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Training Workshop on Commercial
and National Profitability Aspects
of Industrial Project Evaluation

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Issues and Problems
in
Industrial Project Evaluation

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1. The formulation of sound projects is of strategic importance in industrial development under any economic system. Careful and systematic scrutiny of proposed projects based on a thorough investigation of their economic and technical feasibility is indispensable in selecting those projects that are likely to be viable, and in committing financial and technical resources to them. Industrial project evaluation is particularly important in developing countries because of the need to use the limited resources available to maximum effect in accelerating industrial development. It is for this reason that the Centre for Industrial Development has decided to initiate a sustained programme of research, training and technical assistance in industrial project evaluation, as a substantial part of its programme of work in the field of industrial planning and programming. The Inter-regional Symposium on Industrial Project Evaluation constitutes the first stage in this continuing effort.

2. It should be noted that the Symposium is predominantly aimed at examining issues and problems connected with evaluating industrial projects. Although the formulation of sound projects is an important subject and related to the evaluation of projects, the Symposium is not primarily concerned with issues involved in formulating industrial projects (such as market research and demand projections). This limitation is designed to enable the participants to examine intensively the major aspects of evaluation of industrial projects rather than diffusing efforts and the limited time available in covering both formulation and evaluation of projects. The Centre for Industrial Development hopes to take up the topic of formulating industrial projects in its future work programme.

3. One of the purposes of the substantial documentation prepared for the Symposium is to cover adequately all items of the provisional agenda. In addition, it is intended to present to the

participants the criteria and methods of industrial project evaluation as well as the theoretical rationale underlying them in countries with market economies as well as in countries with centrally planned economies. Finally, an attempt has been made to prepare a fairly comprehensive documentation which can be directly and immediately useful to all persons engaged in evaluation of industrial projects in developing countries. Forty-two papers dealing with country experience and case studies of individual projects, it is hoped will provide a sufficient amount of existing practices and problems of industrial project evaluation in developing countries. The documentation includes simple as well as highly sophisticated techniques of industrial project evaluation. However, the latter are presented with a view to show the possibilities of improving existing practices in developing countries and to indicate the leeway that the developing countries have to make up in this field of planning.

4. In view of the voluminous documentation, some of the important issues and problems in evaluation of industrial projects are briefly outlined in this paper, as an aid to the systematic discussion at the Symposium. The issues and problems referred to in this paper are raised from the viewpoint of the conditions in developing countries and are not necessarily pertinent to the developed countries. It should be emphasized that issues and problems presented in this paper are not exhaustive and are in no way designed to exclude the discussion on other relevant issues and problems. Issues and problems will have to be examined in the context of documentation dealing with the survey of country experience and case studies.

A. Preliminary steps in setting up industrial projects. It will be useful to briefly examine certain preliminary measures which are

indispensable to carry out effective and systematic evaluation of industrial projects.

A.1. Relation of projects to the general strategy of industrial development. The importance of this topic arises from the fact that practically all developing countries experience in varying degrees shortage of capital, and/or foreign exchange, and/or skilled personnel which calls for the optimum utilization of available resources for realizing accelerated economic development. The following issues may be dealt with under this item of the agenda:-

- i) An industrial project needs to be evaluated in the context of the development needs of the economy which in this specific case is expressed in the general strategy for industrial development. The essence of the strategy for industrial development lies in the formulation of industrial priorities for a prescribed length of time.
- ii) Industrial sectoral programmes - long-term as well as medium-term - are formulated on the basis of industrial priorities embodied in the strategy for industrial development. These programmes include investment and production targets, allocation of resources, know-how and training requirements, specification of the role of private and public sectors, policies regarding incentives, financial and technical assistance, balance of payments, employment potential, industrial licensing, development of entrepreneurships, etc. In any case, sectoral programmes provide the frame of reference for evaluating industrial projects.
- iii) While the strategy for industrial development and sectoral programmes take into account both import substitution and export promotion, the government has much greater control over the former than the latter. In considering

import substitution, industrial development centres or "poles" and industrial complexes composed of inter-related plants aimed at expanding internal market and creating, to some extent, simultaneously supply and demand, and providing dynamism to the development process may form an important part of the strategy for industrial development.

