during the Joint Evaluation of Emergency Assistance to Rwanda. Such a lack of data also significantly limited the scope and usefulness of attempts to apply cost-efficiency analysis. However, the data problem is not intractable - suitable data is often not available simply because until now it has not been considered worthwhile recording expenditures in a format that allows for meaningful cost-efficiency analysis. This state of affairs stems in part from the reporting requirements of donor organisations which currently emphasise:

- a) financial reporting rather than evidence of appropriateness, impact or even efficiency;
- b) reporting in relation to conventional categories of expenditure (eg. personnel, procurement, transport, etc) rather than by activity.

If donors were to attach greater priority to cost-efficiency analysis, and require their implementing partners to organise financial reporting differently, a greater level of data would become available, and evaluations would become considerably more useful.

## 5. Recommendations

Donor organisations need to work together with agencies and personnel involved in the provision of humanitarian aid to work out common procedures for cost-efficiency analysis, establishing in the process, some consensus on exactly where it can be most useful. Whilst this may sound a dauntingly complex process involving hundreds of different organisations and agencies, it need not be. In the response to the emergency in Rwanda in 1994, over 70% of the total expenditure of US \$1.4 billion was channelled through just 12 organisations and 45% was channelled through UNHCR and WFP alone. Donor organisations need only focus their initial efforts on the large agencies and organisations.

It is important to carry-out cost-effectiveness/efficiency analysis as part of a wider evaluative process. While attention to cost issues is extremely important, it should not detract from the issues of impact and overall suitability of the programme. Evaluations should, therefore, include analysis of a political and anthropological nature, as well as of a more technical and financial nature.

Finally, given the large number of actors involved in a relief operation, and their frequently overlapping mandates and responsibilities, the commitment of a number of organisations to joint evaluations is much more beneficial than the practice of donors and agencies undertaking evaluations which focus only upon their own activities.

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## Acronyms

CDC	Centers for Disease Control and Prevention
CYP	Couple-Year-of-Protection
DAC	Development Assistance Committee (OECD)
DALY	Disability-Adjusted Life Year
DHA	Department of Humanitarian Affairs (UN)
EDP	Extended Delivery Point
FTS	Financial Tracking System
ICRC	International Committee of the Red Cross
IDP	Internally Displaced Person
IUD	Intra-Uterine Device
MSF	Médecins sans Frontières
NGO	Non-Governmental Organisation
ODA	Overseas Development Administration
OECD	Organisation for Economic Cooperation and Development
PWSS	Potable Water Supply System Co. Ltd
QALY	Quality-Adjusted Life Year
ROWPU	Reverse Osmosis Water Purification Unit
UNAMIR	United Nations Assistance Mission in Rwanda
UNHCR	United Nations High Commissioner for Refugees
UNICEF	United Nations Children's Fund
WFP	World Food Programme (UN)
WHO	World Health Organisation

## Relief and Rehabilitation Network

The objective of the Relief and Rehabilitation Network (RRN) is to facilitate the exchange of professional information and experience between the personnel of NGOs and other agencies involved in the provision of relief and rehabilitation assistance. Members of the Network are either nominated by their agency or may apply on an individual basis. Each year, RRN members receive four mailings in either English or French comprising Newsletters, Network Papers and Good Practice Reviews. In addition, RRN members are able to obtain advice on technical and operational problems they are facing from the RRN staff in London. A modest charge is made for membership with rates varying in the case of agency-nominated members depending on the type of agency.

The RRN is operated by the Overseas Development Institute (ODI) in conjunction with the European Association of Non-Governmental Organisations for Food Aid and Emergency Relief (EuronAid). ODI is an independent centre for development research and a forum for policy discussion on issues affecting economic relations between the North and South and social and economic policies within developing countries. EuronAid provides logistics and financing services to NGOs using EC food aid in their relief and development programmes. It has 27 member agencies and two with observer status. Its offices are located in the Hague.

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