The Need for Benefit Cost Analysis in the Appraisal of Public Works Projects in Pakistan

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In most countries of the world it is well recognised that certain social overhead facilities as, for example, dams, irrigation canals, drainage and flood-control works and similar installations can usually be provided more effectively and on a more adequate scale if they are planned and executed by government agencies rather than by private corporations and individuals. In a country like Pakistan, where in the arid western part sufficient water resources are available but very inadequately distributed, and in the eastern part where they are plentiful but usually too well distributed, water resources development and/or control projects executed by the provincial and central governments have been historically, and are now, of the utmost importance for economic development. It is not an overstatement to say that economic development in Pakistan is, at least in its initial stages, synonymous with water development—the former cannot occur without the latter.

The need for water development in pre-partition India was recognised very early by the British rulers; the barrages, canals and dams built by them rank among the outstanding engineering feats of the 20th century. After partition, too, several major works have been constructed in Pakistan, among them the Karnal Pul and Ganges Kobadak projects in the eastern part of the country and the Warsak multi-purpose project in West Pakistan.

During the next decade a series of additional projects will be undertaken mainly in connection with the Indus River Water Treaty which is to be concluded between India and Pakistan in the very near future. The Treaty attempts to solve the problems which are created by the frequent shortage of water in the downstream sections of the rivers Sutlej and Ravi which formerly irrigated large areas of the Punjab. Since partition most of the natural flow in these two rivers has been utilized upstream by India to irrigate the agricultural areas of East Punjab. As a result there have been at least three years since 1947 in which there occurred serious water shortages in agricultural areas of Pakistan formerly dependent upon the natural flow in these rivers.

To solve this problem the Treaty provides for the construction of the necessary storage and diversion facilities which will allow water to be transferred from the three relatively water rich western rivers, in particular the Indus, to replenish the downstream flow of the two eastern rivers. The total cost of the projected works will be well in excess of 5 billion rupees which is, by way of comparison, more than one fourth of the entire planned expenditure in both wings of Pakistan under the Second Five-Year Plan. Most of the required funds are to be supplied initially from foreign sources in the form of a World Bank loan. The United States, countries of the Commonwealth and West Germany are the principal contributors to this fund.

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Whenever facilities of the type referred to above are contemplated, there are usually many possible ways of carrying out a particular project or certain segments of it. A variety of alternative dam sites may be available, all of which might be feasible from an engineering point of view, dams might be constructed such as to serve only one purpose such as irrigation, or they may be constructed in such a way that irrigation, flood control, power generation and may be even recreation can be served simultaneously. Furthermore, once it has been decided to build a multiple-purpose structure, there still remain possibilities for variation in the size of the dam, variations in the routes of the major irrigation canals or variation in the succession in which these facilities are to be constructed.

Whenever there exist many alternatives of this kind, there will also be differences in costs as well as differences in the impact upon economic welfare associated with each one of them. (The taxing public, which ultimately has to shoulder the cost of these projects, regardless of whether or not they are initially financed from foreign sources, has a right to ask about these costs and the benefits associated with various alternatives and to find out to what extent alternatives have been selected which will either maximise the benefits resulting from a given outlay, or else operate on such a scale that the long run difference between benefits and costs is maximised. In the case of underdeveloped areas, not only the local taxpayers but also the foreign agencies or countries lending the required funds will be interested in such an appraisal.)

To carry out economic appraisals of public works projects the United States Bureau of Reclamation and other agencies concerned with water and power development are using an evaluation procedure known as 'Benefit-Cost Analysis.' It is the purpose of the present paper to outline the principal features of this type of analysis and to investigate to what extent similar procedures can and should be applied in the evaluation of proposed public works projects in Pakistan and other economically less-developed countries where water-resources projects are important but where many of the data necessary for the computation of benefits and costs are frequently not available.

Among the many arguments which are advanced against the use of benefit-cost analysis, none is heard more frequently than that which asserts that in actual practice the decisions about public works projects are made on purely political grounds and whatever economic analysis has to provide will have little weight in framing the final decisions. In evaluating this criticism it is interesting to observe that in the political arena the arguments for or against public works projects are almost solely made on economic grounds, although it is frequently difficult to check the accuracy and meaning of the statistics which are being used. Consequently, if benefit-cost analysis can assemble in a systematic way all the available economic data relevant to the evaluation of a particular public works project, it will have contributed to force political decisions to be made as much on rational grounds as the available data allow this to be done at any one time. Only if it could be demonstrated that the introduction of evidence produced by benefit-cost analysis increases the probability of arriving at a wrong decision would it be possible to reject its applicability. It is doubtful that even the most pessimistic critics of the method are prepared to carry their argument to that point.

