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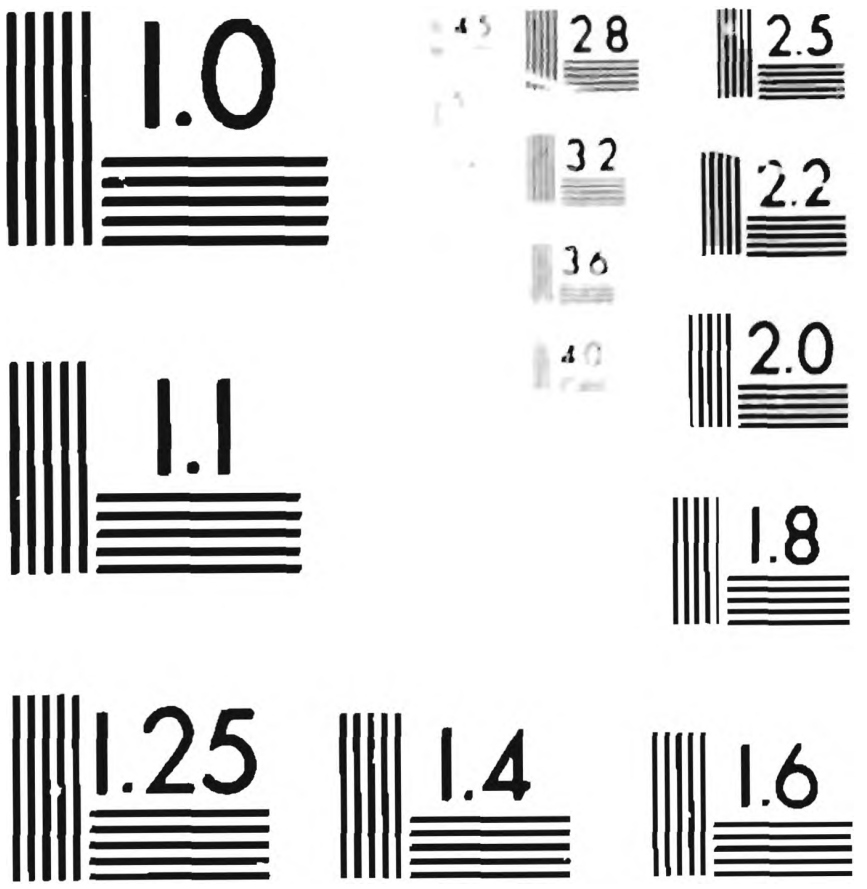

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INDUSTRIAL PRE-INVESTMENT STUDIES*

prepared by

the UNIDO secretariat

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I. INTRODUCTION

As manifested in the Lima Declaration and Plan of Action, it is the express intention of the international community that the developing countries should attain by the year 2000 a 25 per cent share in world industrial production. Among many other considerations, this endeavour is closely dependent on the developing countries' ability not only to negotiate successfully the new distribution of industrial capacities which Governments and industrialists of the developed world, but also, and at least equally important, to select investments commensurate with their development objectives and targets. Because of their limited resources and pressing need for accelerated industrial development, it is essential that developing countries use a systematic approach to project preparation and evaluation. Inadequate preparation of projects risks waste of domestic resources as well as failure to tap fully possibilities of external financing. Before resources are committed, therefore, projects must be identified, formulated and evaluated in terms of their technical and financial feasibility and economic benefits and costs. The selection of sound investment projects has to be undertaken in this context so as to ensure the optimum utilization of scarce human and capital resources towards meeting social objectives and economic growth.

Indeed, one of the major constraints to industrial development is the shortage of viable industrial projects. In this context, the quality of pre-investment studies has not kept pace with the more elaborate demands made on them. The standard and depth of studies are often not of a sufficiently high level to ensure rational decision making at the successive stages of the pre-investment process. This deficiency has resulted in misallocation of resources, long gestation periods, investment cost over-runs, and the creation of excess capacities.

The experience gained by developing countries in the preparation of pre-investment studies has been mixed. Such studies were frequently motivated by equipment sellers or were a part of a turnkey project and the specific problems and difficulties that were likely to be encountered in the project were not sufficiently stressed. In other cases, such studies were largely based on earlier experience with similar projects in developed countries, and then proved inadequate under the prevailing conditions. The costs of some studies

have tended to be disproportionately high compared with the investment in the projects. There has been continuing dependence on foreign consultants in some developing countries and national consultancy services have developed only to a limited extent.

In an effort to overcome some of these problems the United Nations Development Programme (UNDP), the Administrative Committee on Co-ordination (ACC) and the Executing Agencies have in 1981 agreed to define pre-investment projects as follos:

> "Pre-investment projects are those that clearly identify, as an objective, the task of collecting, analysing and presenting economic, financial, technical, institutional and social data, in any development sector, in a form which would facilitate decision-making concerning the feasibility of committing an amount of capital for the creation of physical assets, production of goods and services or the development of human and natural resources."
>
> "Other activities such as the survey of natural resources, sector studies, master plans, regional plans, research, pilot schemes, etc. continue to claim a large portion of UNDP resources. It is proposed that such activities be described as 'investment-oriented' projects given their general orientation and importance to future investment activities."