(iv) A project must be examined in relation to the economy and to other projects in development programmes. In examining the latter, there exists two types of relationship, viz. competitive and complementary. In the former case, the outputs of projects satisfy, with varying degrees of efficiency, the same basic want while the output of one project becomes raw materials, intermediates or components or services for another project. The internal consistency of the development programme is, therefore, very important in evaluating an industrial project. This is especially important for countries with limited foreign exchange.

v) Project development and appraisal is an essential part of the planning process in countries with long-term and medium-term development plans. The broad sectoral targets are translated into specific projects. The submission of project proposal and their evaluation lead to the modification and adjustment of the broad sectoral programmes and the overall plan.

A.2. Essential elements in the preparation of industrial projects.
The careful preparation of a bankable project is necessary for efficient evaluation.

i) Present and potential markets, technical and economic feasibility and sound financial planning are indispensable for a good project.

ii) Social costs and benefits and foreign exchange effects of a project should be carefully formulated and incorporated in a project report.

iii) Special care should be taken to detail various uncertainties and margin of errors in various estimates in the report of a bankable project. Adequate provisions should be made against contingencies which are bound to arise.

iv) Care should be taken to select a well tried out and commercially successful process of production which is not likely to become obsolete in the near future.

v) Provisions for sound designing of the plant and scheduling of construction at a minimum cost are essential for successful execution of a bankable project.

A.3. Requirements of data and other information for and institutional aspects of industrial project evaluation. Data and other information and their degrees of reliability constitute the basic raw materials for project evaluation. Organizational set-up, experience and skill of the evaluating agency determine the efficiency with which these raw materials will be used.

i) Data and information concerning costs and benefits for calculating commercial and national economic profitability and foreign exchange effects, the manning table, availability of technical know-how and raw materials, intermediates and components, inter-industry effects, infra-structural requirements and financial needs, etc. need to be carefully listed.

ii) Reliability of data and estimating the margin of error in the available data have to be carefully examined.

iii) Experience acquired in the past and organizational set-up of evaluating agencies have relevance to the efficiency and speed of project evaluation. Whether the agency should participate in project development or confine its activity merely to evaluation and follow-up, and whether an evaluation of a target should be carried out by the economist, the engineer and the accountant separately or by a team comprising the economist, the engineer and the accountant, are the two most important questions to be examined.

iv) Defining the types of skills required for project evaluation and follow-up arrangements for improving the skills of the existing staff and training new cadres for this purpose represent the most effective means in improving efficiency in this area.

B. Considerations in evaluation of industrial projects. Evaluation of industrial projects has several dimensions; profitability, inter-industry relation; skill formation, competence and reliability of management, pricing problems, financial planning, etc. Each one of them needs to be carefully examined before committing financial and foreign exchange resources to the project. There are from very simple to highly complex methods of evaluation which can be applied depending upon the availability and reliability of data, computing facilities and the skills of evaluating staff.

B.4. Criteria for industrial project evaluation. The commercial profitability and the national economic profitability are the obvious and most important criteria for industrial project evaluation. In addition, the project should be examined from the point of view of the utilization of indigenous resources and requirements of technical and managerial personnel, employment potential, etc.