This is not to say that the techniques used in benefit-cost analysis could not stand considerable improvement—but loopholes are difficult to find and to correct unless the method is constantly applied even in its present imperfect form.
I. Objectives of Benefit—Cost Analysis

The basic purposes of benefit-cost analysis are (1) to determine whether or not a given social objective such as, for example, an increase in food production through the development of more irrigated land, generation of a certain amount of electric power or provision of flood control can be obtained at a real cost which is lower than the sum of the resulting real benefits and (2) in case there are several economically feasible ways of reaching a given social objective, to ascertain that project alternative, public or private, which permits the objective to be reached at the lowest possible cost.

In addition, benefit-cost analysis may serve to establish a basis for allocating the costs of a multiple-purpose project to its individual components and it may serve as a basis for pricing the various products and services produced by the project. The pricing problem is particularly important in those cases where all or part of the project costs initially incurred by the government are expected to be repaid in time by the project users (e.g., farmers who use irrigation water made available through the project).

In a country like Pakistan, benefit-cost analysis may serve additional purposes such as, for example, to evaluate the balance of payments implications of various project alternatives and to rank them according to the amount of drain they constitute on foreign-exchange resources.

A project can be considered to be economically justified if (1) long-run benefits exceed long-run costs, (2) the project is of such a size that either an increase or a reduction in its scale would lead to smaller net benefits or else exceed the limits of the available capital and (3) if there exist no project alternatives which can achieve the given social objective at a lower cost.

Since benefit-cost analysis is always concerned with the development of an entire area or region over a long period of time rather than with individual farms or villages in the short run, it is important that the evaluation of a proposed project be carried out with a broad public viewpoint in mind. It is, therefore, usually necessary to use for the analysis a time period which transcends the life of an individual person, and secondly to evaluate also those positive and adverse project effects which would not be important from a narrow individual point of view (for example, stimulation of secondary economic activities).

II. Definitions of Benefits and Costs

For analytical purposes it is necessary to classify benefits and costs into those that are direct or primary and those which are indirect or secondary. Furthermore, in order to include as many project effects, both positive and negative, as possible into the analysis it is necessary to distinguish between tangible (i.e.

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those which produce a physically measurable product) and intangible project
effects (i.e., effects of the project on such things as scenery, wildlife and recreation-
al opportunities).

Primary or Direct Benefits are those that are directly attributable to the
project. They are usually determined by subtracting the value of the products
that could be expected to be produced in the area without the project from those
that are expected to be produced with the project. For example, in the case of
irrigation benefits resulting from the provision of a certain quantity of irrigation,
water, primary project benefits are computed by subtracting the value of the a-
gricultural produce which is presently produced in the area under dryland conditions
from those that are expected to result after irrigation water has been made avail-
able.

Secondary or Indirect Benefits have been defined in the ‘Green Book’ as
those which are ‘stemming from’ the increased production in primary products,
such as, for example, processing plants which utilize the newly produced products,
or those which are ‘induced by’ the project, such as, for example, small-scale
industries, shoe makers, barber shops, milk stores and others interested in serving
and benefiting from the newly created primary activities.

The advisability and the methods of including secondary benefits and costs
into the overall project analysis has been hotly debated over the years. Professor
Wantrup, for example, has pointed out that under competitive market conditions
the demand function and, theryfore, the price which is assumed for the computation
of primary benefits already imply that there exists a demand for the primary
products by processors. In the absence of such a demand by processors for the products
produced the assumed price would have to be altered accordingly. If, therefore,
the entire ‘value added’ by secondary industries is simply added to primary benefits
whose value already implied on effective demand by secondary industries, then
at least a certain portion of total benefits will have been counted twice.²

For these and other reasons Wantrup has suggested that primary benefits
should be the main choice criterion for the selection of project alternatives, and
that secondary benefits should be either entirely omitted from the analysis or
taken into consideration implicitly through appropriate reductions in the costs of
producing the primary benefits. (This last statement refers particularly to benefits
resulting from those projects which are started specifically as anticyclical measures
during periods of serious underemployment.

