CHAPTER IV

MULTICRITERIA EVALUATION METHODS: APPLICABILITY TO ECONOMIC POLICIES AT MICRO LEVEL
1. Two Levels of Decision-Making and Evaluation

In Chapters II and III we have discussed the various methods that are available for multicriteria evaluation of public policies and also the implications underlying these methods. Now, we want to point out that evaluation of public policies/projects can be done at two levels -

1) Micro level evaluation, and
2) Macro or national level evaluation.

Whether the evaluation is to be done from the micro or the macro stand point, the methods available for carrying out such evaluation are the same. But the picture at the micro level is different from that at the macro or national level. As a result, not only the objective functions and constraints and the variables to be dealt with would be different at the two levels, but there would be many other factors that are peculiar to evaluation at each level. It is important to understand all these peculiarities because without a full understanding of the situation it is difficult to capture the reality in a number of equations for using any method of multicriteria evaluation. Hence, in this chapter and the next we try to explore critically the important features which we come across in applying the methods of multicriteria evaluation
of public policies at the micro level and the macro level. These features also help to understand why evaluation is done at both levels, whether one type of evaluation is more important than the other and such other questions. In this chapter we shall discuss the features of evaluation at micro level and in Chapter V we shall talk of macro level evaluation.

2. Micro and Macro Level: Specificities

But let us first of all define clearly what we mean by 'micro level' and 'macro level'. The term 'micro' is derived from the Greek word 'mikros' meaning 'small' and the term 'macro' from the Greek word 'makros' meaning 'large'. According to K.E. Boulding (1950),

"Microeconomics is the study of particular firms, particular households, individual prices, wages, incomes, individual industries, particular commodities."

and

"Macroeconomics deals not with individual quantities as such but with aggregates of these quantities; not with individual incomes but with the national income; not with individual prices but with the price levels; not with individual outputs but with the national output."

The above definitions give an idea about the scope of decision/policy making at the two levels.

3. Evaluation at Micro-Level: Justification

Next, we shall try to justify why micro level evaluation is necessary at all. Such a justification must be made
from both theoretical and practical angles. Micro level evaluation is required for an in-depth understanding of policy implications. It tells us how the outcome of different projects affect different individuals and different classes of the society. Only such a study can tell us (i.e. explain) the conditions of efficiency of consumption and production and point out the factors responsible for any departure from the efficiency or economic optimum. Only on the basis of this it may be possible to suggest policies to correct such discrepancies and promote thereby the efficiency, and also the welfare of the people. Hence the 'actual operation' of the economy cannot be understood without taking such a micro level study. Describing the usefulness and indispensability of a micro level study, A.P. Lerner (1968) says that it

"facilitates the understanding of what would be a hopelessly complicated confusion of billions of facts by constructing simplified models of behaviour which are sufficiently similar to the actual phenomena to be of help in understanding them. These models at the same time enable the economists to explain the degree to which the actual phenomena depart from certain ideal constructions that would most completely achieve individual and social objectives. They thus help not only to describe the actual economic situation but to suggest policies that would most successfully and most efficiently bring about desired results and to predict the outcomes of such policies and other events."

Modern economies are so complex that it is difficult for the Decision Maker while framing economic policies to
gather all relevant information required for the optimum allocation of resources in order to maximise the achievement of multiple objectives set out for a plan, or to give directives to the thousands of individual units within the economy, each one with its own problems, so as to ensure efficiency in the use of resources. Also, the economy is not static but dynamic. Hence, by the time the effects of the government policies trickle down to those for whom they were meant, many interactions take place within the system. Hence, it is often seen that there is a discrepancy between ex-ante and ex-post magnitudes of the levels of different objectives that are set by the Decision Makers. If the individual units do not benefit from the policies then we can hardly say that the plan has been successful. For attaining social or national welfare it is necessary to ensure welfare of each micro unit. It is because of this that it becomes necessary to carry out micro level evaluation. As an example we can say that when government levies a commodity tax it is micro level study that can determine the distribution of its incidence between buyers and sellers and without this knowledge it is difficult to know about the impacts of the tax system.

4. Odds Against Evaluation at Micro Level

At the micro level money expenditure will reflect costs and money receipts (revenue) will represent benefit. So, at the micro level both input and output of a project must be
valued at market price. It is true that the market prices may not reflect the real cost to the society, but that is not of concern to the individual unit.

Thus, one of the most important differences between evaluation at micro and macro levels is due to the treatment of external effects. Many effects of a particular project—both positive and negative—on account of their being external are not reflected as the input or output of the project—e.g. air or water pollution resulting from the setting up of a project will not be reflected in the profit or loss account of that project at the micro level. Of course, when we are evaluating from a national point of view then such externalities should be taken into account. Hence we find that many projects cannot be considered to be at profit, even though they have beneficial external effects, so long as these beneficial spill-overs remain unpriced. On the other hand, and more significantly, we find that, many profitable projects produce harmful external effects to such an extent that on a more comprehensive pricing criterion, they would be considered as uneconomic. This amounts to saying that though such projects will be considered profitable from micro point of view, yet, from the macro or national standpoint they will not be recommended. Moreover at the micro level it is also not necessary to consider the forward and backward linkage effects of a project/policy.