During its 15 years of operation UNIDO has always played an active role in the pre-investment field. Most of its major programmes are linked to the initiation, promotion and development on investment in the field of industry in one way or another; the Investment Co-operative Programme, the Technology Programme, Redeployment, the System of Consultations are all geared towards the achievement of the Lima Target and thus increased investment in industry. UNIDO's mandate for pre-investment work derives both from the Lima and the New Delhi Plans of Action.

In line with the above given definitions on pre-investment projects and investment-oriented projects, UNIDO undertakes pre-investment studies for client governments, assists in building up national capabilities to conduct such studies, and as part of its programme of technical assistance also offers seminars and workshops to extend national capabilities in project preparation and evaluation. In addition, once a project has been identified as feasible and profitable UNIDO through its Investment Promotion Services in Brussels, New York, Tokyo, Cologne, Zurich, Vienna, Paris and Warsaw can assist governments and project promoters in locating suitable sources of finance, such as the World Bank or regional development banks, and foreign partners who can provide the necessary technical know-how, management expertise, marketing facilities, etc.

II. CATEGORIES OF PRE-INVESTMENT STUDIES

One of the main difficulties investment promoters, industrial development banks, technical assistance agencies and foreign partners face when establishing a dialogue on a potential investment project, is the widely different terminology and concepts applied. This confusion becomes particularly acute when one considers the different approaches to pre-investment work applied in market-oriented, socialist and mixed-economy countries. It appears, therefore, to be necessary to first define the categories of pre-investment studies and agree on a methodology how to conceive such studies.

The project development cycle (figure I) comprises the pre-investment, the investment and the operational phases. Each of these three major phases is divided into stages which constitute mutually interlinked, important industrial activities. Several parallel activities take place within the pre-investment phase. Thus, once the early stages of pre-investment studies have produced fairly dependable indications of a viable project, investment promotion and implementation planning are initiated leaving, however, the main thrust to the final evaluation stage and the investment phase (figure II).

The three phases of the project development cycle involve project preparation, evaluation and decision making, contract negotiation, detailed engineering, construction, start-up and operations. At each stage various activities are carried out requiring different skills and expertise. It is for this reason that UNIDO's technical assistance in the pre-investment field requires a multidisciplinary team approach embracing expertise in the fields of market research, technology and engineering, financial analysis, legal expertise, investment promotion etc. The complexity of tasks involved, their sequence and timing through the various stages of the pre-investment and investment phases require careful planning and the timely provision of sufficient inputs both in qualitative and quantitative terms.

The pre-investment phase comprises several stages: identification of investment opportunities (opportunity studies); preliminary project selection and definition (pre-feasibility studies); project formulation (feasibility studies); the final evaluation and investment decision. Support or functional studies are a part of the project formulation stage. These are usually done

separately, one common reason being that the agency carrying out the feasibility study may not have the qualified manpower or expertise to conduct studies in the areas concerned. These stages assist a potential investor in the decision-making process and provide the base for project decision and implementation.

To differentiate between an opportunity, a pre-feasibility and a feasibility study is not an easy task in view of the frequent, inaccurate use of these terms. The definitions given below are made general enough to be widely accepted and applied in developing countries. During the different pre-investment stages, decisions are taken as summarized in figure III.

Opportunity studies

An opportunity study should identify investment opportunities or project ideas, which will be subject to further scrutiny once the proposition has been proved viable, by analysing, e.g., the following:

a. Natural resources with potential for processing and manufacture such as timber for wood-based industries;

b. The existing agricultural pattern that serves as a basis for agro-based industries;

c. The future demand for certain consumer goods that have growth potential as a result of increased population or purchasing power or for newly-developed goods such as synthetic fabrics or domestic electrical products;

d. Imports in order to identify areas for import substitution;

e. Possible interlinkage with other industries, indigenous or international;

f. Possible extension of existing lines of manufacture by backward or forward integration such as a downstream petrochemical industry for a refinery or an electric arc steel plant for a steel rolling mill.

Opportunity studies are rather sketchy in nature and rely more on aggregate estimates than on detailed analysis. Cost data are usually taken from comparable existing projects and not from quotations of equipment suppliers and the like. Depending on the prevailing conditions under investigation, either general opportunity or specific project opportunity studies, or both, have to be undertaken.

General opportunity studies. Such studies have been implemented in a number of developing countries through state and institutional agencies with the objective of pinpointing specific investment proposals. There are three types of study:

a. Area studies which seek to identify opportunities in a given area such as an administrative province, a backward region or the hinterland of a port;

b. Subsectoral studies which seek to identify opportunities in a delimited subsector such as building materials or food processing;

c. Resource-based studies which seek to reveal opportunities based on the utilization of a natural, agricultural or industrial produce such as forest-based industries, downstream petrochemical industries and metalworking industries.

Specific project opportunity studies. A specific project opportunity study, which is more common than a general opportunity study, may be defined as the transformation of a project idea into a broad investment proposition. Since the objective is to stimulate investor response, a specific project opportunity study must include certain basic information; the mere listing of products that may have potential for domestic manufacture is not sufficient. While such a list - derived from general economic indicators such as past imports, growing consumer demand or from one of the general opportunity studies relating to areas, sectors or resources - can serve as a starting point, it is necessary, first, to be selective as to the products so identified, and secondly, to incorporate data relating to each product so that a potential investor, either domestic or foreign, can consider whether the possibilities are attractive enough to proceed to the next stage of project preparation. Such data can be supplemented with information on basic policies and procedures that may be relevant to the production of the particular product. A broad investment profile would then emerge that would be adequate for the purpose of stimulating investor response.