Regarding the procedures of computing secondary benefits which are
presently used by United States Federal Agencies, it has been pointed out by
Kelso³ that benefits ‘stemming from’ and ‘induced by’ are merely two sides of the
same coin and are no more additive than Keynes’ ‘aggregate supply’ and ‘aggregate
demand’ concepts would be in calculating national real output.

2. For an elaboration of this argument see: Ciriacy-Wantrup, S.V., “The Role of Benefit Cost
Analysis in Public Resource Development”, in Water Resources and Economic Development
of the West, Report, No. 3, Committee on the Economics of Water Resources Development

and Problems. Report No. 1, Committee on the Economics of Water Resources Develop-
ment of the Western Agricultural Economics Research Council, pp. 49-62.

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Since it is the increase in real national income that we are trying to calculate in appraising public works projects, it is necessary to realize that "... a 10 per cent increase in demand plus a 10 per cent increase in supply creates a 10 per cent increase in national real income, not a 20 per cent increase as would be the result if the two were added together." To add secondary benefits 'stemming from' and 'induced by', as has been recommended in the 'Green Book', is, therefore, likely to lead to a considerable exaggeration of total benefits.

In spite of all the theoretical and empirical pitfalls of presently used computation procedures, it appears necessary, nevertheless, to incorporate secondary benefits explicitly into the analysis because different types of autonomous investment are typically accompanied by entirely different secondary effects (i.e. induced investments). The weight of this argument can be illustrated by an example: In Pakistan we have at the present time the choice between increasing food production through using more capital-intensive methods of production (e.g. improved seeds, fertilizers, better irrigation methods etc.) on land which is already under cultivation, and trying to achieve the same objective through the development of new land areas. There may be cases in which the returns in terms of primary benefits from a given capital outlay may be nearly the same for the two alternatives yet there is reason to believe that the induced investment (i.e. secondary benefits) will be significantly different. In the example given above, it is more likely that induced investments will be larger if the second alternative is chosen, because with new land areas being developed new investments in processing plants, schools, barber shops and other service industries will have to follow. In the case of the first alternative, induced investments are likely to be considerably smaller, because while an increase in output per acre of already cultivated land may call forth some new secondary investments there is reason to believe that it will be absorbed largely through a more complete utilization of already existing facilities and, therefore, have only relatively small secondary effects. In a country such as Pakistan, where one of the biggest problems is to set the stage for continued economic growth, it appears very necessary to incorporate estimates of secondary effects of public works projects into the benefit-cost analysis. To evaluate only primary effects and to make the choice on that basis alone would in many instances ignore the most important reasons for undertaking such projects.

Intangible Project Effects are those which cannot be measured satisfactorily in terms of some commonly accepted physical or monetary standard. A good current example of an intangible project cost is the loss of many ancient monuments which will occur as a result of the construction of the Aswan High Dam in Egypt. It is difficult to put monetary values on these ancient ruins, but the sizeable amount of money which is presently being spent by museums and various archeological institutes to rescue as many of them as possible indicates that intangibles may not at all be insignificant project effects. Examples of intangible project benefits are the prevention of loss of life, improvement of national security or creation of scenic and recreational values which would not exist without the project.

Primary Costs can be subclassified into project costs and associated costs.

4. Ibid. p. 53.
In the words of the Green Book, *project costs* "include the initial investments in land, labor and materials and subsequent costs for replacements and for operation and maintenance, costs of post-authorization investigations, interest during construction, engineering, inspection, administration and overhead in general." *Associated costs* are those which are necessary to make the product produced by the project available for use. For example, in the case of an irrigation project associated costs would be those incurred by farmers in terracing, levelling, and construction of on-farm drainage ditches which are necessary to bring the irrigation water provided by the project to its intended use.

*Secondary Costs* are those which have to be incurred in order to make the secondary benefits 'stemming from' and 'induced by' the project possible.

III. The Measurement of Benefits and Costs.

In actual practice, the benefits and costs associated with a project do not occur all at the same time and at the same rate. Costs are usually very high initially during the construction period, then they begin to get smaller, and after all construction work is completed there merely remain the costs of maintaining the structures. Benefits, on the other hand, have a tendency to be small during the construction period and only gradually after a period of gestation will they begin to flow in full measure from the project. For purposes of project evaluation, it is, therefore, more appropriate to think in terms of benefit and cost streams rather than to talk about benefits and cost as if they all occurred at one point in time. Typical benefit and cost streams are shown graphically in Figure 1.