This is one of the biggest drawbacks of micro level evaluation of public policies. By not considering the problem
in its entirety, such piecemeal evaluation is often misleading from the point of view of the economy as a whole. For, the harmful external effects will affect not only others but usually also the procedures of these spillovers. This means that though they remain unpriced, the entire community is affected by such external diseconomies, or, for that matter, also external economies. This limitation can be done away with, to quite some extent, if the 'stated objectives' (i.e. the multicriteria) in policy evaluation, even at the micro level, be not too limited as to ignore the many side effects of it. For, ultimately, an appraisal of a policy will depend not only on the 'stated objectives', but the overall effects.

It is said that the choice of criteria of evaluation of public policies depends on whether the basis of evaluation is economic or social. In economic evaluation, the utilitarian element is dominant, whereas social justice in the democratic framework forms the basis of a social evaluation. But recently, economics has broadened itself not to be limited to the market mechanism. Kenneth Boulding, the leader proponent of Grants Economics maintains that the 'exchange system', the 'threat system' and the 'integrative system' constitutes the three major modes of organizing social life. Hence in the broader economic framework, the social basis of evaluation is not beyond economics. However, social justice can be better ensured while taking the picture of the economy as a whole and hence it is done better from a macro angle.
5. Hierarchical Nature and Integrability at Micro Level: A Further Justification of Evaluation at Micro Level

The odds against decision-making and evaluation at the micro-level cannot, however, be fatal to justification if we consider integrability and hierarchical nature of objectives at the micro-level as plus points. There is more integration in the smaller units such that there can usually be no conflict within a single objective though there will be the possibilities of conflicts among the various objectives even at the micro-level. As H.A. Simon (1959) has shown, as firms grow larger in size conflicts arise and the objectives of the organisation are structurally changed. It is true that at the micro level also we sometimes deal with aggregates, but they are of a different nature, i.e. at micro level we may be evaluating policy regarding a particular industry. Now, since an industry is an aggregate of various firms producing the same product, therefore any policy favouring that particular industry will be to the interest of all firms within that industry. Hence, there cannot arise any conflict within a single criterion. In macro level evaluation, however, we deal with aggregates which cut across various products and industries and therefore relate to different classes of the society. The interests of different sectors of the economy usually conflict, and so do the interests of different classes of the society. Thus there may be conflict within an objective at the macro level. This problem is however not met in evaluating at micro level.
At the micro level, the hierarchical nature of objectives become more prominent. Very often the criteria are found to be clustered in such a way that they have a natural hierarchical structure. The analysts who are evaluating a project/policy can take advantage of this feature which the objectives exhibit. Let us see what is meant by hierarchical nature of objectives.

In a multi-criteria evaluation it is found that at least some of the criteria are qualitative rather than quantitative. By quantitative criteria we mean that the decision maker is able to present his preferences for different alternatives on the basis of these criteria on a cardinal scale. On the other hand, a criterion is said to be qualitative, if the decision maker can only present his preferences (on the basis of that criterion) on an ordinal scale.

Often most of the goals, apart from being 'non-compulsive', are also 'non-basic', in the sense that they are implied by a combination of some other goals. To construct a hierarchy of objectives, it is necessary to subdivide an objective into various lower level objectives which are a 'means' to attain the 'end' which is the higher level objective such that at the lowest level of the hierarchy we have several concrete criteria even if the 'end' is a qualitative or 'abstract' criterion.
Roubens (1982) and Korhonen (1984) have given a detailed solution procedure for aggregating evaluation information from concrete criteria into the more abstract (higher level) criteria. Korhonen (1985) has also developed an interactive approach by which the alternatives are evaluated using the criteria at the basic level. Since the criteria at the basic level are more quantitative in nature, therefore the decision maker can give a cardinal scale to describe his preferences, or, he can rank alternatives or make only pairwise comparisons. To describe the interdependence between criteria these information are used to compute a 'correlation matrix'. This correlation matrix and the hierarchy of criteria are used for aggregating lower level criteria to the next upper level. This process continues till the highest level criteria are reached.

At the micro level, the objectives are easier to be arranged into such a hierarchy than at the macro level where there is inherent conflict within the objectives themselves. Most of the complexities of the macro level evaluation are not met at the micro level and the decision maker at this level usually has a better understanding of the problem he is faced with, as against the decision maker at the macro level. Hence this technique of making use of the hierarchical nature of objectives can come to a great advantage in evaluating projects/policies from a micro point of view. The technique is useful because it makes clearer the meaning and the
intended aim of an objective. Moreover, the more the objectives can be subdivided into lower level subobjectives, the easier will it be to identify some scales for the attributes which are amenable to objective measurement. And it is needless to say that the greater the objectivity the better will be the applicability of the methods designed for multicriteria evaluation. However it is necessary to ensure that the subobjectives incorporate all facets of the higher level objectives and give a comprehensive picture of the problem.