The information conveyed in a project opportunity study should not involve any substantial costs in its preparation as it is intended primarily to highlight the principal investment aspects of a possible industrial proposition. The purpose of such a study is to arrive at a quick and inexpensive determination of the salient facts of an entrepreneurial interest, the pre-feasibility study has to be taken into consideration as and when entrepreneurial response is forthcoming.

Pre-feasibility studies

The project idea must be elaborated in a more detailed study. However, formulation of a techno-economic feasibility study that enables a definite decision to be made on the project is a costly and time-consuming task. Therefore, before assigning funds for such a study, a preliminary assessment of the project idea must be made in a pre-feasibility study, the principal objectives of which are to determine whether:

a. The investment opportunity is so promising that an investment decision can be taken on the basis of the information elaborated at the pre-feasibility stage;

b. The project concept justifies a detailed analysis by a feasibility study;

c. Any aspects of the project are critical to its feasibility and necessitate in-depth investigation through functional or support studies such as market surveys, laboratory tests, pilot plant tests;

d. The information is adequate to decide that the project idea is not either a viable proposition or attractive enough for a particular investor or investor group.

A pre-feasibility study should be viewed as an intermediate stage between a project opportunity study and a detailed feasibility study, the difference being primarily the detail of the information obtained (figure IV). Accordingly, it is necessary even at the pre-feasibility stage to examine, perhaps broadly, the economic alternatives of:

a. Market and plant capacity;

b. Material inputs;

c. Location and site;

d. Project engineering: technologies and equipment, and civil engineering works;

e. Overheads: factory, administrative and sales;

f. Manpower: labour and staff;

g. Project implementation;

h. Financial analysis: investment costs, project financing, production costs, and commercial profitability.

The structure of a pre-feasibility study should be the same as that of a detailed feasibility study.

When a project opportunity study is conducted in respect of an investment possibility, the pre-feasibility stage of the project is often dispensable. The pre-feasibility stage is also occasionally by-passed when a sector or resource opportunity study contains sufficient project data to either proceed to the feasibility stage or determine its discontinuance. A pre-feasibility study is, however, conducted if the economics of the project are doubtful unless a certain aspect of the study has been investigated in depth by a detailed market study, or some other functional study, to determine the viability.

Pre-feasibility studies should normally not involve more than 6-8 man/months of different expert services.

Feasibility study

A feasibility study must provide a base - technical, economic and commercial - for an investment decision on an industrial project. It should define and analyse the critical elements that relate to the production of a given product together with alternative approaches to such production. Such a study should provide a project of a defined production capacity at a selected location, using a particular technology or technologies in relation to defined materials and inputs, at identified investment and production costs, and sales revenues yielding a defined return on investment.

To reach this objective, an iterative process has to be launched with a cycle of feedbacks and interlinkages covering possible alternative solutions for production programmes, locations, sites, technology, plant, mechanical, electrical and civil engineering and organizational set-up that have to be harmonized in order to minimize investment and production costs. If the resulting data show a non-viable project, several parameters and the production programme, material inputs or technology should be adjusted in an attempt to present a well-defined, viable project. The feasibility study should describe this optimization process, justify the assumptions made and the solutions selected and define the scope of the project as the integration of the selected partial alternatives. If, however, the project is not viable despite all alternatives reviewed, this should be stated and justified in the study.

Final estimates on investment and production costs and the subsequent calculations of financial and economic profitability are only meaningful if the scope of the project is defined unequivocally in order not to omit any essential part and its pertaining cost. The scope should be defined in drawings and schedules which should then serve as a supporting structure during further project work.

Most feasibility studies have the same or similar coverage, though there may be considerable differences in orientation and emphasis depending on such factors as the nature of the industry, the magnitude and complexity of the production unit contemplated, and the investment and other costs involved. By and large, however, a satisfactory feasibility study must analyse all the basic components and implications of an industrial project and any shortfall in this regard will limit the utility of the study (see figure IV).

The term feasibility study is often misunderstood and often deliberately misused by suppliers of equipment or technology. Frequently, an outline of a project primarily oriented to the supply of equipment or the choice of particular techniques is called a feasibility study. Sometimes, production or sales estimates are based on experience gained in an industrialized country and bear little relation to the conditions within which a project has to operate in a developing country. As these studies are unrelated or unadapted to local production factors, they can be misleading and can result in the misapplication of resources, as has often occurred in developing countries. A feasibility study must be related to available production factors, local market and production conditions and this involves an analysis which has to be translated into costs and income.

A feasibility study is not an end in itself, but only a means to arrive at an investment decision that need not agree with the conclusions of the study. In fact, it would be rare to find investor response so flexible as to fully conform to the results of such a study.

Feasibility studies can take up to 9-12 months to prepare and may require up to 3-4 man/years to prepare depending on the different size of the projects under review.

Support (functional) studies

Support (functional) studies in industrial programming cover one or more but not all aspects of an investment project and are required as prerequisites for, or in support of, pre-feasibility and feasibility studies, particularly large-scale investment proposals. They are classified as follows:

a. Market studies of the products to be manufactured, including demand projections in the market to be served together with anticipated market penetration;

b. Raw material and input studies;

c. Laboratory and pilot plant tests;

d. Location studies;

e. Economies of scale studies, which are generally conducted as a part of technology selection studies. These are separately commissioned when several technologies and market sizes are involved, but the problems are confined to the economies of scale and do not extend to the intricacies of technology;

f. Equipment selection studies. When very large investments are involved, the structure and economics of the project depend heavily on the type of the equipment and its capital and operational costs; even the operational efficiency of the project is a direct function of the selected equipment. In such cases, where standardized costs cannot be obtained, equipment selection studies become imperative as a support to techno-economic feasibility studies.