![Figure 1](Image)

**Figure 1.**

Typical Benefit and Cost Streams for a Public Works Project.

A number of important considerations follow from the peculiar nature of benefit and cost streams: First of all, it is apparent that funds which have to be

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spent on construction during the early stages of a project have to be weighed more heavily than on offsetting amount of benefits receivable many years after the project has been constructed, just as to most of us a Rupee in the pocket is worth more than a promise to receive two rupees 5 years hence. Consequently, in order to make benefit and cost streams comparable with each other it is necessary to adjust them for differences in the time of occurrence. This adjustment can be made by applying the formula \( \frac{1}{(1+i)^t} \) to the benefits (costs) expected to occur one year from now, \( \frac{1}{(1+i)^2} \) to those benefits (costs) expected to occur two years from now and \( \frac{1}{(1+i)^n} \) to those benefits (costs) expected to occur \( 'n' \) years from now. In the above formulas, 'V' stands for the value of benefits (costs) expressed in monetary terms and 'i' is the discount rate. In order to obtain total benefits and total costs over the entire planning period it is necessary to sum up all the discounted annual values to obtain the following sums which represent the present value of the expected benefit and cost streams:

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(1) \sum_{i=1}^{n} \frac{B}{(1+i)^t} \\
(2) \sum_{i=1}^{n} \frac{C}{(1+i)^n}
\]

Before these sums can be calculated it is necessary to make a choice of the following constants which are implied in (1) and (2) above:

(a) The physical levels of outputs produced by the project and the physical quantities of inputs to be used. This means the level of technology or the production functions which are to be assumed for calculating benefits and costs.

(b) The prices or price levels which should be used for purposes of calculating future benefits and costs.

(c) The discount rate 'i' which should be applied for calculating the present value of future benefits and costs.

(d) The number of years 'n' over which benefits and costs should be analysed.
Variations in the choice of any one of these four constants can significantly change the outcome of the analysis. It is, therefore, necessary to state explicitly all the assumptions which are made about these constants and to ensure that the assumptions are as realistic as the present state of knowledge permits them to be. If, for example, the project is analysed over a 56-year period, it is apparent from figure 1 above that total costs might exceed total benefits by a sizeable margin and the entire project might be unjustified on that basis; if, on the other hand, a 100-year period were chosen for analysis, it would be more likely that benefits would exceed costs and that on this basis the project would be economically justified. Similarly with the remaining constants, even minute variations in the level of any one of them can produce significantly different results. In the following paragraphs we will treat each one of these constants separately in order to gain a fuller understanding of the criteria which govern their choice:

**The Level of Technology.** In any project analysis certain assumptions have to be made about the production functions and thereby the input-output coefficients which can be derived from them. For example, in the case of an irrigation project under which it is planned to irrigate an area which was hitherto farmed under dryland conditions or was entirely uncultivated, it is necessary to make certain assumptions about (a) the types of crops which will be grown in the area and (b) the yields which can be expected to be achieved. Decisions regarding cropping patterns will usually have to be made in consultation with engineers, soil scientists and agronomists considering such factors as climate, soil types (with respect to fertility, topography and water holding capacity), water quality, and consumers’ tastes and preferences. In many instances it will be necessary to carry out the analysis for two or three different types of cropping patterns and rotations in order to ascertain their differential effects.

More important and more difficult are the assumptions which have to be made about input-output coefficients and their changes over time. In the case of agricultural technology, the assumptions about crop yields can be based initially on the experiences of neighbouring irrigated agricultural areas which produce the same crops as those which are planned for the project area. However, to construct the entire benefit stream on the basis of these yield assumptions is to ignore entirely the factor of technological change. In a country like Pakistan, where agricultural technology is presently on a very low level but can be expected to rise significantly over the next two or three decades, this would be a particularly serious omission. What we need, therefore, is some method of projecting changes in the production function. On what basis should these projections be made? To answer this question adequately would in itself require one or several separate papers; nevertheless, a few possible points of departure for such an analysis can be suggested here: First, one might determine whether over the past 20—25 years there is any trend of improvement in agricultural yields in those comparable areas of Pakistan which have not been subject to such adverse factors as increases in salinity or waterlogging. If such a trend is discernible, it can be projected into the future and provide a kind of lower limit to the improvement in technology which can be expected to occur in the years to come. A second, and probably more fruitful, alternative would be to study input-output coefficients under presently known technologies in foreign countries with soil and climatic conditions comparable to those existing in Pakistan. A possible basis for such comparisons would be certain areas of western United States where natural conditions are strikingly similar to those existing in West Pakistan.