In the preceding paragraphs we have seen that for various complexities involved in macro level evaluation it is often necessary to undertake micro level evaluation, for an indepth understanding. But again in evaluating projects/policies at micro level, many factors are ignored as not being of concern to it which we consider to be its disadvantage also. However, one cannot say whether micro level evaluation or macro level evaluation is more important. In fact both types of evaluation are complementary to each other. Macro level evaluation (national profitability analysis) will be useful for a single project because it has to function in the network of the entire economy and hence has to meet the criteria set up at the national level. This is so because the government agencies at the national level will have to accord approval and/or extend financial assistance to the individual public projects. For this, even if a project is found profitable on
evaluation from the micro angle, yet it may not get the approval of the decision maker from macro angle unless it also fulfills the criteria set for the national plans. Similarly, micro level evaluation proves useful to macro level evaluation too. Each unit of the macro level policies will in reality have to function like private firms in many respects; they have to make their purchases and sales at market prices. If a project is chosen on the national level criteria which turns out to be unprofitable from the micro angle, it will be necessary to subsidize the project and this has to be provided for in the budget. In case it is felt (on the basis of national level criteria) that subsidy is not the best policy then the government will have to protect the project by imposing duty on the competing projects. But how much subsidy or protection is needed by the project for it to be commercially viable also, can be known only if prior evaluation is done at the micro level. Thus it becomes easier for the decision maker to frame policies, once an indepth study has been done through evaluation at micro level. However, it may not be possible to incorporate all the information obtained by carrying out micro level evaluation for the thousands of individual units, for the macro level evaluation. This would not only involve huge costs of evaluation but would also make the decision process at national level extremely complicated.

6. Various Methods of Evaluation: Suitability at Micro Level

In Chapter II we had discussed some methods for carrying
out multicriteria evaluation and in Chapter III we have also discussed the implications underlying the methodological procedures so that we know the limitations and advantages of applying each method. Now the choice of a multicriteria evaluation method for applying to a particular problem itself depends on multicriteria (1) These criteria are obtained from the characteristic features of the multicriteria evaluation problem at hand. In this chapter we have discussed the general characteristic features of an evaluation problem at micro level. On the basis of these characteristic features we will now see which methods are, in general, more suitable at this level. Of course, even within the broad category of a micro level problem, different multicriteria evaluation problem may present different characteristics which may justify the use of different methods for each case. We will, however, consider the category of micro level evaluation in general and try to explore the suitability of the different methods at this level.

For micro level multicriteria evaluation problems, much of the complexities of a macro level problem are absent, as we have already seen. Hence the criteria for selecting a method should be that the method must suit the needs of the problem and at the same time should not be too time consuming and expensive (we must not forget that good evaluation requires highly trained personnel, time and money). In other words, the benefits from the evaluation should be greater than the costs involved.
If the problem is such that it can be tackled reasonably well by a single decision maker then methods like Goal Programming can be usefully applied. Goal Programming method allows the decision maker to have enough flexibility needed to deal with cases with conflicting multiple goals. Also Goal Programming method does not require the prior generation of nondominated set and usually requires only one solution step, i.e. the computational burden is less. However, sometimes the solution arrived at may be a dominated solution. In this case, the targets have to be readjusted and the model solved again.

The Surrogate Worth Tradeoff method can also be used. Of course, in using this method it is advisable that the tradeoff function relationships should be used which will greatly reduce the computational requirement. Otherwise the computational burden of this method will be great. This method can be usefully applied to hierarchical decision making also. This is another reason why it is suitable to micro level problems.

If the main criteria of a micro level evaluation problem is to ensure 'commercial profitability', then it is useful to apply methods that take into consideration risk and uncertainty also. The Von Neumann Morgenstern Expected Utility approach, the Multi-Attribute Utility Theory (MAUT), the approach by Wilhelm (1975) and by Fandel and Wilhelm (1976) have been built to deal with multicriteria decision making under
uncertainty. These methods also can be applied at the micro level.

At the micro level it may be possible for the decision maker to reasonably articulate his preferences for different criteria even at the beginning of the problem. Moreover it has been found that most decision makers do not like to be involved with too much questioning of the analyst. Assuming that at the micro level, commercial profitability is more important than justice and such other considerations the decision maker are even more uninterested and unwilling to answer questions because they feel it is too time consuming and also too opaque for their understanding i.e., they feel that the costs are more than the benefits.

Hence they prefer to rely on the simple trial and error methods. For such reasons it is suggested that methods with prior articulation of preferences is more suitable in most cases.

Of course the various characteristics of a particular micro level evaluation problem will help to choose the best method for the problem at hand. The above discussed considerations can help only as providing general guidelines for choosing the right method at this level.