The contents of the support study vary, depending on the nature of the study and the projects contemplated. Since, however, it relates to a vital aspect of the project, the conclusions should be clear enough to give a direction to the subsequent stage of project preparation.

In most cases, the abridged contents of a support pre-investment study, when undertaken either before or together with a feasibility study, form an integral part of the latter and lessen its burden.

Support studies are carried out before commissioning a pre-feasibility or a feasibility study when, for example, a basic input may be a decisive factor in determining the viability of a project and the support study may show negative results. Support studies are commissioned separately but simultaneously with a pre-feasibility or a feasibility study when detailed work required for a specific function is too involved to be undertaken as part of the feasibility study. A support study is undertaken after completion of a feasibility study when it is discovered in the course of the study that it would be safer to identify a particular aspect of the project in much greater detail although the preliminary evaluation as a part of the decision-making process may commence earlier.

In the project development cycle, the pre-investment phase is critical, firstly, to ascertain financial and economic viability of the project (see figure V) and secondly, to design the industrial investment project which is to be successfully implemented and subsequently operated without any unexpected shortcomings and difficulties. Inadequate preparation of projects risks waste of domestic resources as well as failure to tap all existing possibilities for external financing. This fact has been recognized by UNDP, UNIDO and other agencies involved in assisting developing countries to work. Efforts are therefore being made to improve the quality of pre-investment studies as a major precondition for the implementation of viable industrial projects in the developing countries.

III. THE UNIDO MANUAL FOR THE PREPARATION OF INDUSTRIAL FEASIBILITY STUDIES

With the publication of the Manual for the Preparation of Industrial Feasibility Studies in 1978, UNIDO has made a major contribution towards standardizing the terminology and approach to be used in the field of pre-investment studies and has thus provided the developing countries with a tool to facilitate the preparation of projects that are technically, financially and economically sound. The standardization of the applied methodology is of particular relevance to ensure that both users and producers of pre-investment studies are dealing with the same concepts. It enables UNIDO for the first time to prescribe terms of reference to consulting firms, monitor their progress and ensure high quality of pre-investment studies. With the above Manual being available in English, French, Spanish, Russian, Chinese, Turkish, Dahri, Hungarian, Czech, Polish, German and Burmese (1983) and a present edition of 60,000 copies and its wide application by consulting firms, development banks, the EDI of the World Bank, etc., good progress has been achieved in the effort to standardize pre-investment work.

Since project planning is an interdisciplinary task requiring a team of engineers, economists, social scientists, businessmen and governmental administrators, the Manual is aimed at readers with

different educational backgrounds and professional experiences from both developing and developed countries. The Manual is practical in approach; it aims to put the various feasibility studies into a similar framework with a view to making them more comparable than in the past.

The Manual has two parts: the first one concerns the different types of pre-investment studies that can be applied to the industrial sector as a whole, and shows the information required at the various stages of decision making in the project selection process. The implications of undertaking one of the different types of pre-investment studies can thus be determined fairly clearly against the need in each case.

The second part constitutes the core of the Manual and its outline corresponds to the framework of a feasibility study given further above. In the principal chapters, related issues are grouped in such a way that their results can serve as input for the succeeding chapters. Three chapters deal with the basis of a project: its history and the overall economic context in which it will operate; the assessment of markets; the supply conditions and the resulting production and supply programmes. Together with the results obtained from the chapter on location and site selection, the production and supply programme serve as points of reference for the chapters on choice of technology, equipment and civil engineering, and administration and manpower requirements. The concluding chapters are on implementation scheduling, financial analysis and issues related to economic evaluation. A bibliography is provided for each chapter, as is an index of main topics covered.

To ensure clarity, each chapter in the second part of the Manual is presented in three parts: brief introductory remarks, a data and information section, and detailed explanatory notes.

The data and information section constitutes the backbone of the feasibility study. When preparing this section, the user of the Manual should proceed as follows:

a. Decribe briefly the data of the chapter; show the data processing required to arrive at possible alternative solutions, as appropriate; explain the formulae used and justify their application;

b. Select the best alternative for further consideration in the study and describe it in detail; state the method of, and reasons for, its selection;

c. Estimate, as far as necessary, the investment and annual production costs for the duration of the project at full feasible normal capacity.

The notes given in each chapter are intended to acquaint the reader with the conceptual problems to be faced in completing the study. These notes have as much detail as is possible in a manual dealing with the many multidisciplinary problems of a feasibility study. The bibliographies point the way to further study of individual issues raised in the Manual.

This format allows a stage-by-stage analysis of the various components of a feasibility study, with the sets of figures generated for each component gradually converging to the most important totals. This method also allows any single component of the entire study to be dealt with separately, within the overall logic of the study. The format was designed in this way because the true evaluation of an investment proposal can only be done correctly if data are collected properly during the preparatory stage.