How soon and at what rate could technology presently employed in these
areas be expected to reach Pakistan? Very few studies exist which through any light on this particular question. On the basis of the few studies which have been conducted on this subject, the process can be expected to take a rather long time. Griliches, for example, in a study dealing with the rate of adoption of hybrid corn within the United States, shows that the more backward agricultural areas were about 15—16 years behind the more advanced states in adopting this particular practice. If the adoption of a new technology takes 15 years in a country where the level of literacy is relatively high and communication facilities favourable to a fast spread of new knowledge, it can be expected to take considerably longer in under-developed areas. A trend based on this type of study could, therefore, provide an upper limit to the rate of technological progress in a country like Pakistan.

Whatever the actual rate of technological change may turn out to be, the assumption has to be made that input-output coefficients of major agricultural crops in Pakistan will change in the years to come. Estimates of the speed at which this will occur have to be based largely upon informed guesses, although here again the analysis can be performed using conservative as well as liberal estimates of the rate of technological change.

**Price Levels.** Ideally, prices should serve the function of a common yardstick without distorting the relationship between real costs and real benefits. Unfortunately, it is only under the assumption of a constant degree of employment of all available resources over the entire planning period, and in the absence of any significant changes in the value of the monetary unit, that market prices would provide a reasonably accurate index of real benefits and real costs.

In actual practice, the assumption of a constant degree of resource employment can be made neither in developed nor in under-developed countries. In the former there is the phenomenon of the business cycle, which causes significant variations in the general level of employment and thereby in real costs and real benefits. In less-developed countries such as Pakistan or India, the presently high degree of unemployment in manpower resources which tends to lower present real project costs cannot be expected to last over the entire period of the project.

On the benefit side, it can be expected that with a growing abundance of goods and services in the economy their real value, at least those of basic agricultural commodities, will have a tendency to fall. The same might not be true in the case of such project products as electric power or recreation whose real values might rise along with the rise in general factor employment. To construct benefit and cost streams entirely on the basis of present relative prices in an economy like that of Pakistan would, therefore, tend to underestimate the total cost stream and overestimate the value of certain primary benefits, in particular those of basic agricultural commodities.

In addition to the less obvious distortions of real values caused by long-run changes in the extent of factor employment, there exists the phenomenon of long-run inflation which has been observable in almost all countries of the world for several decades past. Unless adjustments are made to correct for changes in the value of the monetary unit, benefits which occur mostly at a much later point in time would be greatly exaggerated in comparison to the total value of the cost stream whose centre of gravity lies usually in the early part of the period of project analysis.

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In order to account both for changes in the level of factor employment and for changes in the general price level, it is recommended the use be made of prices reasonably expected to prevail at the time costs are incurred and at the time benefits are realized, in terms of a constant general price level.8

The Choice of the Discount Rate ‘i’. It has been shown previously that benefits and costs which accrue at different points in time must be adjusted for the time factor in order to make them comparable with each other. Benefits and costs occurring in the more distant future are necessarily discounted more heavily than those occurring presently or in the near future.

Returns on various kinds of investments in the capital market generally reflect both the time element (i.e. a payment for deferred consumption and liquidity) and a risk factor. Conservative investments such as government bonds are, therefore, expected to produce a lower rate of return than investments in common stocks of private companies whose future may be very uncertain.

Similarly, in the case of projects for which benefit-cost analyses are being carried out, we have some whose expected returns are less certain than others, and the discount rate could conceivably be used to reflect both the time element and higher or lower degrees of risk inherent in a project. But rather than reflect different degrees of risk through variations in the discount rate, it is suggested that risk allowances should be made elsewhere in the analysis, specifically through appropriate reductions in expected benefits. The discount rate should merely reflect the waiting or time element. Since government bonds are among the least risky investments which one can undertake, it is recommended that the long-term average rate of return on government bonds be used as the discount factor ‘i’.