B.4.a. Commercial profitability and national economic profitability. The proposed project should not only earn the acceptable rate of return but also be beneficial to the national economy. These twin objectives are not always attainable. In addition, there are difficulties in measuring both categories of profitabilities.

i) It is necessary to examine relative efficiency of measuring commercial profitability by the three available methods, viz., payback or recoupment period, average return on investment and discounted cash flow method. Applying these methods in project evaluation will involve the measurement of at least four dimensions: the amount and timing of investment outlay, the amount and timing of the added stream of earnings (net cash receipts), the economic life of the project (duration of the earning stream) and the risks, uncertainties and imponderable benefits associated with the project.

ii) It is recognized that the discounted cash flow method is superior to the other two methods of estimating commercial profitability. The feasibility of applying this method in developing countries should be explored.

iii) The objective standards of minimum acceptability and ranking of projects from the standpoint of commercial profitability are important issues for any evaluating agency.

iv) It is necessary to distinguish between purely accounting and economic aspects in estimating national economic profitability. For example, duty on imported raw materials or excise taxes on domestic raw materials are cost to an enterprise but they are not costs to the economy. These adjustments are purely of an accounting nature. In an economy with shortage of foreign exchange resources, the cost of imported raw material to the enterprise is arrived at on the basis of official exchange rate while it would be much higher to the economy. The margin between private and social costs of imported raw materials will depend on the alternative uses of the available foreign exchange resources. The latter is an example of economic adjustment.

- v) Four types of economic adjustments or corrections arising from the imperfection of markets may be necessary. Firstly, there is a case of developing countries with surplus labour where the market wage rate is much higher than the opportunity costs of labour or the alternative marginal product of labour.
- vi) Secondly, there is the problem of divergence between the market price of capital and its social cost in developing countries. In perfectly competitive conditions, the rate of interest is supposed to represent the time preference of the community attaching relative weights to present consumption compared with future consumption on the one hand and to express the productivity of capital investment. The problem of divergence between the market price and social cost arises in developing countries because the rate of interest does not correspond to both magnitudes.
- vii) Thirdly, there is a divergence between the official rate of exchange and the "true" market price of the currency in several developing countries. The over-valued currency distorts the true costs and benefits resulting from the allocation of foreign exchange to a project.
- viii) In addition to these general market imperfections, specific monopolistic elements are often found in some branches of industry. There is no certainty that the monopolistic firms will attach to factors of production prices equal to their contribution to production.
- ix) The market prices do not take into account the question of the desired pattern of income distribution. Some countries may desire to attach relatively greater weight for the proportion of income accruing to low income groups or a depressed region. This will require adjustments in the estimates of benefits in the form of income.

x) Prices which people are prepared to pay for some goods such as medicine, books, equipment for hospitals and laboratories, etc. are generally less than their true utility. This arises on account of the insufficient comprehension of their usefulness. In estimating the revenues of projects designed to meet such "merit wants", one may add an extra weight on them over and above market price.

xi) The issue of "consumer's surplus" arises when one deals with a discreet set of fixed alternatives rather than the marginal question of changing the amount of each factor applied by tiny amounts. Similarly, the question of producer's surplus" may also arise in some cases.

xii) The evaluation of projects involving presence of economies of scale and indivisibility (e.g. interdependence of projects) may require a highly complex mathematical technique of integer programming.

B.4.b. Other criteria (linkage considerations, skill formation, composite criteria, etc.) There are several other criteria of project evaluation. They have been treated separately because of their importance or difficulties involved in their quantitative measurement. Some of them may be considered as the part of national economic profitability in the broad sense of the term because these aspects do not enter into the calculation of private enterprise.

i) The proposed project is generally related to current and future economic activities. On the benefit side, it may meet the import needs of other industries or branches of the economy. Secondly, it may give rise to new economic activities in the form of either forward or backward linkage. On the cost side, it will often require new supporting and servicing activities, particularly infra-structural facilities such as power and transport. The material balance and input-output methods can be employed to

determine these effects.

ii) Evaluation of required technical and managerial skills include a) assessment of the manning table of the proposed project, b) scrutiny of the organizational plan, and c) the examination of the availability of skilled personnel, arrangements for training of nationals, and hiring of foreign experts on a temporary basis and their respective costs.