Although the Manual is chiefly concerned with project preparation, the need for the wider application of cash-flow analysis in project evaluation prompted the addition of a presentation of the discounting and simple evaluation methods applied in financial evaluation. Thus, each chapter of the Manual contains several proforma schedules suitable for data collection. These schedules are designed in such a way as to correspond to the timing requirements of cash-flow analysis. Furthermore, the schedules are sequential and can ultimately provide an accounting of all the major inflows and outflows of funds needed for financial evaluation and planning.

IV. PROGRAMMES OF TECHNICAL ASSISTANCE

In the field of pre-investment work, UNIDO's assistance takes place at three different but interlinked levels:

* assistance in the preparation of specific pre-investment studies;

* assistance to national institutions to strengthen the local capacity for pre-investment studies;

* assistance in upgrading national staff to prepare and evaluate pre-investment studies.

A. Specific pre-investment studies

Upon request from governments of developing countries UNIDO offers assistance in the preparation of pre-feasibility and feasibility studies for specific industrial projects. Such pre-feasibility and feasibility studies may be carried out either by individual experts or by consulting firms. However, in general, there is a preference for consulting firms to handle the complex and full-fledged feasibility studies because of their ability to meet the multidisciplinary requirements.

Emphasis is placed on the impartiality of the assistance provided. Particular attention is given to involving project sponsors from developing countries as early as possible in the process of project preparation, in order that they may identify with the studies worked on by the consulting firms.

Of equal importance is the identification of investment opportunities and the preparation of related opportunity studies. This type of work is mainly done by individual experts.

Industrial pilot plants have recently gained particular interest as one form of support/functional study. Conceptionally intended to test locally available raw materials or the technical suitability of a process for manufacturing in developing countries, pilot plants have been used to deliver substantial amounts of equipment (a form of direct investment) without considering the investment and production costs, the financial implications for the recipient and for the economy. Pilot plants are not gifts to Governments and require careful preparation and study preferably based on a pre-investment study.

In 1984 UNIDO is conducting over 100 pre-feasibility and feasibility studies.

B. Assistance to national institutions

UNIDO offers assistance to national institutions in the development of national capabilities to conduct feasibility studies either by establishing project planning units, or industrial study centres, or by strengthening existing centres to identify, prepare, evaluate and promote industrial projects. The preparation of feasibility studies requires specialized, multidisciplinary inputs and teamwork. The limited availability of qualified cadres to handle feasibility studies, and the long training period usually necessary to acquire adequate knowledge and experience for carrying out such studies, constitute a serious constraint to the building up of national capacities. Such assistance from UNIDO, by providing expertise and on-the-job training to nationals over a sufficiently long period (2-4 years), enables developing countries to carry out by themselves the work of identification, preparation, evaluation and promotion of projects for industrial development.

Assistance in setting up an industrial project planning unit is usually provided by a team of experts composed of an industrial economist (team leader), market and financial analysts and technologists recruited for specific projects as required, depending on the industrial branches to be covered. UNIDO is currently providing or planning this type of assistance to some 25 developing countries, including Congo, Honduras, Indonesia, Mali, Mauritania, Oman, Saudi Arabia and the United Arab Emirates as well as to regional institutions.

C. Workshops for the preparation and evaluation of feasibility studies

UNIDO activities to improve developing countries' capabilities for the preparation and evaluation of pre-investment studies include the provision of training programmes in the preparation and evaluation of feasibility studies. Such training programmes are carried out either at the national level or with the participation of trainees from a particular region or group of countries. The workshops are based on the UNIDO Manual for the Preparation of Industrial Feasibility Studies and other teaching materials developed for the purpose. Over a period of two to six weeks, trainees are exposed to advanced methods and techniques in the preparation of pre-investment studies and commercial

and socio-economic evaluation. Case studies are usually used based on selected pre-investment studies provided in advance by the relevant government(s). UNIDO has so far conducted over 50 workshops - 10 of them during 1983 alone. It is intended to maintain this level over the coming years as well as to make provision for refresher courses.

V. UNIDO'S COMPUTER MODEL FOR FEASIBILITY ANALYSIS AND REPORTING (COMFAR)

The structural layout of the UNIDO "Manual for the Preparation of Industrial Feasibility Studies" was designed with the objective of eventually developing an EDP-Programme to facilitate the fast computation of the statements needed for economic and financial analysis of an envisaged investment project. The application of an EDP-Programme facilitates the computation of alternatives of the project and its components already during the preparation of the feasibility study. In this way it will be easier to approach the optimum solution of the project which is otherwise a very time-consuming task due to the high amount of computation work.

Since it is to be expected that UNIDO's future work in the field of feasibility studies will further grow, the development of a computer programme is of utmost importance. In addition, as UNIDO-sponsored feasibility studies are in future to be prepared in accordance with the Manual, it will be of great help to have easy access to a computer programme. The COMFAR is designed to be transportable and to be run on personal computers with the intention of utilizing it not only at UNIDO Headquarters in Vienna, but also, much more importantly, by consulting firms carrying out studies in the field or by UNIDO-sponsored Industrial Project Planning Centres set up in the developing countries. To achieve this objective, it is necessary to provide consulting firms conducting pre-investment studies on behalf of UNIDO with the programme software and occasionally even with a personal computer on a loan basis in order to carry out all the required computations already in the field. Industrial Project Planning Centres are to be supplied with personal computers to be able to run the COMFAR by themselves.

The COMFAR Programme package is an important tool for the project analyst who wants to prepare and evaluate industrial investment projects and to use computer power for preparation of cashflow tables, balance and income statement projections following the guidelines described in the UNIDO Manual for the Preparation of Industrial Feasibility Studies.