The Period of Project Analysis. The report of the interagency committee suggests, regarding the period of analysis, that “......the upper limit of the economic life of a project is reached when...... physical depreciation, obsolescence, changing requirements for project services and time discount and allowances for risk and uncertainty cause the costs of continuing the project to exceed the additional benefits expected from continuation......” Again, in actual practice it is not easy to foresee when this will occur. One could look at structures which were built 100 years ago in an attempt to draw inferences about the expected life of projects presently undertaken. The usefulness of this procedure in the light of all the technological changes which have occurred in construction techniques is, however, very questionable. The United States Bureau of Reclamation in many of its studies uses a 50 as well as a 100-year period of analysis, usually the final recommendation regarding the economic feasibility of a project is made on the basis of the 100-year-period analysis.10

IV. Problems in Applying Benefit Cost Analysis to Underdeveloped Areas

One of the most significant arguments raised against the applicability of benefit-cost analysis to underdeveloped areas maintains that benefit-cost ratios may lead to wrong investment decisions whenever intangible or nonmeasurable

8 Green Book, op cit., p. 21.
9 Green Book, op cit., p. 25.
project effects far outweigh measurable benefits and costs. If this is the case, it might happen that a project which shows a high benefit-cost ratio, for primary and other measurable project effects, leads in secular perspective to much smaller overall economic growth and development than a project whose measurable benefits and costs are small. Logically, this leads to the conclusion that in underdeveloped areas benefit-cost ratios might initially be a much less powerful choice criterion for the selection of projects than they are in countries where a larger proportion of the total benefits and costs can be assumed to be measurable. The argument does not, however, support the conclusion that benefit-cost analysis in underdeveloped areas is useless and should not be undertaken. Even if initially it should be possible to measure only primary benefits and costs, it must be admitted that important knowledge has been gained and guesswork has been significantly restricted to a much smaller area of potential project effects; without any kind of scientific analysis, the entire decision about the project would have to be made on the basis of intuition. Besides, the history of benefit-cost analysis in the United States over the past 25 years shows that the area of nonmeasurable project effects has become progressively smaller, procedures have been clarified, concepts more clearly defined; most important of all, many of the projects started in the thirties are now beginning to have a sufficiently long history to permit empirical analysis of actual secondary effects and comparisons of these with the projections made at the time the project was originally planned.

A second argument, not unrelated to the first, against the use of benefit-cost analysis in underdeveloped areas maintains that the lack of physical data is so great that not even primary benefits and costs can be computed adequately. Partial evidence for this conclusion is contained in the Second Five-Year Plan of Pakistan, which states that in most of the projects undertaken during the First Plan period project costs were grossly under-estimated. For example, the Karnafuli project in East Pakistan was expected to be completed in 1960 at an estimated cost of 250 million rupees. It is now expected to come into operation in 1961 at a cost of 428 million—an increase of 71 per cent over the original estimate.

What are the kinds of basic data most urgently needed for benefit-cost analysis? Hydrologic data giving indications of stream flow and its variations from season to season and from year to year, groundwater levels and recharge potentials, studies of water quality, sedimentation, precipitation, evaporation and related aspects are probably the most essential information underlying benefit-cost studies. FAO (UN) experts are presently assigned to Pakistan to aid in the initiation of this type of study and train local personnel in carrying out hydrologic measurements.

Also important are data regarding soils and their production potential: up to now soils in only a very small part of Pakistan have been mapped in terms of their suitability for various types of crops; topography, fertility and water-holding capacity have to be known before water requirements can be estimated for various types of crops. Where flood control is the objective, detailed surveys of the frequency and average size of the annual flood loss must be made available as a basis for planning and executing the required flood-control works.

12 cf. Second Five Year Plan of Pakistan, p. 199.
The list of data required for benefit-cost analysis could be considerably enlarged. Suffice it to say, in conclusion, that in Pakistan some of them are already partially available but most of them have still to be developed. To those who recommend waiting for all the data to be in before we start carrying out economic analysis one might say that decisions about public works projects will be made anyway, with or without economic analysis, so why not use whatever information we have at any one time and bring it to bear on the decision-making process claiming for it no more and no less than the state of our knowledge permits?