iii) Skills of the personnel are developed partly by formal education and partly by in-job training. The latter without the former is not possible in case of jobs involving complex activities. Such jobs increase with expansion of industries based on modern technology. Formal education has to be provided by public authorities as part of infra-structural services. In order to facilitate accelerated industrial development, it is necessary to make long-term forecasts for the development of different industries, and corresponding forecast of the occupational structure and manpower requirements. Since many industries do not exist at present and expansion of the existing industries will be based on higher levels of technology and productivity in developing countries, such forecasts will have to be based on international comparisons. The forecasts can be used for expanding, modifying and diversifying formal educational structure. The formal education structure referred to here includes vocational training.

iv) Industries can be classified on the basis of the number of basic production processes. It is, therefore, necessary to evaluate the contribution of the proposed project in accumulating technical know-how and in creating a pool of managerial and technical personnel operating other projects with similar processes.

v) The importance of the choice of location in industrial project evaluation needs no emphasis. The subject will be dealt with in detail in a separate seminar.

vi) There are considerable amounts of underutilized or unutilized natural resources in a large number of developing countries. The value of unutilized resources is, at present, nil and their utilization would be a net benefit to the economy. Comparative cost of their utilization valued at corrected foreign exchange rate should be assessed in evaluating projects which are designed to make use of them.

vii) Additional considerations in evaluation industrial projects include among other, health of operations, prevention of accident, air and water pollution, etc.

viii) The many dimensions of project evaluation referred to above yield varying results expressed in different units. For example, a project may have low commercial profitability but high potential linkage effects. The problem arises of adding the two dimensions together as well as comparing it with alternative projects. Attempts have been made to express the manifold dimensions in a common unit, i.e. to evolve a composite criteria often in the form of synthetic indexes in order to solve these problems.

B.4.c. Survey of current practices and theories in the field of industrial project evaluation. The theory and especially the practice of industrial project evaluation both in countries with centrally planned economies and in countries with market economies are characterized by a wide range of differences.

i) In both types of economies, there exists a wide gap between theory and practice of industrial project evaluation. This raises the issue of how to narrow the gap between the two.

ii) The field of industrial project evaluation is a relatively new branch of economic analysis, and as such still in formative stages. There appear to be some gaps and unresolved issues, especially in evaluation of economies of scale, invisibilities and the social rates of discount and in calculation and application of shadow prices.

iii) In countries with market economies, there appears to be a large gap between the best and worst practices indicating the problem of diffusion of knowledge.

iv) In countries with centrally planned economies, there appears to be a serious difference of opinion regarding new and more advanced techniques among the academic circle. The planning agencies appear to gradually realize the necessity of changes in institutional set-up in order to implement new techniques of industrial project evaluation.

v) The development of new operational techniques seems to be hampered by the limited facilities for testing new techniques and the application of newly developed operational techniques appears to be slow because computing facilities, availability of trained personnel and collection and systematization of the required data lag behind the development of new techniques.

B.5. Pricing problems with special reference to foreign exchange and trade considerations. The reference has been made to market imperfections and the resulting necessity to adjust market prices in order to measure social costs and benefits. The adjustment or correction of market prices is especially important in examining

the contribution of a project in the form of import substitution and/or export promotion and foreign exchange costs.

i) In estimating national economic profitability, imperfection of market prices are corrected by means of shadow prices which represent the mathematical problem of maximizing or minimizing subject to constraints as the increase in the optimum value of the maximand (or decrease in the optimum value of the minimand) made possible by a unit change in constrained variable. It has been impossible to arrive at perfect shadow prices. Consequently, accounting prices which represent approximate shadow prices and meet a certain standard of administrative feasibilities are used in practice to correct imperfection of market prices. ✓

ii) An important aspect of accounting prices involving high level policy decisions is expressed in giving relative weights to stated policy objectives such as the maximization of return on social capital, reduction in degree of inequality in levels of income distribution and in regional income variations, expansion of employment, etc.