The computer novice can easily learn to use the full power of COMFAR because the programme package is designed to be user-friendly, to operate in a dialogue mode and to guide the user through the three following subsections: DATA ENTRY, COMPUTATION OF RESULTS and PRINTING OF SCHEDULES. The programme will check the data input and subsequent computations and provide useful prompting messages, and protect the files from unintentional change.

The COMFAR programme is designed to be used on a personal computer and due to its modular structure and segmentation its operation and control are nearly as comfortable as on large-EDP systems.

COMFAR is a cashflow-oriented model and the user can simulate cash outflows and inflows of an industrial investment project in accordance with the method described in the UNIDO Manual. During the first subsection COMFAR requests on the computer terminal screen DATA ENTRY under programme control, it rejects wrong answers and ensures that all basic data required for the following computations are saved in an external data file. This file can be updated or modified and used again for computation of alternatives and sensitivity analysis.

Starting from the data file the COMFAR programme produces a complete cashflow-oriented RESULT TABLE, which contains all variables produced by module programmes: INITIAL and CURRENT INVESTMENT, SALES AND PRODUCTION PROGRAMME, COST ACCOUNTING, CASHFLOW DISCOUNTING procedures. COMFAR is a very flexible tool for financial and economic analysis of industrial projects. Based on few essential input data, it provides provides procedures such as separate planning of local and foreign cashflows in local and foreign currencies, respectively, planning of cashflows in half-year periods during construction (pre-production phase) and automatic computation of a finance scheme.

The COMFAR will enable teams of project planners to compute alternatives of components of a feasibility study as well as of an entire project while working on the study. By applying the computer programme, feasibility studies become more transparent and allow the calculation of project alternatives already during the planning stage.

The programme is conceived in such a way that it will be attractive not only to the consulting firms but also equally attractive to sponsoring institutions and investors. Since UNIDO-sponsored feasibility studies may be more attractive for investors and sponsors if prepared jointly, the computer programme will be of great promotional help if project alternatives can be computed jointly with the investors and the financing institutions.

The COMFAR will also be of great help during UNIDO's seminars and workshops in project preparation, evaluation, financing and contract negotiation.

When developing the Computer Model for Feasibility Analysis and Reporting, the following tasks were carried out:

- preparation of a systems analysis;
- selection of a programming language;
- selection of computer hardware;
- preparation of a detailed programming and data processing design;
- development of actual computer programme.

For computers of any size the choice of a programming language has to be made. The questions to be addressed are:

- power of the language especially related to computations and to I/O features;
- standardization of the language, ease of documentation and structuring;
- safety of the programming language;
- programming productivity;
- independency from a particular manufacturer.

In summary, the Computer Model for Feasibility Analysis and Reporting (COMFAR):

- facilitates the fast computation of the statements needed for economic and financial analysis of feasibility studies;

- facilitates the quick approach to optimum solutions;

- enables the performance of sensitivity analysis in order to determine dependencies on input values obtained or available with broad error;

- enables easy access to computer resources;

- may be handed over to other organizations or consulting firms without major difficulties;

- supports the promotional activities related to industrial studies to be performed in developing countries.

FIGURE I

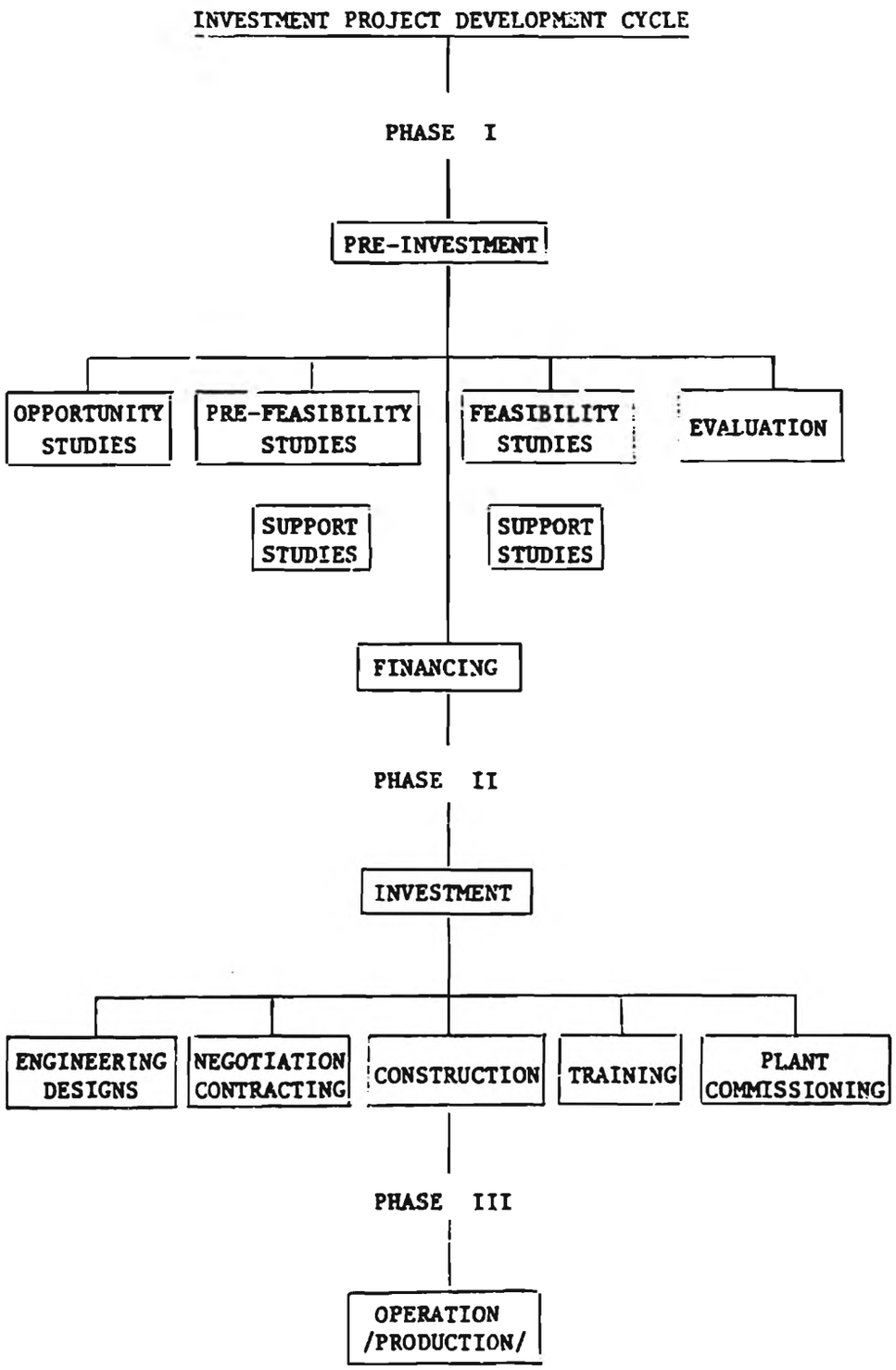
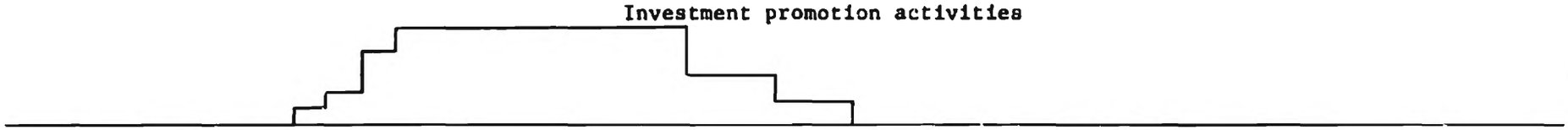
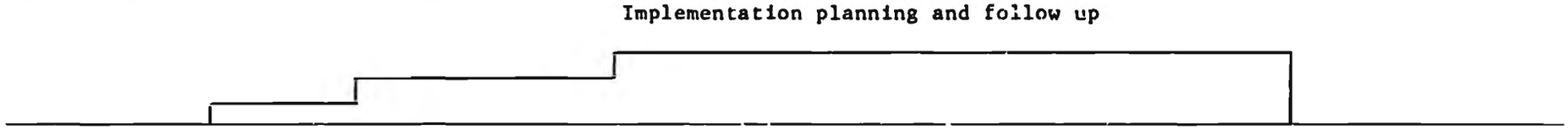

INVESTMENT PROJECT DEVELOPMENT CYCLE
PHASE I
PRE-INVESTMENT
OPPORTUNITY STUDIES
PRE-FEASIBILITY STUDIES
FEASIBILITY STUDIES
EVALUATION
SUPPORT STUDIES
SUPPORT STUDIES
FINANCING
PHASE II
INVESTMENT
ENGINEERING DESIGNS
NEGOTIATION CONTRACTING
CONSTRUCTION
TRAINING
PLANT COMMISSIONING
PHASE III
OPERATION /PRODUCTION/

FIGURE II

PROJECT DEVELOPMENT CYCLE

PRE-INVESTMENT PHASE				INVESTMENT PHASE				OPERATIONAL PHASE
Identification of investment opportunities (project ideas)	Preliminary selection stage (Pre-feasibility study)	Project formulation stage (Techno-economic feasibility study)	Evaluation and decision stage (Evaluation report)	Negotiation and contracting stage	Project design stage	Construction stage	Start-up stage	





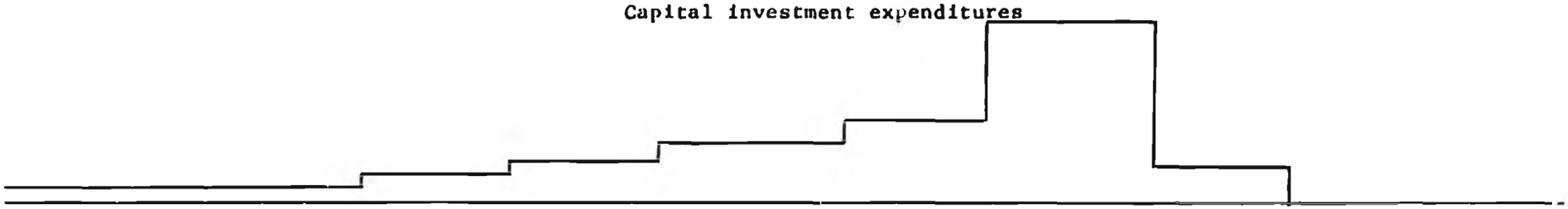


FIGURE III

TYPES OF DECISIONS TO BE TAKEN DURING DIFFERENT PRE-INVESTMENT STAGES

Decision	Analysis tool study	Decision goal
Identification	General or project opportunity studies	Identify opportunity. Determine critical area for support studies. Determine area for pre-feasibility or feasibility studies.
Preliminary analysis	Support studies	Determine which of the possible choices is the more viable. Identify the choice of project criteria.
	Pre-feasibility studies	Determine provisional viability of the project. Appraise if the feasibility study should be launched.
Final analysis	Support studies	Investigate in detail selected criteria requiring in-depth study.
	Feasibility study	Make final choices of project characteristics. Determine the feasibility of the project and selected criteria.
Project evaluation	Evaluation study	Make final investment decision.