✓ It should be added that accounting prices may also be used for doing separate accounting in a large organization which does not buy its inputs or sell its output (e.g. inter-departmental transfers) in the open market and for constructing a set of market values for managers and workers so as to induce them to operate in a way that accords with defined social criteria.

iii) Since costs and benefits occur at different points in time involving inter-temporal choice in industrial project evaluation, the determination of social time preference relating values of present and future consumption or benefits acquires great importance in project evaluation.

iv) There are important issues of inducing the decision makers at sectoral and project levels to use centrally established accounting prices for various inputs and outputs and of counteracting the undesirable disturbances which may result from the application of inadequately developed computation techniques.

v) Another important aspect of accounting prices is the techniques of computing value parameters needed for making investment decisions. The solution for the dual problem in linear programming, maximizing returns from factors in short supply, the use of import-export prices for calculating accounting prices for intermediate and final goods and iterative multi-stage factor accounting prices are among the techniques for computing these value parameters.

vi) It may be useful to work out net foreign exchange effects and distinguish three types of projects, viz. net export-earning, net import saving and net import-increasing projects. In working out net foreign exchange effects, both capital or once for all cost and recurrent expenditure and earning of foreign exchange should be taken into account and foreign exchange rate in an over-valued currency should be corrected by means of accounting prices. Short-run and long-run prospects in world markets and expected comparative cost advantages, competitive efficiency over the life span of the project and uncertainties are important considerations in evaluating net export-earning projects.

B.6. Appraisal of financial aspects. Accurate estimates of various financial data such as requirement for fixed and working capital, cash flow estimates, cash balances, etc. are required not only for the smooth construction and operation of an enterprise, but also for correctly assessing the commercial profitability of the proposed project.

i) The projected balance sheet method and the cash flow forecast method represent two techniques of organizing projections of financial requirements. The former represents a comparative statistics giving a picture of key balance sheet items at two different points of time without reflecting the needs that may arise in the interim. The latter is essentially a tabulation of the plans of the enterprise in terms of the impact on the receipts and expenditures of cash in future periods. A good set of financial forecasts should include both projected balance sheets as of the month-end and cash forecasts detailed by monthly periods for the similar span of time.

ii) Wide-spread tendency towards under-estimation of financial needs and failure to provide sufficient un-committed reserves for financial strength and the failure to reflect distinctive circumstances of the particular project appear to be the common weaknesses in financial planning of projects in developing countries.

iii) An evaluating agency may profitably assist sponsors of a project in development of detailed financial forecasts.

(iv) Concepts used in calculating commercial profitability by accountants and national economic profitability by economists diverge widely. This often leads to confusion and two sets of calculations consuming considerable time. The integration of accounting and economic concepts is a new

field and the task of integrating the two concepts and standardizing them has yet to be realized.

7.C.7. Follow-up and supervision of approved projects. The objective of a systematic follow-up is to check that the project follows the agreed lines. Assuming that resources are employed for assigned purposes, any discrepancy between expectation and performance may be ascribed to errors in estimating costs and benefits, or in applying evaluation criteria, or to accidents and other exogenous factors, severally or in combination. This, in turn, may require revision in techniques of making estimates of costs and benefits and methods of applying evaluation criteria. Systematic follow-up would permit the authorities to take timely measures to rectify errors or scrap the project with minimum losses.

i) Personal links, reports and budgets and processing of reports are three follow-up techniques which should be simultaneously employed.