FIGURE IV

STANDARD FORMAT OF THE TABLE OF CONTENTS OF A FEASIBILITY STUDY

1. Executive summary

2. Project background and history

3. Market and plant capacity
   - Demand and market study
   - Sales and marketing
   - Projection programme
   - Plant capacity

4. Material inputs
   - Materials and inputs
   - Supply programme

5. Location and site
   - Location
   - Plant site and local conditions
   - Environmental impact

6. Project engineering
   - Layout and physical coverage of project
   - Technology and equipment
   - Civil engineering

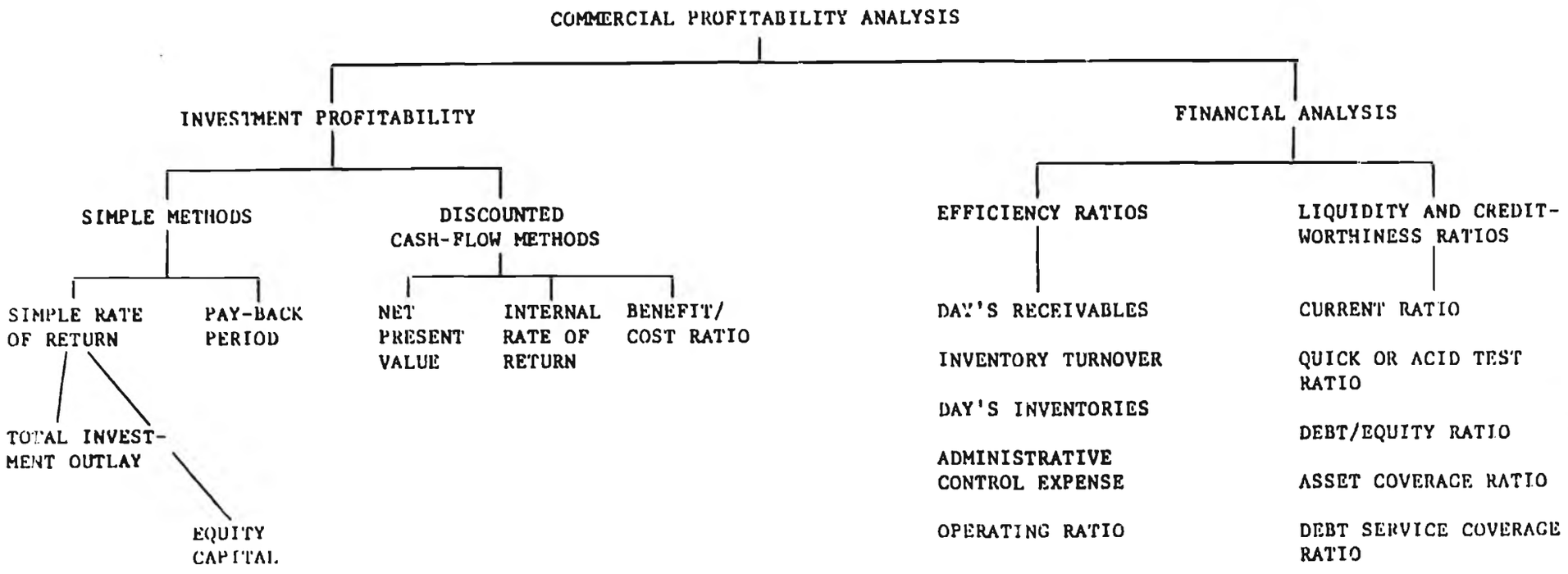
7. Plant organization and overhead costs
   - Plant organization
   - Overhead costs

8. Manpower
   - Labour
   - Staff

9. Project implementation

10. Financial and economic evaluation
    - Total investment outlay
    - Project financing
    - Production cost
    - Commercial profitability
    - Socio-economic evaluation

FIGURE V


COMMERCIAL PROFITABILITY ANALYSIS
INVESTMENT PROFITABILITY
FINANCIAL ANALYSIS
SIMPLE METHODS
DISCOUNTED CASH-FLOW METHODS
EFFICIENCY RATIOS
LIQUIDITY AND CREDIT-WORTHINESS RATIOS
SIMPLE RATE OF RETURN
PAY-BACK PERIOD
NET PRESENT VALUE
INTERNAL RATE OF RETURN
BENEFIT/ COST RATIO
TOTAL INVEST-MENT OUTLAY
EQUITY CAPITAL
DAY'S RECEIVABLES
INVENTORY TURNOVER
DAY'S INVENTORIES
ADMINISTRATIVE CONTROL EXPENSE
OPERATING RATIO
CURRENT RATIO
QUICK OR ACID TEST RATIO
DEBT/EQUITY RATIO
ASSET COVERAGE RATIO
DEBT SERVICE COVERAGE RATIO