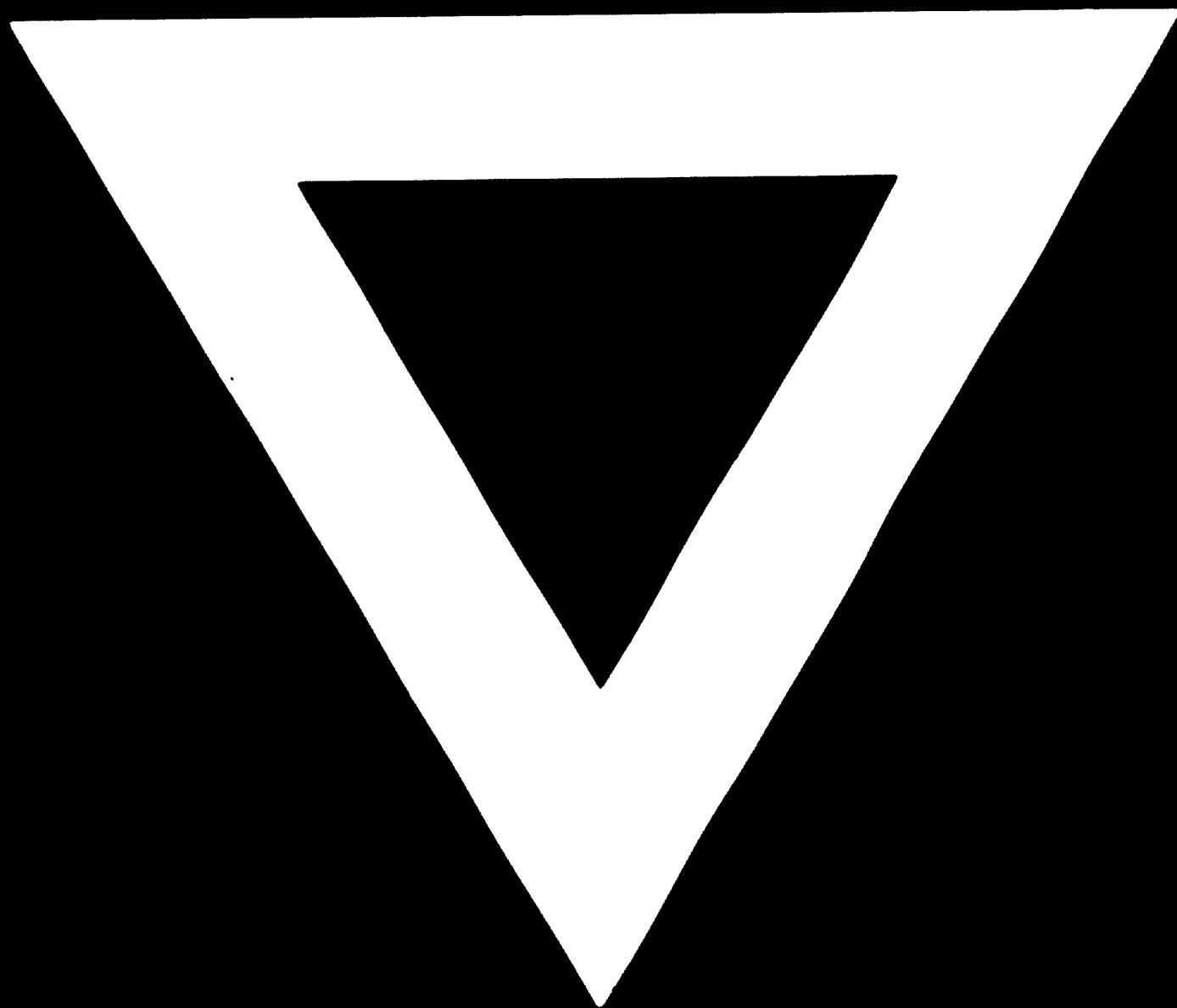
ii) In developing countries, problems relating to the arrangement of finance, delays in completing construction, over-runs in costs beyond original estimates and weak management are often encountered in the construction phase while problems connected with technical difficulties in developing production, supplies of raw materials and marketing are predominant in the production phase.

iii) As a condition for providing finance, the financial agency may provide a right to nominate a director on the board of the company but may exercise this right only where the agency has provided a large fraction of the total cost or it is found that the execution of the project is experiencing serious difficulties.

The country experience and case studies of projects may be examined in the context of issues and problems stated above.



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